

A STUDY OF THE FOOD GROUP DISTRIBUTION  
PATTERNS OF CHILDREN,  
GRADES 7-12

BY

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## CHAPTER I

### INTRODUCTION

Because of their complexity and variability, physical fitness and health must be uniquely defined by each person. Yet various reports suggesting that from 400 to 500 million persons are affected by malnutrition describe the global proportions of this social concern (Kreutler, 1980).

Ironically, twentieth century technology, while making significant contributions to health by increasing the longevity of human beings, has further complicated the definition. No longer can health be measured or defined by remedial or quantitative methods alone. Some qualitative dimensions of social and psychological significance such as accomplishment, enjoyment, and appreciation are beginning to be superimposed on life's chronological yardstick.

Much of a healthful life-style is nutrition-dependent. From the smallest social unit, family, to the largest social unit, nation-state, food-related activities are prominent in evaluative criteria. The World Health Organization (WHO) of the United Nations, the United States Department of Agriculture (USDA), and the Senate Select Committee on Nutrition and Human Needs are some of the diverse political groups addressing the nutritional health concerns of population

groups. Numerous ongoing studies by these and other governmental agencies have shown strong positive correlations between the quality of the diet and the quality of living throughout the developmental process.

Researchers point out that cultural influences play an important role in the dietary patterns that have been described for various population groups (Lowenberg, Todhunter, Wilson, Savage, and Lubawski, 1974). Historically the types and quantities of foods eaten were rather narrowly determined by geographic and climatic conditions. Diet histories have documented incidences of malnutrition caused by regional food preferences and availabilities, especially in low-income groups (Ten State Nutrition Survey, 1972). Education and technology have been the tools through which any undesirable imbalance in food consumption was quantitatively and qualitatively redressed. These strategies are employed by both the family and the school.

Recommended food consumption patterns have been taught since the 1950's by the use of a succession of food group strategies (Briggs and Calloway, 1979). The USDA'S Basic Four Food Groups, the Senate Select Committee's Dietary Goals, and the new Dietary Guidelines from USDA have emphasized knowledge of "what" foods or food types to eat. Unfortunately, strong evidence exists that children rarely alter their eating pattern because of an increase in nutrition knowledge (Head, Giesbrecht, and Johnson, 1977). The "when" of balanced food consumption is of equal importance. Mealtime is one of the first socializing

processes. It is the framework of time that is the dominant organization of principle in a culture (Hall, 1977). This concept of time, based on a natural series of rhythms associated with daily (or monthly or annual) cycles, has been largely overlooked by nutrition researchers. For much of the third world where quantities are still the primary concern, one meal per day may mean the difference between survival and death. For the United States of America and other developed countries, however, snacks are eaten as frequently as any one meal. So called "low-nutrient density" or empty calorie snacks containing high proportions of fat and/or sugar are often eaten in addition to regular meals. This food consumption pattern may contribute to the health problems associated with obesity, cardiovascular disease and premature aging and death (Stunkard, 1976).

It is equally undesirable to crowd a large proportion of the daily food intake into a short time space (Leverton, 1967). The natural time cycle of food consumption is one which provides nutrients at a relatively steady rate in direct relationship to the level of physical activity. Natural time cycles are increasingly ignored as lifestyles are altered to fit the mechanical model of industrial society. Fabry, Hejda, Cerny, Osancova, Pechar and Zvolavkova (1966) show the risk of obesity actually increases with the decrease in meal frequency for children 10-16 years of age.

In the continuing effort to construct guidelines for the establishment of desirable eating patterns, it is necessary to determine an existing pattern or patterns.

The U.S. Congress included a needs assessment in the 1977 Amendment to the Child Nutrition Act, PL 95-166, which allowed each state to identify specific nutrition education training needs. Any differences between the optimal and the existing patterns were thus exposed for remedial and preventative educational measures.

In the Oklahoma Needs Assessment (Baird, 1979) it was concluded that adolescents need nutrition education to increase their knowledge of what to eat for optimal health benefits. The needs assessment process could also indentify discrepancies between optimal and existing time frames of food group ingestion. Identification of problem dietary habits of children and designation of those areas where nutrition education might assist in positive changes is one of the identified foci of the needs assessment. Dietary patterns which showed consistent delay or omission of any meal or food group, would be amenable targets for nutrition educators.

#### Statement of Problem

Little research has been done concerning the relationship between the frequency or time of eating and dietary adequacy by food group. Although the School Lunch Program has been in effect since 1946, and was augmented by the School Breakfast Program in 1973, snacking may account for as much as one-third of a teen's total energy intake (Kreutler, 1980).

This study is concerned with the mealtime pattern of food group consumption of selected Oklahoma school children in grades 7-12, representing a subculture approximately 300,000 strong. According to the 1978-1979 Annual Report of the Oklahoma State Department of Education (Baird, 1979), an average of 349,321 luncheon meals was served daily during October 1978 and March 1979. School lunch participation by grades 7-9 closely approximated the overall state average of 63.5 percent. Grades 10-12, however, had the lowest participation rate, only 36.9 percent.

#### Purpose

As the ability of the body to maintain its functional integrity even in the presence of inadequate supplies is as much concerned with "when" food is eaten as "what" food is eaten, the author will seek to determine that "when" of food group eating patterns of selected Oklahoma school children to accompany the "what" already investigated.

#### Objectives

The objectives of the study are:

1. To determine the percentage of students by sex who attained the food intake distribution patterns defined as acceptable by this study.
2. To determine the percentage of students in grades 7-12 who attained the food intake distribution patterns defined as acceptable by this study.
3. To determine the number and choice of the Basic

- Four Food Groups provided by breakfast of selected students by sex and grade levels 7-9 and 10-12.
4. To determine the number and choice of the Basic Four Food Groups provided by lunch of selected students by sex and grade levels 7-9 and 10-12.
  5. To determine the number and choice of the Basic Four Food Groups provided by the evening meal-plus-snacks of selected students by sex and grade levels 7-9 and 10-12.
  6. To make recommendations for further study.

### Hypotheses

For this study, the following null hypotheses are to be tested:

- H<sub>1</sub>: There will be no significant difference in the food group distribution patterns by sex of students.
- H<sub>2</sub>: There will be no significant difference in the food group distribution patterns of students by grade level.
- H<sub>3</sub>: There will be no significant difference in the number and choice of food groups provided by breakfast of students by sex and grade levels 7-9 and 10-12.
- H<sub>4</sub>: There will be no significant difference in the number and choice of food groups provided by lunch of students by sex and grade levels 7-9 and 10-12.
- H<sub>5</sub>: There will be no significant difference in the

number and choice of food groups provided by the evening meal-plus-snacks of students' by sex and grade levels 7-9 and 10-12.

#### Data Source

The data utilized to accomplish the objectives was obtained from the 1979 Nutrition Survey conducted by Oklahoma State University (Baird, 1979). Students in 385 classrooms from grades 1-12 provided information related to meal patterns and foods consumed in the 24 hours preceding the survey. Level 3 (grades 7-9) and Level 4 (grades 10-12) compose 50.4 percent of the entire survey of 7,588 students, or 2,159 students in grades 7-9 and 1,663 students in grades 10-12.

#### Limitations

The following limitations are acknowledged by the researcher. The study is limited to:

1. Students selected from schools within the State of Oklahoma.
2. The student's memory of what they ate for the period preceding 24 hours.
3. The student's memory of the meal-associated time that food was consumed.
4. Surveys conducted on a Tuesday, Wednesday, or Thursday.

## Assumptions

The assumptions of this study were:

1. that all responses were truthful and not purposely biased or slanted.
2. that students were capable of understanding the questionnaire.
3. that the "Basic Four Food Groups" is an accepted contemporary standard used to model and evaluate dietary behavior.

## Definition of Terms

The following definitions are given in order to clarify specific meanings for this study:

Basic Four Food Groups: A food plan constructed to meet nutrient needs, with the exception of calories, and specifically adapted to common dietary practices of the American population.

Food Group	Recommended Number of Servings	
Milk (1 cup milk, yogurt or calcium equivalent)	Children	3 or more
	Teenager	4 or more
	Adult	2 or more
Protein-Meat (2 ounces cooked lean meat, fish, poultry or protein equivalent)	Children	2 or more
	Teenager	2 or more
	Adult	2 or more
Fruit-Vegetable (Dark green leafy, or orange vegetables and fruit are recommended 3 or 4 times weekly for Vitamin A. Citrus fruit or other high Vitamin C food is recommended daily for Vitamin C)	Children	4 or more
	Teenager	4 or more
	Adult	4 or more

Bread-Cereal (Whole grain, fortified, or enriched grain products are recommended)	Children	4 or more
	Teenager	4 or more
	Adult	4 or more

Acceptable Dietary Pattern: A ranking pattern of food consumption over time which is based on the Basic Four Food Groups; used in this study for criterion in evaluating all meals, whether breakfast, lunch, or dinner-snack:

<u>A</u>	No food group missing, with the exception of breakfast when omission of the protein/meat group still qualifies the dietary behavior as most complete
<u>B</u>	One food group missing
<u>C</u>	Two food groups missing
<u>D</u>	Three food groups missing
<u>E</u>	Four food groups missing

### Summary

According to a Hoffman-La Roche, Incorporated (1978) study, 69 percent of the students surveyed believed nutrition to be very important to their families, although they exhibited poor eating habits. Healthful nutrition practice is a complex concept investigated by many disciplines. Food group strategies used as educational tools for almost forty years to improve the nutritional status and health of populations have been primarily concerned with the "what" of food consumption. The question of "when" and the "meal-association" of food group consumption seems a pertinent sequential consideration.

## CHAPTER II

### LITERATURE REVIEW

Since the body is dependent on a regular supply of nutrients, intricate biochemical mechanisms have evolved to regulate the availability of the nutrients to the cells so that the organism can adjust to a wide range of intakes (Scrimshaw and Young, 1978, p. 158).

Choices are made when the food supply is plentiful enough to permit them. In the United States choice is extended to the number and times food is eaten daily. Just as the imagery and symbolism connected with food are important cultural factors in diet selections, variegated food consumption spaced throughout the day could do much to ensure optimal nutrition.

The limitation of food choices and meal times characteristic of scarcity has been adopted by many citizens. This is demonstrated by the feast-or-famine dietary behavior of many adolescents (especially females), or the claims of "health food" merchants for their miracle foods. The consequences of such action would seem to be maladaptive. Solutions for these possible harmful consequences are a remedial aspect of research. Most social programs of the last 40 years have dealt with this outcome as one of habit reformation (Gifft, Washbon, and Harrison, 1972).

The culturally diverse North American recommended dietary patterns are based on the assumption of essential nutrient content. The general nutritional status of most people has been described as good. The fact that malnutrition still exists, partly because people do not act on their nutrition knowledge, creates a continuing challenge to nutrition educators and policy-makers.

Research pertinent to this study is given in this chapter and is organized in the following manner: nutritional assessment, adolescent nutritional needs and food patterns, and the need for nutrition education.

### Nutritional Assessment

#### Methods

Researchers identify health problems associated with nutrient deficiencies by status assessment. The effectiveness of various feeding programs has also been evaluated by the same methodology. Of the four methods used to assess nutritional status--anthropometric, clinical, biochemical, and dietary--the Oklahoma Needs Assessment (Baird, 1979) focused on the dietary.

Dietary behavior, that is the food and nutrient intake of individuals and groups, is determined by dietary surveys. Kreutler (1980, p. 406) states, "Dietary surveys are the only method by which actual intake can be assessed, and they can confirm or deny suspicions raised by other methods of assessment." It is generally agreed that the dietary

survey measures and allows the researcher to evaluate current food intake.

There are four commonly used methods of recording food intakes. The most expensive and time consuming method, that of weighed intake, provides a very accurate record. It is the preferred procedure in laboratory-controlled studies where the researcher assumes responsibility for the tediousness (Pike and Brown, 1975).

The food record method, while less expensive than the weighed intake, also requires relatively long periods of time. Written records of food consumed are kept by the subject for various lengths of time, typically three to seven days. Eppright (1952) felt that dietary records more accurately depicted the food intake of groups than of individual subjects. Gersovitz, Madden, and Smiciklas-Wright (1978) attempted to test the internal validity of the seven-day food record. They found that although the means did not differ to a significant degree, the food record tended to understate the actual intake of a group of elderly subjects. The number of usable records also declined after the fourth day.

Another survey technique, the diet history, is designed to determine a subject's usual dietary behavior. Morgan (1962) reported that dietary histories were more accurate than food records for the same subjects. Diet histories are usually obtained by interview or questionnaire and require skilled interviewers to maintain validity (Pike et al., 1975). This method is also useful in determining frequency of intake

of groups of foods.

The remaining technique used in individual dietary surveys is the recall, and it is almost always for a 24-hour period only. As Huenemann (1973, p. 38) points out ". . . dietary intake studies, valuable as they are, are not by themselves a valid measure of nutritional status." They can aid in the detection of possible dietary lacks or excesses and the evaluation of programs. Although Campbell (1963) concluded that more research was needed regarding the reliability of the 24-hour recall method, it has continued to gain in acceptance because of its simplicity and ease of use with large population groups. A few studies have assessed the internal validity of the 24-hour recall survey method.

Gersovitz and others (1978) suggest that both the 24-hour recall and the seven-day dietary record are approximately equal representative estimates of dietary intake when analyzed by the statistical procedure, paired-t. The procedure, linear regression, however, ". . . suggests that the recall is prone to over-reporting low intakes and under-reporting high intakes" (p. 54). This could be a disadvantage that no researcher should ignore when evaluating a nutrition intervention program.

In a comparison of actual with recalled intakes for eight nutrients and the mean adequacy ration, Madden, Goodman, and Guthrie (1976) tested the validity of the 24-hour dietary recall of 76 elderly subjects. They concluded that if a significant difference between two

groups within the sample was determined by recalled data, it tended to be statistically conservative. By paired-t test, no significant difference was found between mean recall and mean actual intake of the nutrients with the exception of calories. However, by regression analysis, a statistically significant difference was found regarding three of the nutrients, calories, protein, and vitamin A. Small intakes tended to be over-reported while large intakes were under-reported.

In an effort to simplify dietary assessment based on 24-hour recalls, Bowering, Morrison, Lowenberg, and Tirado (1977) compared the "food group approach" with the "nutrient approach." Data on 119 pregnant women, ages 14 to 44 years, were obtained by nutritionists in a clinic situation, and were analyzed for both 1) content of nine nutrients and 2) contribution to the USDA Four Food Groups. A dietary assessment procedure based on the USDA Four Food Groups yielded the same fundamental conclusions regarding initial dietary status. The results also

suggest that for the purposes of assessing changes in food intake in response to nutrition intervention, the use of food groups rather than nutrients may be satisfactory (p. 23).

Researchers choose the appropriate methodology for collecting data and the means of analyzing that data. Dietary standards for comparative measurement are then selected. The evaluation of dietary or nutritional adequacy from food consumption data was one of the primary uses of the Recommended Dietary Allowances of the Food and Nutrition

Board, National Academy of Sciences-National Research Council (1974, revised 1979). The Recommended Daily Allowances (RDA) are not absolute and are intended for use when dealing with groups of people. They are set at levels high enough so that adequacy can be assured for practically all healthy Americans. These allowances are revised on a regular basis to incorporate current nutritional knowledge advances. A population group is considered at risk of nutritional deficiency when intakes of one or more nutrients are less than two-thirds of the RDA.

#### Assessment Results

Two attempts have been made to assess the nutritional status of the United States population. They are the Ten-State Nutrition Survey and the U.S. Health and Nutrition Examination Survey (HANES). The final report on the Ten-State Nutritional Survey was sent to Congress in the summer of 1972. The conclusions reached by the survey were the results of data collected in 1968-1970. The sample for the HANES included persons from thirty-four states and the District of Columbia. They were examined from April 1971 through June 1974. The data generated are still being analyzed.

The premise that malnutrition is more prevalent in the low-income population provided the emphasis for the Nutrition Program of the Department of Health, Education, and Welfare (Ten State Nutrition Survey, 1972). Based on the 1960 Census, the sample is

geographically representative of the major areas of the country, the broad diversity of economic, ethnic, and sociocultural composition (p. 5).

The survey thus was limited to the states of California, Kentucky, Louisiana, Massachusetts, Michigan, New York (plus a separate survey of New York City), South Carolina, Texas, Washington, and West Virginia. Of the more than 86,000 persons from whom demographic data were obtained, approximately 40,000 persons were evaluated for nutritional status. The adolescent was one of the high-risk subgroups selected to receive more detailed biochemical and dietary evaluation.

Because the social, cultural, economic, and ethnic characteristics of a population influence the problem of malnutrition as well as its solution, it is often difficult to generalize from one geographic area to another. However, the survey showed incidence of malnutrition in increasing order from white persons to Spanish-Americans to blacks. Malnutrition also seemed to increase as income decreased. In all ethnic groups the 10-to-16-year-old adolescent had the most unsatisfactory nutritional status (Ten State Nutrition Survey, 1972).

Poor food choices may partially explain the inadequacy of the surveyed diets. The number of years of school completed by the person who usually bought and prepared the family food affected the nutritional status of children under the age of 17. The inference is both qualitative and quantitative, in that a substantial number of adolescents had caloric intakes below accepted dietary standards. At

the same time adolescents exhibited poor dental health associated with the pattern of between-meal snacks of highly refined or processed carbohydrate foods. The large numbers of overweight and underweight adolescents are problems of high nutritional significance because of the disease association of both conditions (Ten State Nutrition Survey, 1972).

For many school children, particularly black children, school lunch programs supplied a considerable proportion of their total daily nutrient intake. This was especially true in Kentucky, Louisiana, South Carolina, Texas, and West Virginia. The wide-spread problem of iron deficiency anemia exposed by the Ten State Nutrition Survey was alleviated for many children 10-16 years of age by school lunch programs that supplied 20-35 percent of the recommended allowance for this nutrient. As much as 45 percent of the RDA for Vitamin A and 50 percent of the RDA for calcium was contributed to the adolescent diet by school lunch programs (Ten State Nutrition Survey, 1972).

Whereas the Ten-State Nutrition Survey focused on the extent of malnutrition in low-income populations, the U.S. Health and Nutrition Examination Survey (HANES) attempted to assess the nutritional status of a more representative sample of the U.S. non-institutional population. Over 20,000 persons age one to seventy-four years from 34 states and the District of Columbia provided the dietary records from which the nutritional value and the frequency with which certain food groups were eaten, the numbers of meals

or snacks consumed, places where food was eaten, and the use of table salt. Preliminary findings confirm the iron deficiency shown by the Ten-State Nutrition Survey to be generally present in all age groups (Abraham, Lowenstein, and Johnson, 1974).

### Nutritional Needs and Patterns of of Adolescents

It has long been recognized that a good diet promotes a general sense of well-being in all ages. Because adolescence is a period of rapid physical development second only to the growth rate of infancy, the impact of nutrition is a critical factor. Closely related to socioeconomic status, nutrition may play a permissive role. "As most children have adequate amounts of foods, they achieve their full growth potential" (Heald, 1973, p. 18).

The dramatic changes of adolescence are obvious ones. The increase in height, changes in body composition usually defined by weight gain, and sexual maturation create great demand for nutrients. The term "adolescence" describes a stage of development which includes two or three periods (Valadian, 1973; Briggs and Callaway, 1979; Pipes, 1977).

Prepubescence is the initial period. This period is characterized by changes in the endocrine system that result in cellular changes. However, these alterations to the body are predominantly chemical ones invisible to the observer's eye (Valadian, 1973; Hurst, 1977).

Postpubescence is the period of deceleration of growth.

During this interval, covering at least two to five years, more muscle growth and the maturation of sex organ function occurs (Valadian, 1973). Although these growth stages have been reduced to the lowest common denominator, chronological age ranges, it should be remembered that these are averages. Within the chronological groupings there are various maturational or biological age groups.

The growth spurt associated with the central period of adolescence, pubescence, begins at about 10 to 12 years of age for females. On the average the same growth spurt occurs about two years later in boys. Changes in weight occur before changes in height, but tend to vary irregularly. The height growth spurt is more abrupt and provides an easier way to recognize the onset of puberty (Valadian, 1973).

Rapid growth makes the adolescent more vulnerable to the environment. Mitchell (1964) found that the severely restricted nutrient intake of Japanese children during World War II was most apparent in adolescence. Fourteen-year-old boys and twelve-year-old girls exhibited the greatest loss of stature. With the post-war return to a more adequate dietary intake, stature increased rapidly and steadily.

Hampton, Huenemann, Shapiro, Mitchell, and Behnke (1966), in a four-year study of approximately 1,000 teen-agers, found a large increase in the lean body weight of boys up to age 17. They found smaller increases in the lean body weight of girls up to age 17. From the eleventh to the twelfth grades boys' body fat increased, but girls'

body fat decreased. In girls the body fat had increased from the tenth to the eleventh grades. The authors attributed the increase in the girls to normal development and the decrease to a possible voluntary weight reduction effort.

Huenemann et al., (1966) questioned their subjects about eating practices. They found that dinner was the preferred meal. Although more girls than boys chose lunch, breakfast was nearly as popular as lunch with boys. This was not so with girls. The primary reasons for meal preference given by students were: breakfast's effect in providing energy, the company of friends at lunch, and the food at the dinner meal. Nearly 65 percent of the students rated the healthfulness of their own diets as good to excellent. However, of those who ". . . rated their diets as excellent, 66 percent mentioned milk, 85 percent fruits and vegetables, 83 percent meats, and 43 percent cereals" (p. 331) as foods that should be eaten every day.

Several studies have shown a positive relationship between nutrition knowledge and good food practices (Hinton, Eppright, Chadderdon, and Wolens, 1963; Eppright, Fox, Fryer, Lamkin and Vivian, 1970). Because only about half the teenagers studied by Huenemann et al. (1966) named all four basic food groups, that popular nutrition education strategy seems to be unavailable nutrition knowledge to many adolescents.

Actual daily food intake is influenced by feelings of hunger. When asked the time of day when they were most

hungry, girls checked 12:00 noon, and boys checked 12:00 noon and 6:00 P.M. with equal frequency (Huenemann et al., 1966). Since 46.9 percent of the boys and 33.5 percent of the girls indicated they were hungry all or most of the time, some control factor such as knowledge or time was functioning to regulate their dietary intake.

The study by Hampton, Huenemann, Shapiro, and Mitchell (1967) supported the popular conception of the teenager as a snacker. Although the range of eating frequency was from two to six times a day, those subjects who ate more frequently tended to have generally good diets. Dietary records kept by 122 subjects over four weeks during 1963, 1964, and 1965 showed the dairy food group contributed the most calories per day for half of the days. These researchers included butter and cream, as well as ice cream, in the dairy food group. The meat group contributed the most calories one-fifth of the days. Dessert-type foods, candies and other sweets, and breads and pastas were major contributors of calories on approximately 25 percent of the days. Those boys and girls classified as obese by the researchers ate less frequently than the others, tended to skip meals more frequently, and ate something from the fruit and vegetable food group on fewer days than the students classified as average or lean. The mean nutrient intakes of iron and calcium were below two-thirds of the 1964 Recommended Dietary Allowances for girls. The same nutrients in reverse order were low for boys. The next lowest nutrients were ascorbic acid for both sexes and vitamin A for girls.

In another report by Huenemann et al., (1968), those students who preferred dinner were less likely to skip other meals. They found ". . . that those adolescents who ate regular structured meals, usually augmented by snacks, tended to have better nutrient intakes than the irregular eaters" (p. 24). The milk group and the protein group were leading contributors of calories for both sexes in all body fat classes. The fruit and vegetable group was not so regularly consumed.

Milne, Kerr, Truenholme, and Beaton (1963) and AuCoin, Haley, Rae, and Cole (1972) surveyed and analyzed the eating habits of 248 and 435 Canadian teenagers respectively. Milne et al., reported that the nutrient intakes of boys were consistently higher than those of girls. However, AuCoin et al., found that food intakes of their sample were not significantly affected by the student's sex. Quantity of food eaten and the pattern(s) of food chosen were co-factors in diet evaluation. They concluded that if the

Pao (1980) reported teenage patterns and frequencies of eating from the 1977-78 Nationwide Food Consumption Survey (NFCS) relevant to dental health. Approximately 65 percent of the boys age 12-18 and 69 percent of the girls in the same age group reported eating three or four times a day. In this same age group 63 percent of the snacking occasions for boys occurred between 4:00 P.M. and 12:00 A.M. Nearly 67 percent of the snacking occasions occurred during the same time period for girls. Pao found that the respondents'

reported eating three or four times a day. Nealy 67 percent of the snacking occasions for girls age 12-18 and 63 percent for boys age 12-18 occurred between 4:00 P.M. and 12:00 A.M. Respondents' food patterns of meals were in sharp contrast to those of snacks. Table I summarizes the responses obtained in the Nationwide Food Consumption Survey, spring 1977 (Pao, 1980).

TABLE I  
PERCENTAGE OF CHILDREN, AGE 12-18, EATING SPECIFIED  
FOOD GROUPS<sup>1</sup>

Food Group		Boys	Girls
Milk	B*	73	68
	L	50	41
	E	48	39
	S	36	29
Bread/Cereal	B	103**	88
	L	85	79
	E	76	71
	S	38	33
Protein/Meat	B	48	40
	L	104**	101**
	E	102**	102**
	S	21	18
Fruit/Vegetable	B	7	6
	L	68	16
	E	100	98
	S	17	19

\*B-breakfast, L-lunch, E-evening meal (dinner and/or supper)  
S-snack

\*\*Percentages total more than 100 percent because students could check more than one response.

<sup>1</sup> 1977 data from Pao (1980)

Jakobovits, Halstead, Kelley, Roe, and Young (1977) studied the nutrient intakes and frequency of food intake of a group of college women. They compared nutritional habits of students a generation apart and found that the college women ate more often than the teenage girls of the Huenemann et al., (1968) study. The mean intakes of the group showed that with the exception of energy, thiamin, and iron, the 1974 RDA's were exceeded. The women ate an average of 5.14 times a day, and evening was the most popular time for snacking.

Animal studies have demonstrated that metabolic changes occur when long time intervals separate large intakes of food. Fabry, Hejda, Cerny, Osancova, Pechar, and Zvolankova (1966) investigated the probable significance in the human population. From January 1964 to January 1965, 226 students in three boarding schools were studied. School A served three meals per day, school B served seven meals per day, and school C maintained the original pattern of five meals per day. Although no significant differences were found among the younger children (boys 6-11 and girls 6-10 years) in the three schools, an inverse relationship between the number of meals per day and over-weight was found in the older children (boys 11-16 years and girls 10-16 years). The older boys, and especially the older girls, tended to form and deposit more fat reserves when eating three meals per day as compared to those subjects eating five or seven meals per day. This data supported findings from an earlier study of 379 men aged 60-64 by Fabry, Hejl, Fodor, Braun, and

Zvolankova (1964) in which excessive weight, increased serum-cholesterol and diminished glucose-tolerance were more common among those who ate three meals per day (or less) than among those who ate five meals (or more) per day.

Several researchers have investigated the effect the breakfast meal has on human performance. Daum, Tuttle, Martin, and Myers (1950) examined the effect of four types of breakfasts on the physiologic response of ten university women aged 18-25. The resulting data showed that in 80 percent of the subjects, work output increased when food was consumed at breakfast time.

Tuttle, Daum, Larsen, Salzano, and Roloff (1954) investigated the effects of the omission of breakfast on boys aged 12-14. Although daily nutrient intake was consistent during both the basic and "no breakfast" periods, both maximum work rate and maximum work output were significantly less during the period when breakfast was omitted. The other physiologic responses tested, neuromuscular tremor magnitude, choice reaction time, grip strength, and grip strength endurance seemed unaffected by the omission of breakfast.

Thornton and Horvath (1963 and 1966) examined the effects on blood glucose levels of no breakfast, one breakfast, or two breakfasts. Young adults of both sexes and fourteen-year-old girls either ate breakfast or skipped the meal. Whereas the fasting blood glucose levels of the young adults stabilized (after an initial drop) above the fasting level, the blood glucose levels of the adolescents dropped consistently below the fasting levels. The subjects' glucose

response to the same test meal differed markedly. The young adults postprandial blood glucose level stayed above the fasting level throughout the 6 1/2-hour experiment. The teenagers' blood glucose rose briefly, returned to the fasting level in 2 1/2 hours and dropped below the fasting level for the remainder of the test period. The experimental breakfast provided 767 kilocalories and included one serving from the fruit/vegetable group, two servings from the bread/cereal group and two servings from the milk group. Although there was no meat item on the menu, ample protein was provided by the milk. By serving a second basic breakfast Thronton and Horvath (1966) noted

that the blood glucose curve remained above the fasting level 3 1/2 hours following the second breakfast, and it was significantly above the values observed for the same period when only one breakfast was eaten in the morning (p. 216).

This suggests that a dietary pattern of two successive meals, separated by short time intervals, would better satisfy physiologic energy demands of the body.

Included in the U.S. Department of Agriculture and Health and Human Services dietary guidelines is the recommendation to attain and maintain an appropriate body weight for height. The neglect of this goal has many disease implications. Excess body fat, obesity, is associated with cardiovascular disease, hypertension, gall bladder disease, maturity-onset diabetes, and various psychological aberrations. The achievement of this goal depends upon a dynamic equilibrium between energy intake and energy expenditure. Cohn (1961) states,

At birth, man is normally fed 'on demand' over a 24-hour period, but a number of factors, including convenience, custom, working conditions, habit, and 'togetherness' soon change him into a meal-eater (p. 434).

Cohn concluded that the periodicity of food ingestion influenced the manner in which the body utilized its daily ration of calories. Citing animal studies which showed rats fed twice daily were twice as fat as animals eating the same diet ad libitum, he suggested two requirements for the ideal nibbling diet for man. The two guiding principles suggested were:

(a) it must be adequate in protein, vitamins, calories, and essential fatty acids and (b) fat and carbohydrate must be ingested within a limited time period after the protein has been consumed, if nitrogen balance is to be attained (p. 435).

Gwinup, Byron, Roush, Kruger, and Hamwi (1963) also found correlations between pathogenesis of human metabolic states and meal patterns. Many studies have shown that animals develop hyperglycemia, hypercholesterolemia, and atherosclerosis in addition to becoming obese when the same diet is gorged as opposed to nibbled (Hollifield and Parson, 1962; Okey, Scheier, and Reed, 1960; Rakes, Lister, and Reid, 1961). Although changes in body weight were slight when the meal pattern of the human subjects was changed from three meals a day to nibbling (ad libitum), a prompt decrease in serum lipid levels was noted. When the meal pattern was changed from three meals a day to gorging (a single large meal eaten), there was a corresponding increase in serum lipid levels. No difference in the effect was noted because of sex.

Gwinup et al. (1963), in another report of the same

study, found the glucose tolerance curves distinctly lower during the nibbling phase of the experimental period. The glucose tolerance curve was highest in the gorging phase and intermediate when the subjects ingested three meals a day. It was recommended that the periodicity of the food ingested was a proper consideration in the administration of the glucose tolerance test as a diagnostic tool.

At a conference on "Nutrient Requirements in Adolescence," Hodges (1976) stated, "It almost seems that the only constant in evaluating adolescent food habits is continual change" (p. 127). Meal-skipping (particularly breakfast), eating away from home, adoption of periodic dietary fads and/or alternate dietary patterns characterize the adolescent's need for self-expression. The fruit/and vegetable group is obviously neglected by many. Although the probability is strong that an unbalanced diet will be eaten during this period, more information is needed in order to plan for the nutritional needs of this population segment.

The Oklahoma Needs Assessment Baird, (1979) received useable responses to a nutrition survey from 3,822 students in grades 7-12. General findings were:

1. Over one-fourth (29.6 percent) of the girls in grades 7-9 and over two-fifths (44 percent) of the girls in grades 10-12 reported eating no breakfast.
2. Nearly one-fifth (18.7 percent) of the boys in grades 7-9 and over one-fourth (29.0 percent) of the boys in grades 10-12 reported eating no breakfast.
3. Parents were considered by the students as their

primary source of nutrition information. Teachers ranked second; television ranked third.

4. One-third (33.5 percent) of the boys in grades 7-9 and over one-fourth (29 percent) of the boys in grades 10-12 achieved the Adequate Diet--Basic Four as defined by this study (three or more servings of the milk group, two or more servings of the meat group, three or more servings of the fruit/vegetable group, and three or more servings of the bread/cereal group).
5. Slightly more than one-fifth (21.4 percent) of the girls in grades 7-9 and only slightly more than one-tenth (11.5 percent) of the girls in grades 10-12 achieved the Adequate Diet--Basic Four described above.
6. Less than one-fifth (18.9 percent) of the boys in grades 7-9 and only about one-sixth (15.0 percent) of the boys in grades 10-12 achieved the more rigorous standards of the Adequate Diet--Basic Four + A and C (inclusion of one or more servings each of vegetables and/or fruits high in vitamin A or vitamin C in addition to the Basic Four food groups listed above).
7. Over one-tenth (11.8 percent) of the girls in grades 7-9 and approximately one-twentieth (5.6 percent) of the girls in grades 10-12 reported the Adequate-Diet--Basic Four + A and C.
8. Students in grades 7-9 most frequently "did not like

what was served" and, while students in grades 10-12 agreed, they also felt that "more fun to eat away from school" was sufficient reason for not eating the school lunch.

### The Need for Nutrition Education

The American Dietetic Association (1973) defined nutrition education as the

process by which beliefs, attitudes, environmental influences and understandings about food lead to practices that are scientifically sound, practical, and consistent with individual needs and available resources (p. 429).

This definition implies a certain degree of uniformity in the information and advice offered to the public on selection of food. If a diet is to be planned wisely, the planner must be able to work with food facts, not fancies. In this regard Richmond (1980, p. 91) also admonishes nutrition educators

to help people make food choices that will reduce their risk of heart disease and stroke, cancer, and diabetes--leading causes of death in this country.

Although the knowledge base for nutrition is often described in negative terms, current nutritional knowledge is deemed adequate to justify further public education efforts. A report of nine of the American Society for Clinical Nutrition (1979) senior members agreed to a dietary relationship of carbohydrates to dental caries; salt to high blood pressure; cholesterol and saturated fats to heart disease; excess calories to diabetes mellitus, high blood pressure, and heart disease; and of cholesterol alone to heart disease. According to Peterson (1980, p. 92)

Nutrition education is the sum total of the experience, knowledge, and skill possessed by the individual and family and used to translate health concerns into the act of buying and consuming food.

Thoughts (based on knowledge), attitudes and values, then actions and reactions are the elements in the behavior chain where the nutrition educator may successfully institute preventive or remedial change.

Since social learning plays a major role in dietary behavior, many studies have focused on the family experience as the first nutrition education for human beings. Mead (1962), as an anthropologist interested in food uses beyond physiological demands, concluded that the prevailing atmosphere during the principal family meal was instrumental in shaping the life attitude of children toward food. In a relaxed, happy environment, food habits of children lovingly fed became resistant to change.

During adolescence, teenagers may exercise their first independent eating decisions, many of which may not be wise. Huenemann (1972) found that overweight teenagers were much more likely than the normal-weight teenagers to have erratic eating patterns. They were more often breakfast-skippers and lunch-skippers. With ill-defined mealtimes in general, their food intake varied significantly in content and quantity daily.

Families in which there was some interpersonal disturbance tended to produce more overweight adolescents (Hammar, Campbell, Campbell, Moores, Sareen, Gareis, and Lucas, 1972; Hinton, et al., 1963; Kahn, 1970; Stanley, Glaser, Levin, Adams and Coley, 1970). Those families with interpersonal

disturbance tended to use mealtimes as times of family closeness less often than families with little interpersonal disturbance. The mothers, in families with interpersonal disturbance tended to use food as rewards for good behavior more often, than did the mothers in families with little interpersonal disturbance. If the family interaction was positive, the nutritional practices of teenagers tended to be good. The teenagers' nutritional practices were poor if family tension was high.

According to the Oklahoma Needs Assessment (Baird, 1979), 75 percent of the students in grades 7-9 ranked their parents first as reliable nutritional informants; 71 percent of the students in grades 10-12 ranked their parents first. Sixty-two percent of the students in grades 7-9 and 57 percent of the students in grades 10-12 ranked teachers second as a source of nutrition information.

The Oklahoma Needs Assessment (Baird, 1979) also included a questionnaire to a randomly selected sample of teachers. Most of the 390 respondents believed that students have poor nutritional habits. The teachers emphasized nutrition education topics such as eating a well-balanced diet and the importance of a good breakfast. Classification of foods according to four food groups was considered the most successful teaching method by those teachers currently teaching nutrition education. Only 57 percent, 222 teachers, ate the school lunch with the students more than one time per week. Since values are displayed by actions rather than words, it would seem that those 102 exemplary teachers who ate every day

with the students were the effective nutrition educators.

Food guides and food groups have been designed and promulgated for their ease and acceptability in educational efforts. Lowenberg (1974) believed that although cues to proper eating were learned early, they were no less transitory. If a change in dietary behavior was indicated, than those in whom change was desired need to become involved in the process early.

In 1942 the U.S. Department of Agriculture introduced a seven food group diet selection guide. Although it was much more simple than the guides which preceded it, Stare and McWilliams (1977, p. 7) stated that ". . . it soon became apparent that a system with seven categories still presented more of a challenge than most people wished to accept". This effort at mass public nutrition education used the concept of protective foods, that is classes of foods providing a larger proportion of the recognized needs for two or more nutrients than for energy. With that goal in mind the strategy was simplified from the Basic Seven to the Basic Four in 1955.

Translating the Recommended Dietary Allowances (RDA) into the four food groups of the Essentials of Nutrition (1957) has provided the best tool to date for use by the general public. The four food groups and the minimum number of recommended servings for adolescents included: (1) milk, four servings, (2) bread and cereal, four servings, (3) protein/meat, two servings, and (4) fruits and vegetables including citrus fruits and dark green leafy vegetables or

deep yellow-orange fruits and vegetables, four servings. This simplified guide was well accepted by the academic community and health professionals. It was utilized by elementary, secondary and college teachers. Since introduction of the Basic Four was in the 1950's, most, if not all, of the Oklahoma Needs Assessment subjects have been exposed to it all of their academic careers.

Simplification in the effort to gain acceptability incorporated some limitations. The Basic Four provided practically the full allowances of all nutritive essentials except energy. The model is only as "good" as the individual choices within the food group alternatives, the size of the portions chosen and/or the skill of the preparer (Briggs and Calloway, 1979). Nutrition education should be guided by the rule that "...the family diet should include a wide variety of natural foods chosen from among a number of food classes" (p. 454).

White (1976) perhaps summarizes best the need for nutrition education:

1. to equip one to make judicious food choices for health and well-being. Good nutrition is vital to the achievement of one's genetic potentials.
2. a good knowledge of nutrition is essential for the maintenance of health, especially when food habits temporarily or permanently deteriorate--as in dieting, illness, old age and poverty and when an educational base might fail leading to 'faddish' experimentation.
3. food and nutrition education is necessary for saving money and avoiding waste. In essence nutrition education relates scientific knowledge to the total strategy for survival.

4. nutrition education can be a great benefit to those in the lowest economic stratum. While not as important as financial resources, nutrition education can equip the person who finds himself economically deprived to make the most expeditious use of financial resources.
5. nutrition education is a base for the evaluation of food and nutrition information, both good and bad.
6. nutrition education is essential to reinforce or correct family teaching about food and nutrition (p. 54).

### Summary

Choice is the keynote in dietary behavior. Teenagers often do not make wise choices in either quantity or quality of their diet. Meals are skipped, delayed, or concentrated in one time period. The influence of such patterns on the adolescents' health, and the possible consequences later in their life of such dietary behavior has attracted much attention. Educational efforts have attempted to change undesirable dietary behavior through the development of simple, easy to implement cognitive aids. One of these tools, Essentials of Nutrition the Basic Four Food Groups, has been in use since 1957.

## CHAPTER III

### METHODS AND PROCEDURES

This study is an analysis of previously collected data that seeks to determine specific dietary behaviors of Oklahoma students in grades 7-9 and 10-12. The students were surveyed in the Oklahoma Needs Assessment in 1979 (Baird, 1979). Is there a pattern of food group ingestion peculiar to this age group? Is there a pattern of food group ingestion peculiar to the student's sex in this age group? Is the consumption of any food group significantly related to breakfast, to lunch, to the evening meal-plus-snack? This study will utilize only a portion of the larger research survey, which included all grade levels, in an effort to determine the relationship, if any, between food group ingestion and meal times during adolescence.

#### Type of Research Design

The data for this study were collected in 1979, using the survey research method, to assess the eating behavior of students in grades 7-9 and 10-12. The survey research method involves the collection and quantification of data of a sample from a population. The problems associated with sampling and then generalizing are great when the researcher

is dealing with the human population. "Survey research provides an excellent vehicle for the development of useful methods, and by extension, fuller understanding" (Babbie, 1973, p. 52). Elicited information concerning adolescent dietary behavior provides a description of one aspect of nutritional well-being of the sample. Correlations among the different responses reached by analysis are then generalizable to the adolescent population of Oklahoma.

#### Population Sample and Instrument Selection

The population for the Oklahoma Needs Assessment was chosen by a two-stage stratified cluster selection process from all public schools in Oklahoma, Spring 1979. According to Babbie (1973, p. 95) ". . . a stratified sample is likely to be more representative on a number of variables than would be the case for a simple random sample." From a compilation of all the school districts in Oklahoma the population was organized into seven categories by district size.

To keep the study within prescribed economic boundaries, the school districts were stratified on the basis of average daily attendance so that as many clusters of student responses as possible were collected in fewer, but representative, numbers of school districts in the state. Table II demonstrates the natural cluster arrangement the independent districts appeared to form based on 1975-1976 attendance figures.

TABLE II  
DISTRICT GROUPS BASED ON 1975-76 AVERAGE DAILY ATTENDANCE

Group	Group Boundaries	Total Districts in Group
1	0 - 500	254
2	500 - 1,000	105
3	1,001 - 2,500	62
4	2,501 - 5,000	21
5	5,001 - 10,000	8
6	10,001 - 20,000	4
7	over - 20,000	2

The target sample of 10,000 students, based on the estimated average classroom size of 25, provided a goal of 400 classrooms to be selected at random around the state. Because the Tulsa school district (group 7) allowed only 40 classrooms to be surveyed, an additional 20 percent of the remaining 360 classrooms (72 classrooms) was deemed advisable. Thus the 472 classrooms selected represented a 20 percent over-sample. This was done to insure against the possibility for non-participation by some of the selected classrooms and to compensate for some small classes. Table III identifies the participating districts by attendance group and the classrooms allocated to each group.

Letters were first sent to the superintendents in an effort to obtain their district's cooperation. From the consenting participants a list of all teachers in every school in the district was requested. The lists were

TABLE III  
 ALLOCATED CLASSROOMS AND PARTICIPATING DISTRICTS  
 BY ATTENDANCE GROUP

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Group 1 (0-500)	76 classrooms	Amber-Pocasset Blue Granite Navajo Waynoka
Group 2 (501-1,000)	74 classrooms	Fort Gibson Hominy Keota Tipton
Group 3 (1,001-2,500)	91 classrooms	Frederick Guymon Newcastle Pauls Valley Valliant Vinita Waggoner Wewoka
Group 4 (2,501-5,000)	72 classrooms	Chickasha Claremore Guthrie Okmulgee Owasso Sand Springs Union
Group 5 (5,001-10,000)	54 classrooms	Altus Bartlesville Broken Arrow Edmond Norman Ponca City
Group 6 (10,001-20,000)	65 classrooms	Midwest City Moore
Group 7 (over 20,000)	40 classrooms	Tulsa

---

corrected and a computer-assisted randomization procedure was used to randomize all the classroom teachers within each group, regardless of their district or school affiliation. If the first district chosen declined to participate, an alternate was selected by counting down four names on the computer list of all Oklahoma independent school districts. The classrooms for each group were then randomly selected from the list of teachers for each district group.

Within the time constraints and with a large population sample the 24-hour recall dietary survey method provides accurate, reliable results. The 24-hour dietary developed by Nutter for Wisconsin was designed to assess eating patterns of students in grades K-12. With the permission of the Wisconsin Department of Public Instruction, and in accordance with recommendations from the Wisconsin Department of Food and Nutrition Services, Nutter's 1973 survey was modified for use by Oklahoma State University to meet the objectives of the Oklahoma Needs Assessment (Baird, 1979).

The revised questionnaire was a 48-item instrument to be completed by checking appropriate response(s). (See Appendix A.) It included directions and examples to assist the respondent. A more detailed set of instructions was developed for the instructor/administrator. (See Appendix B.) The final question was open-ended to determine the extent of the respondent's knowledge of the Basic Four Food Groups.

After pretesting with 24 children in the Stillwater elementary school system, the modified instrument was approved for use by the School Lunch Section, Oklahoma State

Department of Education.

### Data Collection and Analysis

The teachers of classrooms selected for the sample were requested to survey all the students in their classroom. Each participating teacher and his/her principal also completed questionnaires. The student questionnaires were to be administered the first hour after lunch on Tuesday, Wednesday, or Thursday. If the selected teacher had no class at that time, no other class was to be substituted. No other teacher in that school was to be substituted if the selected teacher no longer taught in the participating school. A detailed letter of instructions for the teacher accompanied the student questionnaire (Appendix B).

The district's selection of a coordinating administrator was critical to the success of the survey. This liaison person provided the list of teachers and oversaw the distribution, administration, and collection of the instruments. The instructional letter to the liaison is included in Appendix C.

The Oklahoma Needs Assessment utilized a two-part questionnaire. Questions 1 through 5 relate to meals students ate and reasons for the choices. Also included were questions pertaining to the source of information about good food and an open-ended question to determine their knowledge of the Basic Four Food Groups.

The second part of the questionnaire is a 24-hour dietary recall which uses two methods to aid the student's

memory. The students were asked to list what they remembered first and then they circled yes/no for foods eaten at the day's lunch and breakfast and the previous day's evening meal and snacks. Foods in this latter portion of the questionnaire are arranged so that question numbers 7-9 included foods from the milk or dairy group. Questions 10-18 included foods from the protein/meat group. Questions 19-35 included selections from the fruit and vegetable group, questions 20, 24-27 included foods high in vitamin A, and questions 20-22, 25, and 26 included foods high in vitamin C. Questions numbered 18 and 36-39 included foods from the bread/cereal group. Questions 40-47 are representative of "other" or "extra" foods. The statistical procedure Chi Square, with a level of significance of ( $p < 0.05$ ) was used to establish any relationship between food group choices and meal(s), students' sex, students' grade, and acceptability of dietary pattern(s).

For this study, acceptability is described in a ranking from most complete (A corresponding to a diet where no food group is missing with the exception of breakfast when omission of the protein-meat group still qualifies that three-food-group diet choice as most complete) to least complete (E corresponding to a diet where no food group is present). Because certain questions are linked to each of the four food groups, the relationships of the food category eaten to the sex, grade level, and mealtime were investigated. Table IV illustrates the ranking applied to students' responses.

TABLE IV

ACCEPTABLE DIETARY PATTERNS BY RANKING ORDER OF RESPONSES  
OF STUDENTS, GRADES 7-12 FOR BREAKFAST, LUNCH, AND  
EVENING MEAL-PLUS-SNACKS

Rank	Milk	Bread/Cereal	Fruit/Vegetable	Meat/Protein
<u>A</u>	1 1*	1 1*	1 1*	1 0*
<u>B</u>	0 1 1 1	1 0 1 1	1 1 0 1	1 1 1 0
<u>C</u>	0 1 1 0 1 0	0 0 1 1 0 1	1 0 0 1 0 0	1 1 0 0 1 1
<u>D</u>	0 1 0 0	0 0 0 1	0 0 1 0	1 0 0 0
<u>E</u>	0	0	0	0

\* This particular pattern A is applicable only to breakfast due to governmental breakfast standards.

## CHAPTER IV

### RESULTS AND DISCUSSION

#### Introduction

Educators feel that identification of the Basic Four Food Groups is important because these groups provide major sources for nutrients. Teachers surveyed in the Oklahoma Needs Assessment (Baird, 1979) considered the Basic Four the most successful teaching method. This study sought to determine the extent that the students exemplify the strategy in the selection of their diet.

#### Sample

To fulfill the requirements for the Needs Assessment of PL 95-166, a state-wide survey of students was conducted by Oklahoma State University for the School Lunch Section of the Oklahoma State Department of Education. Questionnaires (Appendix A) were administered to selected classrooms to determine dietary behavior. A total of 3,822 students in Oklahoma schools, grades 7-12, responded. Twenty-four responses were discarded because the respondent's sex was not indicated. Thus 3,798 student responses were analyzed in this study to determine any pattern(s) of food group choices at mealtimes and as snacks.

Of the 3,798 responses, 2,146 students were in grades 7-9, and 1,652 students were in grades 10-12. There were 1,109 boys and 1,037 girls in grades 7-9 returning usable responses. There were 794 boys and 858 girls in grades 10-12 returning usable responses. The students were asked to respond with either a yes or no for each food listed in the questionnaire. Each yes answer was computed as a serving although the actual amount of food consumed was not determined.

### Food Group Distribution Patterns

In this section the first two hypotheses tested by this study will be addressed. Concerned with the rank of acceptability of the adolescent diet, they state:

H<sub>1</sub>: There will be no significant difference in the food group distribution patterns by sex of students.

H<sub>2</sub>: There will be no significant difference in the food group distribution patterns of students by grade.

### Breakfast Patterns

When the Oklahoma Needs Assessment data were analyzed by food group, 19.5 percent of the students in grades 7-9 demonstrated pattern ranking E. Pattern E corresponds to the students' responses of no food group ingestion. More girls in grades 7-9 displayed this pattern of no food group ingestion than did the boys. Nearly one-fourth of the girls

(23.9 percent) ate no foods from the Basic Four food groups for breakfast. Only 15.4 percent of the boys chose this dietary pattern on the survey day. These results are shown in Table IV.

TABLE IV  
PERCENTAGE OF STUDENTS ATTAINING DIETARY  
PATTERNS BY SEX AND GRADE FOR  
BREAKFAST\*

Rank	Total		Boys		Girls	
	Boys N=1,903	Girls N=1,895	Grades 7-9 N=1,109	Grades 10-12 N=794	Grades 7-9 N=1,037	Grades 10-12 N=858
A	22.70	14.46	24.08	20.78	16.59	11.89
B	17.03	11.45	16.14	18.26	12.73	9.9
C	26.22	26.02	29.22	22.04	28.45	23.08
D	15.66	18.47	15.45	16.37	18.32	18.65
E	18.39	29.60	15.42	22.54	23.92	36.48

\*A=4 food groups present, B=3 food groups present, C=2 food groups present, D=1 food group present, E=0 food group present.

The E pattern was exhibited by even more students in grades 10-12, and the difference between the sexes was even greater (level of significance 0.0001). In grades 7-12, 29.60 percent of the female students ate no food from the

Basic Four food groups for breakfast. Over one-third (36.5 percent) of the girls in grades 10-12 responded with a "no" answer to the questions including foods from the Basic Four. No foods from the Basic Four were eaten by 22.5 percent of the boys in grades 10-12 (see Table V).

Does food group ingestion at breakfast tend to lessen as students progress through the school system? Analysis of the data would seem to affirm this. In grades 7-12, 22.7 of the boys exhibited the A pattern. However, the nearly one-fourth portion in grades 7-9 had diminished to one-fifth in grades 10-12. The A pattern for breakfast has either all four food groups or a combination of the milk, bread/cereal, and fruit/vegetable groups.

Girls had the most complete breakfast pattern A much less frequently. Only 14.46 percent of the girls attained the A pattern. Results showed 16.59 percent of the girls in grades 7-9 and 11.89 percent of the girls in grades 10-12 ate foods from the selected three food groups or all four food groups. A much larger proportion of the girls than boys had food from two or fewer food groups. Nearly three-fourths (74.21 percent) of the female students in grades 7-12 exhibited C, D, or E dietary patterns. Over two-thirds, of the girls in the grades 7-9 (70.69 percent), and over three-fourths of the girls in grades 10-12 (78.21 percent) ate foods from two or fewer food groups at breakfast.

The results showed boys' dietary behavior was somewhat more acceptable, but there was still room for improvement.

Over half (60.27 percent) of the boys in grades 7-12 exhibited patterns C, D, or E dietary patterns at breakfast. Approximately three-fifths (59.79 percent of the boys in the grades 7-9, and 60.95 percent of the boys in grades 10-12) of the boys surveyed ate foods from two or fewer food groups at breakfast.

The Oklahoma Needs Assessment (Baird, 1979) reported that 24.1 percent of the students in grades 7-9 and 36.8 percent of the students in grades 10-12 said they did not eat breakfast on the survey day. Analyzed by food group ingestion, however, 19.52 percent in grades 7-9 and 29.78 percent of the students in grades 10-12 reported no foods from the Basic Four food groups. This compares to a Massachusetts survey in which Callahan (1971) reported that 18 percent of the students in grades 7-9 and 29 percent of the students in grades 10-12 omitted breakfast. Baird (1979) also wrote that 44 percent of the girls in grades 10-12 reported eating no breakfast. Analysis of the data by food group ingestion, however, showed 36.48 percent of the girls in grades 10-12 ate no Basic Four foods.

Some of the students surveyed for the Oklahoma Needs Assessment (Baird, 1979), responding first that they had eaten no breakfast, obviously indicated in the dietary section of the survey instrument that a food item had been consumed. The apparent differences between Baird's findings (1979) and this study may be explained in various ways. Perhaps students do not perceive certain foods as breakfast foods or perhaps they perceive certain foods as breakfast

foods only. They may not equate the first food eaten, regardless of the time of ingestion, with breakfast. Or perhaps students may not equate a single food with the perception of breakfast. If anything less than the perception of a "complete breakfast" was eaten, did some of the students conclude that they had not eaten breakfast?

There is a significant difference (level 0.0001) in the ranks of the dietary patterns for breakfast of boys versus girls in grades 7-12. There is also a significant difference (level 0.0001) in the ranks of the dietary patterns for breakfast of students in grades 7-9 and grades 10-12. Therefore both Hypothesis I and Hypothesis II are rejected for breakfast.

#### Lunch Patterns

Analysis by food group distribution patterns showed that 10.62 percent of the students in grades 7-9 exhibited pattern E at lunch. Only 7.57 percent of the boys in grades 7-9 reported no foods from the Basic Four food groups, but 13.89 percent of the girls in grades 7-9 exhibited this pattern at lunch time. These results are shown in Table VI.

The E pattern was also exhibited by more students in grades 10-12 than grades 7-9 at lunch time on the survey day (significant at the 0.0001 level). Whereas 15.86 percent of the students in grades 10-12 ate no Basic Four foods, 10.62 percent in grades 7-9 ate no foods from the Basic Four. The disparity was greater between the sexes at this grade level, also. The girls omitted Basic Four food group choices much

more often than boys; 13.89 percent of the girls in grades 7-9 as compared to 19.58 percent of the girls in grades 10-12, 7.57 percent of the boys in grades 7-9 compared to 11.84 percent of the boys in grades 10-12 (see Table VI).

TABLE VI  
PERCENTAGE OF STUDENTS ATTAINING DIETARY  
PATTERNS BY SEX AND GRADE FOR  
LUNCH\*

Rank	Total		Boys		Girls	
	Boys N=1903	Girls N=1895	Grades 7-9 N=1109	Grades 10-12 N=794	Grades 7-9 N=1037	Grades 10-12 N=858
A	42.77	27.86	43.28	42.07	32.21	22.61
B	28.48	27.44	28.85	27.96	26.04	29.14
C	12.30	17.63	11.36	13.60	16.68	18.76
D	7.09	10.61	8.93	4.53	11.19	9.91
E	9.35	16.46	11.84	11.84	13.89	19.58

\*A=4 food groups present, B=3 food groups present, C=2 food groups present, D=1 food group present, E=) food groups present.

Does food group ingestion at lunch tend to diminish also as students progress through the school system? In grades 7-9, 37.93 percent of the students attained the A pattern. Of the students in grades 7-9, 43.28 percent of the boys and 32.21 percent of the girls exhibited pattern A. Only 31.96 percent of the students in grades 10-12, 20.78

percent of the boys and 11.89 percent of the girls, attained pattern A at lunch. One thousand students (60.53 percent) in grades 10-12 consumed food from three or four of the Basic Four food groups at lunch. Six-hundred-fifty-two students (39.46 percent) in grades 10-12 consumed food from two or fewer of the Basic Four food groups.

In grades 7-9, 1,404 students (65.42 percent) chose diets at lunch that included foods from three or four of the Basic Four food groups. Boys had the most complete lunch patterns, A and B, much more frequently than girls. On the survey day, 72.13 percent of the boys in grades 7-9 ate foods from at least three of the Basic Four food groups. Results of analysis for this study showed that only 58.25 percent of the girls attained the same dietary patterns at lunch.

In grades 7-9 there seems to be a direct relationship between completeness of dietary patterns and percentages of boys' in grades 7-9 chosen patterns. The more complete the dietary pattern, the more boys in grades 7-9 chose it, from 43.28 percent attaining pattern A to 7.57 percent choosing pattern E for lunch. The same is not true for boys in grades 10-12; more boys exhibited pattern E than pattern D, no food group as opposed to some food group. About the same numbers of girls in grades 10-12 (194) chose pattern A, all food groups, as pattern E, none (168). This can be compared with over twice as many girls in grades 7-9 (334 versus 144) in the all or none categories.

The preferred pattern at lunch of girls in grades 10-12

was pattern B, foods from three of the Basic Four food groups, which was chosen by 29.14 percent of the girls in grades 10-12. Pattern A was preferred by girls in grades 7-9 (32.21 percent). Pattern D, ingestion of food from only one of the Basic Four food groups, was the least often chosen by both girls and boys in grades 10-12 (7.32 percent), 9.91 percent of the girls and 4.53 percent of the boys. In grades 7-9 boys seldom exhibited pattern E (3.91 percent) and girls, pattern D (5.41 percent).

The Oklahoma Needs Assessment (Baird, 1979) reported that all students ate lunch more often than breakfast. Baird (1979) wrote that 7.9 percent in grades 7-9 and 13.6 percent in grades 10-12 reported not eating lunch. Girls tended to skip lunch more often than boys, with the girls in grades 10-12 the worst offenders with a non-participation rate of 16 percent (Baird 1979). Callahan (1971) reported that 24 percent of the students in a Massachusetts survey omitted lunch; 15 percent of the girls and 9 percent of the boys. This compares to 11.84 percent of the boys and 19.58 percent of the girls in grades 10-12 who exhibited pattern E in this study.

Baird (1979) wrote that 16 percent of the girls in grades 10-12 reported no lunch. What about the 3.6 percent of those girls in grades 10-12 who must have eaten something (19.58 percent exhibiting pattern E minus 16.0 percent who said they skipped lunch)? This is the reverse of the breakfast situation wherein more girls reported the omission of breakfast than exhibited pattern E. Were food sources of calcium, ribo-

flavin, protein, iron, vitamins A or C or fiber ingested by these 31 girls in grades 10-12? Questions 40-47 in the student questionnaire (Appendix A) included the "other foods" which have little or no nutrient value other than energy (kilocalories). Did some of the girls eat the cake, pie, candy or soft drinks included in these questions and perceive those foods as lunch? Did some girls eating a lunch consisting of chips or pretzels and cola, believe that they were eating something from at least one food group?

Callahan (1971) also reported that 58 percent of the boys in grades 10-12 ate a good or satisfactory meal, and 47 percent of the girls in grades 10-12 did, also. Her results compare to the findings of this study which showed that 42.07 percent of the boys attained pattern A, but only 22.61 percent of the girls in grades 10-12 attained pattern A on the survey day. Responses for dietary patterns A and B would have to be combined to find half the female students in grades 10-12 choosing a somewhat satisfactory lunch on the survey day.

Hypothesis I is rejected for lunch. There is a significant difference (level 0.0001) in the ranks of dietary patterns for lunch by sex of students in grades 7-9 and grades 10-12. Students in grades 7-9 eat foods from more of the Basic Four food groups than do those students in grades 10-12. Therefore Hypothesis II is also rejected for lunch.

#### Evening Meal-Plus-Snacks Patterns

Fewer students showed no food group ingestion for the evening meal-plus-snacks category than other meals on the

survey day. Only 1.47 percent of the boys in grades 7-12 and 1.95 percent of the girls in grades 7-12 exhibited pattern E for the evening meal-plus-snacks. Statistically there was no significant difference in the dietary patterns of boys in grades 7-9 and 10-12. Over three-fourths of the boys (77.64 percent in grades 7-9 and 75.19 percent in grades 10-12) ingested food from three or four of the Basic Four food groups. Less than 10 percent of the boys in grades 7-12 ate food from only one food group or ate food from none of the Basic Four food groups on the survey day. The results are shown in Table VII.

TABLE VII  
PERCENTAGE OF STUDENTS ATTAINING DIETARY  
PATTERNS BY SEX AND GRADE FOR  
EVENING MEAL-PLUS-SNACKS\*

Rank	Total		Boys		Girls	
	Boys	Girls	Grades 7-9	Grades 10-12	Grades 7-9	Grades 10-12
	N=1,893	N=1,895	N=1,109	N=794	N=1,037	N=858
	%	%	%	%	%	%
A	42.85	35.20	43.01	42.70	39.83	29.60
B	33.74	37.26	34.63	32.49	37.03	37.53
C	16.40	19.74	15.51	17.63	17.26	22.73
D	5.52	5.86	5.32	5.79	4.82	7.11
E	1.47	1.95	1.53	1.39	1.06	3.03

\*A = all four food groups, B = three food groups, C = two food groups, D = one food group, and E = 0 food group present.

There was, on the other hand, a significant difference (level of significance 0.0001) between girls in grades 7-9 and girls in grades 10-12. Many more girls in grades 7-9 (39.83 percent) attained pattern A than did girls in grades 10-12 (29.60 percent). More girls in grades 10-12 (22.73 percent) exhibited pattern C than did girls in grades 7-9 (17.26 percent). Only 37 of the 1,895 female respondents (1.95 percent) said that they did not eat any food from the Basic Four at the evening meal-plus-snacks on the survey day.

Analysis of the Oklahoma Needs Assessment data by food groups showed no significant differences between girls and boys in grades 7-9 (level of significance 0.3595). Huene-mann et al., (1968) reported that the evening meal was the most popular with teenagers. Other investigators have shown the teenager to be a snacker (Leverton, 1967; Deutch, 1971; Kreutler, 1980). This study would seem to confirm their findings at grade levels 10-12 in which many more of the students reported eating foods from two or more of the Basic Four food groups than at other meals on the survey day (level of significance 0.0001). Especially in the most complete dietary pattern, A, boys in grades 10-12 (42.70 percent) did better than girls (29.60 percent). On the survey day 32.87 percent of the girls in grades 10-12 ate foods from two or fewer of the Basic Four food groups, patterns C, D, or E. Only 24.81 percent of the boys in grades 10-12 exhibited the same patterns of food choice for the evening meal-plus snacks.

Hypothesis I is rejected for grades 10-12 for the evening meal-plus-snacks. There is a significant difference between the dietary pattern ranking for the evening meal-plus-snacks of boys and girls in grades 10-12 (level of significance of 0.0001). For the evening meal-plus-snacks, (significance level of 0.3595) Hypothesis I is not rejected for grades 7-9. There was no significant difference between the ranks of girls' and boys' dietary patterns for the evening meal-plus-snacks.

For the evening meal-plus-snacks, Hypothesis II is rejected for girls in grades 7-12 (level of significance of 0.0001). There is a significant difference between the dietary patterns of girls in grades 7-9 versus girls in grades 10-12 for the evening meal-plus-snacks. Hypothesis II is not rejected for boys in grades 7-12. There was no significant difference (significance level of 0.7059) in the ranks of the dietary patterns for evening meal-plus-snacks of boys in grades 7-9 and boys in grades 10-12.

#### Food Group Consumption and Meal Association

In this section the final three hypotheses tested by this study will be addressed. Concerned with the numbers and combinations of food groups associated with meal times they state:

H<sub>3</sub>: There will be no significant difference in the choice and number of food groups for breakfast of students by sex and grade levels of 7-9 and 10-12.

H<sub>4</sub>: There will be no significant difference in the choice and number of food groups for lunch of

students by sex and grade levels 7-9 and 10-12.

H<sub>5</sub>: There will be no significant difference in the choice and number of food groups for evening meal-plus-snacks of students by sex and grade levels 7-9 and 10-12.

### Breakfast Patterns

When the Oklahoma Needs Assessment data were analyzed by food group, 81.61 percent of the boys in grades 7-12 ate something for breakfast. Only 70.40 percent of the girls in grades 7-12 responded affirmatively. Some of these same students had responded earlier in the questionnaire that they had eaten no breakfast. Since they indicated in the dietary section that a food item had been consumed the question of what food arises. What then did the students eat from the Basic Four food groups for breakfast, and in what combinations?

Slightly more than one-fifth of the students in grades 7-9 (20.46 percent) reported that they attained the A pattern of acceptability. Two patterns are acceptable as most complete. Nearly one-tenth (9.74 percent) of the students in grades 7-9 ate food from the combination of fruit/vegetable-milk-bread/cereal groups, and 10.72 percent of the students ate from the three groups above plus the protein/meat group. Boys were much more likely to include a protein/meat item, 13.07 percent of the boys ate food from all four food groups compared to 8.20 percent of the girls in grades 7-9 (see Table VIII).

TABLE VIII

PERCENTAGES OF STUDENTS, GRADES 7-9 EATING SPECIFIC  
FOOD GROUP COMBINATIONS FOR DIETARY PATTERNS  
A, B, C, D, AND E FOR  
BREAKFAST

Sex	A		B			C						D				E
	Milk, Grain, Meat/Protein, Fruit/Vegetable	Milk, Grain, Fruit/Vegetable	Milk, Grain, Protein/Meat	Grain, Protein/ Meat, Fruit/ Vegetable	Milk, Protein/ Meat, Fruit/ Vegetable	Milk, Grain	Grain, Fruit/ Vegetable	Grain, Protein/ Meat	Milk, Fruit/ Vegetable	Protein/ Meat, Fruit/ Vegetable	Milk, Protein/ Meat	Milk	Fruit/ Vegetable	Grain	Protein/ Meat	No Food Groups
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Boys N=1,109	13.07 ( total 24.08 )	11.00 ( )	7.84 ( )	5.59 total 16.14	2.71 ( )	15.42 ( )	3.25	3.07 total 29.22	3.07	2.07	2.34 ( )	6.67 ( )	2.61 total 15.15	3.79 ( )	2.07 ( )	15.42
Girls N=1,037	8.20 ( total 26.59 )	8.39 ( )	5.59 ( )	5.21 total 12.73	1.93 ( )	14.66 ( )	5.21	2.60 total 28.45	2.22	2.22	1.54 ( )	6.17 ( )	6.56 total 18.32	4.05 ( )	1.54 ( )	23.92
Total 7-9 2,146	10.72 ( total 20.46 )	9.74 ( )	6.76 ( )	5.41 total 14.49	2.33 ( )	15.05 ( )	4.19	2.84 total 28.84	2.66	2.14	1.96 ( )	6.43 ( )	4.52 total 16.68	3.91 ( )	1.82 ( )	19.52

Since 19.52 percent of the students in grades 7-9 ate no food from the four food groups, and 20.46 percent of these students chose the most complete diet, approximately three-fifths of the students ate something. What did those students who ate something at breakfast time, but did not meet the requirements set forth in this study as most complete, consume? Students in grades 7-9 who ate from only one food group (D pattern) preferred something from the milk group, 6.43 percent. The fruit/vegetable group was their second choice, 4.52 percent. The bread/cereal group was next, 3.91 percent, and finally the protein/meat group, 1.82 percent. More girls than boys in grades 7-9 chose food from the fruit/vegetable group when the D pattern was exhibited (6.56 percent of the girls versus 2.61 percent of the boys).

The dietary choices comprising pattern C (28.84 percent) were more uniformly distributed among the students in grades 7-9 after a strong first choice. About 15 percent ate foods from the milk and bread/cereal groups combination, 7.97 percent of the boys and 7.08 percent of the girls. The second choice C combination, bread/cereal-plus-fruit/vegetable (4.19 percent of the students in grades 7-9), was chosen by slightly more of the girls than boys (5.21 percent versus 3.25 percent). This was followed by choices of the protein-meat-plus-bread/cereal combination (2.84 percent), milk-plus-fruit/vegetable (2.66 percent), protein/meat-plus-fruit/vegetable (2.14 percent), and milk-plus-fruit/vegetable combination (1.96 percent). The preceding pattern C diets

were, with the noted exceptions, approximately evenly distributed among boys and girls in grades 7-9.

Slightly more than one-sixth (14.50 percent) of the students in grades 7-9 said that they ate food from the remaining three food group combinations that constitute pattern B. More of the boys (7.84 percent) than of the girls (5.59 percent) chose the milk-plus-bread/cereal-plus-protein/meat combination (6.76 percent total). The other B patterns, bread/cereal-plus-protein/meat-plus-fruit/vegetable (5.41 percent) and milk-plus-protein/meat-plus-fruit/vegetable (2.33 percent) were exhibited slightly more often by boys than girls.

Whereas 60.02 percent of the students in grades 7-9 ate something less than this study's most complete diet, only 54.06 percent of the students in grades 10-12 ate from one to three food groups at breakfast (see Table IX). As was true with the younger students, when only one food group was represented at breakfast, it was the milk group most often (7.26 percent). Nearly eight percent (7.93 percent) of the boys and 6.64 percent of the girls chose this specific pattern D. The other manifestations of pattern D were respectively fruit/vegetable only, 5.08 percent, bread/cereal only, 3.21 percent, and protein/meat group only, 2.00 percent. When foods from the fruit/vegetable group only were indicated, over twice as many of the girls as boys made that choice (6.99 percent of the girls in grades 10-12, 3.02 percent of the boys in grades 10-12).

Equal numbers, 96, of boys (12.09 percent) and girls (11.19 percent) chose the two food group combination of

TABLE IX  
PERCENTAGES OF STUDENTS, GRADES 10-12 EATING SPECIFIC  
FOOD GROUP COMBINATIONS FOR DIETARY PATTERNS  
A, B, C, D, AND E FOR  
BREAKFAST

	A		B			C						D				E
Sex	Milk, Grain, Meat/Protein, Fruit/Vegetable	Milk, Grain, Fruit/Vegetable	Milk, Grain, Protein/Meat	Grain, Protein/Meat, Fruit/Vegetable	Milk, Protein/Meat, Fruit/Vegetable	Milk, Grain	Grain, Fruit/Vegetable	Grain, Protein/Meat	Milk, Protein/Meat	Milk Fruit/Vegetable	Protein/Meat, Fruit/Vegetable	Milk	Fruit/Vegetable	Grain	Protein/Meat	No Food Groups
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Boys N=794	12.85 ( total 20.78 )	7.93	9.70 (	5.92 total 18.26	2.64 )	12.09 (	2.39	2.02 total 22.04	3.15	1.51	0.88 )	7.93 (	3.02 total 16.37	3.02	2.39 )	22.54
Girls N=858	5.13 ( total 11.89 )	6.76	5.59 (	3.61 total 9.91	0.70 )	11.19 (	3.61	2.80 total 23.08	1.63	2.45	1.40 )	6.64 (	6.99 total 18.65	3.38	1.63 )	36.48
Total 10-12 N=1,652	8.84 ( total 16.16 )	7.32	7.57 (	4.72 total 13.92	1.63 )	11.62 (	3.03	2.42 total 22.58	2.36	2.00	1.15 )	7.26 (	5.08 total 17.55	3.21	2.00 )	29.78

milk-plus-bread/cereal at breakfast. This 11.62 percent of the students in grades 10-12 represents nearly a 4.00 percent decline from the 15.05 percent of the students in grades 7-9 who chose this particular pattern C. The remaining pattern C possibilities were closely clustered, ranging from the sixth choice bread/cereal-plus-protein/meat combination (1.15 percent of the students in grade 10-12) to the second choice bread/cereal-plus-fruit/vegetable group combination (3.03 percent).

Approximately the same percentage of students in grades 10-12 (13.92 percent) as students in grades 7-9 (14.50 percent) said that they ate food from the remaining three food group combinations that are pattern B at breakfast (one three-food-group combination is designated pattern A due to governmental breakfast standards). Slightly more boys than girls in grades 10-12 chose each of the possible B patterns. The total percentages in descending order of preference were: milk-plus-bread/cereal-plus-protein/meat, 7.57 percent; bread/cereal-plus-protein/meat-plus fruit/vegetable, 4.72 percent; and milk-plus-protein/meat-plus-fruit/vegetable, 1.63 percent.

Of the 16.16 percent of the students in grades 10-12 who attained the A pattern of dietary acceptability for breakfast, many more of the boys than girls chose the four food group patterns that included the protein/meat group (12.85 percent versus only 5.13 percent of the girls in grades 10-12). The percentage of students in grades 10-12

choosing the three-food-group combination pattern A (7.32 percent) was close to the percentage choosing the four-food-group combination pattern A (8.84 percent).

Do the numbers of food groups and/or the particular food group or food group combinations consumed at breakfast change as boys and girls progress through the school system? The results of data analysis for this study would, for boys in grades 7-12, justify an affirmative answer (level of significance of 0.0009). The primary difference lies in pattern E, where 15.42 percent of the boys in grades 7-9 indicated no food group ingestion compared to 22.54 percent of the boys in grades 10-12. Results of this analysis are shown in Table X.

Milk was most often chosen by boys when a single item was consumed at breakfast, and boys in grades 10-12 (7.93 percent) chose it slightly more than boys in grades 7-9 (6.67 percent). The most popular two-food-group combination of pattern C (14.03 percent milk-plus-bread/ cereal), however, was chosen by more boys in grades 7-9 (15.42 percent of the boys in grades 7-9 compared to 12.09 percent of the boys in grades 10-12). As the dietary pattern progressed toward most complete, the participation rate for boys in grades 7-9 tended to exceed that of boys in grades 10-12. The one three-food-group pattern A was chosen by 11.00 percent of the boys in grades 7-9 and only 7.93 percent of the boys in grades 10-12. When the meat/protein group was added at breakfast boys in both grade levels tended to participate at about the same rate (13.07 percent of the boys in grades

TABLE X  
PERCENTAGE OF BOYS, GRADES 7-9 AND GRADES 10-12 EATING  
SPECIFIC FOOD GROUP COMBINATIONS FOR DIETARY  
PATTERNS A, B, C, D, AND E FOR  
BREAKFAST

	A		B			C					D				E
	Milk, Grain, Grade Meat/Protein, Fruit/Vegetable	Milk, Grain, Fruit/Vegetable	Milk, Grain, Protein/ Meat	Grain, Protein/ Meat, Fruit/ Vegetable	Milk, Meat/ Protein, Fruit/ Vegetable	Milk, Grain, Fruit/ Vegetable	Milk, Protein/ Meat	Grain, Protein/ Meat	Milk, Fruit/ Vegetable	Protein/ Meat, Fruit/ Vegetable	Milk	Grain	Fruit/ Vegetable	Protein/ Meat	No Food Groups
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
7-9 N=1,109	13.07 ( total 24.08 )	11.00 ( )	7.84 ( )	5.59 total 16.14	2.71 ( )	15.42 ( )	3.25	2.34 total 29.22	3.07	3.07	2.07 ( )	6.67 ( )	3.79 total 15.15	2.61 ( )	15.42
10-12 N=794	12.85 ( total 20.78 )	7.93 ( )	9.70 ( )	5.92 total 18.26	2.64 ( )	12.09 ( )	2.39	3.15 total 22.04	2.02	1.51	0.88 ( )	7.93 ( )	3.02 total 16.37	3.02 ( )	22.54
Total 7-12 N=1,903	12.96 ( total 22.70 )	9.72 ( )	8.62 ( )	5.73 total 17.03	2.68 ( )	14.03 ( )	2.89	2.68 total 26.22	2.63	2.42	1.58 ( )	7.20 ( )	3.47 total 15.66	2.79 ( )	18.39

7-9 and 12.85 percent of the boys in grades 10-12).

As with boys, a much lower percentage of girls in grades 7-9 indicated pattern E (23.92 percent) than did the girls in grades 10-12 (36.48 percent). They were about equal in their preference when one food group was represented at breakfast. Results show 6.56 percent of the girls in grades 7-9 and 6.99 percent of the girls in grades 10-12 chose the fruit/vegetable group (see Table XI). When the milk group was ingested the distribution was 6.17 percent of the girls in grades 7-9 and 6.64 percent of the girls in grades 10-12. The most popular two-food-group combination, milk-plus-bread/cereal, of pattern C was chosen by 14.66 percent of the girls in grades 7-9 compared to 11.19 percent of the girls in grades 10-12. Whereas more boys chose the four-food-group pattern A, more girls indicated a preference for the three-food-group pattern A. One-hundred-forty-five girls (8.39 percent of the girls in grades 7-9 and 6.76 percent of the girls in grades 10-12) chose the milk-plus-bread/cereal-plus-fruit/vegetable combination. One-hundred-twenty-nine (6.81 percent) of the girls (8.20 percent in grades 7-9 and 5.13 percent in grades 10-12) chose to add the protein/meat group.

By grade level of students, Hypothesis III is rejected. There is a significant difference (level 0.0001) between the numbers and choice of food group ingestion at breakfast of girls in grades 7-9 and girls in grades 10-12. Girls in grades 7-9 dietary behavior at breakfast represents many more of the Basic Four food groups than does the dietary

TABLE XI  
PERCENTAGES OF GIRLS, GRADES 7-9 AND GRADES 10-12 EATING  
SPECIFIC FOOD GROUP COMBINATIONS FOR DIETARY  
PATTERNS A, B, C, D, AND E FOR  
BREAKFAST

	A		B			C						D				E
Grade	Milk, Fruit/ Vegetable, Grain	Milk, Grain, Protein/Meat, Fruit/Vegetable	Milk, Grain, Protein/ Meat	Grain, Protein/ Meat, Fruit/ Vegetable	Milk, Fruit/ Vegetable, Protein/Meat	Milk, Grain	Grain, Fruit/ Vegetable	Grain Protein/ Meat	Milk, Fruit/ Vegetable	Protein/ Meat, Fruit/ Vegetable	Milk, Protein, Meat Vegetable	Fruit/ Vegetable	Milk	Grain	Protein/ Meat	No Food Groups
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
7-9 N=1,037	8.39 ( total 16.59 )	8.20	5.59 (	5.21 total 12.73	1.93 )	14.66 (	5.21	2.60 total 28.45	2.22	2.22	1.54 )	6.56 (	6.17 total 18.32	4.05 )	1.54 )	23.92
10-12 N=858	6.76 ( total 11.89 )	5.13	5.59 (	3.61 total 9.91	0.70 )	11.19 (	3.61	2.80 total 23.08	2.45	1.40	1.63 )	6.99 (	6.64 total 18.65	3.38 )	1.63 )	36.48
Total 7-12 N=1,895	7.65 ( total 14.46 )	6.81	5.59 (	4.49 total 11.45	1.37 )	13.09 (	4.49	2.69 total 26.02	2.32	1.85	1.58 )	6.75 (	6.39 total 18.47	3.75 )	1.58 )	29.60

behavior of girls in grades 10-12. Hypothesis III is also rejected for boys in grades 7-12. Results showed a significant difference (level 0.0009) existed between the numbers and choice of food groups ingested at breakfast by boys in grades 7-9 and boys in grades 10-12 at breakfast. In general boys in grades 7-9 eat foods from more of the Basic Four food groups than do boys in grades 10-12.

Results of analysis showed there was a significant difference (0.0001) between the numbers and choices of food group ingestion for breakfast of boys and girls in grades 7-9. Boys in grades 7-9 tend to ingest a more varied diet than girls in grades 7-9. Results also indicate that a significant difference (level of 0.0001) exists between the numbers and choices of food groups ingested at breakfast by boys and girls in grades 10-12. Therefore, Hypothesis III is rejected by sex. Girls in grades 10-12 tend to ingest a much less varied diet than boys in grades 10-12.

### Lunch Patterns

Food group ingestion was much greater for all students at lunch. Less than one-tenth (9.35 percent) of the boys in grades 7-12 indicated that a food from any food group was not ingested at lunch. More boys in the older group exhibited pattern E (7.57 percent by grades 7-9 boys, and 11.84 percent of the boys in grades 10-12). The bread/cereal group was least often chosen by boys in grades 7-12 to satisfy pattern D (0.95 percent). Foods from the milk group were most often chosen (2.84 percent) by all male students and more often chosen by

boys in grades 7-9 (3.88 percent) than by boys in grades 10-12 (1.39 percent). Table XII shows the distribution of patterns A, B, C, D, and E among male students in grades 7-9 and grades 10-12.

Pattern C was chosen by only 12.30 percent of the boys in grades 7-12 (11.36 percent of the boys in grades 7-9 and 13.60 percent of the boys in grades 10-12). The most popular pattern C at lunch for boys was the bread/cereal-plus-protein/meat combination (4.73 percent). The least popular pattern C at lunch for boys was the bread/cereal-plus-fruit/vegetable combination (0.89 percent). These results are also in Table XII.

Foods from the milk group or fruit/vegetable group tended to be most often excluded by boys exhibiting the B pattern. Foods from the fruit/vegetable group were excluded by 12.09 percent of the boys (12.89 percent of the boys in grades 7-9 and 10.96 percent of the boys in grades 10-12). These results are shown in Table XII.

Almost half of the boys in grades 7-12 ate foods from all four of the Basic Four food groups (42.77 percent) at lunch. Boys in grades 10-12 (42.07 percent) attained pattern A about as often as did the boys in grades 7-9 (43.28 percent). Callahan (1971) reported that 58 percent of the boys in grades 10-12 ate a "good or satisfactory" meal at lunch time.

More than one-sixth (16.46 percent) of the girls in grades 7-12 did not eat a food from any food group at lunch. The percentage difference, however, was greater between the

TABLE XII  
PERCENTAGE OF BOYS, GRADES 7-9 AND GRADES 10-12 EATING  
SPECIFIC FOOD GROUP COMBINATIONS FOR DIETARY  
PATTERNS A, B, C, D, AND E FOR  
LUNCH

Grade	<u>A</u>		<u>B</u>				<u>C</u>					<u>D</u>				<u>E</u>
	Milk, Grain Protein/Meat/ Fruit/Vegetable	Milk, Grain, Protein/ Meat	Grain, Protein/ Meat, Fruit/ Vegetable	Milk, Fruit/ Vegetable, Protein/Meat	Milk, Grain Fruit/ Vegetable	Grain, Protein/ Meat	Milk, Protein/ Meat	Protein/ Meat, Fruit/ Vegetable	Milk, Fruit/ Vegetable	Milk, Grain	Grain, Fruit/ Vegetable	Milk	Fruit/ Vegetable	Protein/ Meat	Grain	No Food Group
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
7-9 N=1,109	43.28	12.89 (	7.84 total 28.85	5.23	2.89 )	3.43 (	2.80	1.44 total 11.36	1.62	1.35	0.72 )	3.88 (	1.89 total 8.93	1.89	1.26 )	7.57
10-12 N=794	42.07	10.96 (	10.71 total 27.96	4.28	2.02 )	6.55 (	1.39	2.39 total 13.60	1.39	0.76	1.13 )	1.39 (	1.39 total 4.53	1.26	0.50 )	11.84
Total 7-12 N=1,903	42.77	12.09 (	9.04 total 28.48	4.83	2.52 )	4.73 (	2.21	1.84 total 12.30	1.52	1.10	0.89 )	2.84 (	1.68 total 7.09	1.63	0.95 )	9.35

TABLE XIII

PERCENTAGES OF GIRLS, GRADES 7-9 AND GRADES 10-12 EATING  
SPECIFIC FOOD GROUP COMBINATIONS FOR DIETARY  
PATTERNS A, B, C, D, AND E FOR  
LUNCH

Grade	A		B			C						D			E	
	Milk, Grain Protein/Meat/ Fruit/Vegetable	Milk, Grain, Protein/ Meat	Grain, Protein/ Meat, Fruit/ Vegetable	Milk, Fruit/ Vegetable, Protein/Meat	Milk, Grain Fruit/ Vegetable	Grain, Protein/ Meat	Grain, Fruit/ Vegetable	Milk, Protein/ Meat	Milk, Fruit/ Vegetable	Milk, Grain	Grain, Fruit/ Vegetable	Milk	Fruit/ Vegetable	Protein/ Meat	Grain	No Food Group
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
7-9 N=1,037	32.21	10.80 (	8.29 total 26.04	4.34	2.60 )	6.56 (	2.41	2.60 total 16.68	2.70	2.03	0.39 )	3.76 (	2.99 total 11.19	3.09 )	1.35 )	13.89
10-12 N=858	22.61	12.59 (	12.12 total 29.14	2.45	1.98 )	8.16 (	3.61	2.56 total 18.76	1.75	1.05	1.63 )	3.03 (	3.38 total 9.91	3.15 )	0.35 )	19.58
Total 7-12 N=1,895	27.86	11.61 (	10.03 total 27.44	3.48	2.32 )	7.28 (	2.96	2.59 total 17.63	2.27	1.58	0.95 )	3.43 (	3.17 total 10.61	3.11 )	0.90 )	16.46

girls in grades 7-9 (13.89 percent) and girls in grades 10-12 (19.58 percent) than between the boys in the same grade levels. When some food item was indicated, girls most often chose from the milk group (3.43 percent by girls compared to boys' 2.84 percent). Table XIII shows the distribution of patterns A, B, C, D, and E among female students in grades 7-9 and grades 10-12.

Pattern C was chosen by more girls in grades 7-12 than boys in grades 7-12 for lunch. When girls indicated food from only two food groups was eaten, those in grades 7-12 preferred the bread/cereal-plus-protein/meat combination (6.56 percent of the girls in grades 7-9, and 8.16 percent of the girls in grades 10-12). The least often chosen pattern C combination for lunch (0.98 percent) was bread/cereal-plus-fruit/ vegetable (0.39 percent of the girls in grades 7-9, and 1.63 percent of the girls in grades 10-12). These results are shown in Table XIII.

Foods from the fruit/vegetable group were excluded by 11.61 percent of the girls in grades 7-12 (grades 7-9, 10.80 percent of the girls and grades 10-12, 12.59 percent of the girls). As with boys in grades 7-12, girls tended to omit the milk group much more often than food from the protein/meat group or the bread/cereal group (Table XIII).

In grades 7-9 when one food group was omitted, boys (6.66 percent) and girls (5.22 percent) tended to leave out the fruit/vegetable group most often. Other pattern B choices by students in grades 7-9 omitted the milk group (8.06 percent), the bread/cereal group (4.80 percent), and

the protein/meat group (2.75 percent). The results of this analysis are shown in Table XIV.

The most popular choice in pattern C for students in grades 7-9 was the bread/cereal-plus-protein/meat combination (4.94 percent). Nearly twice as many girls (6.56 percent of the girls) made this choice as boys (3.43 percent of the boys) in grades 7-9. Girls in grades 7-9 also chose the milk-plus-fruit/vegetable combination (2.70 percent of the girls) more often than their male classmates (1.62 percent of the boys). The least popular pattern C was the bread/cereal-plus-fruit/vegetable combination (0.56 percent of the students in grades 7-9). (See Table XIV.)

Many more students in grades 10-12 chose pattern B at lunch than did the students in grades 7-9. Table XV shows that nearly one-fourth (23.24 percent) of the students in grades 10-12 (21.67 percent of the boys, 24.71 percent of the girls) omitted at lunch foods from either the fruit/vegetable group or the milk group. Only two percent of the students in grades 10-12 omitted the protein/meat group at lunch on the survey day.

If only two food groups were represented at lunch, students in grades 10-12 also chose the bread/cereal-plus-protein/meat combination first (7.38 percent). More of the girls (8.16 percent) than boys (6.55 percent) made this choice as they did in the remaining pattern C categories (see Table XV).

Slightly over one-fourth of the girls in grades 7-12 attained pattern A for lunch (32.21 percent of the girls in

TABLE XIV

PERCENTAGE OF STUDENTS, GRADES 7-9 EATING SPECIFIC  
FOOD GROUP COMBINATIONS FOR DIETARY PATTERNS  
A, B, C, D, AND E  
LUNCH

	A		B				C						D				E	
Sex	Milk, Grain Protein/Meat/ Fruit/Vegetable	Milk, Grain, Protein/ Meat	Grain, Protein/ Meat, Fruit/ Vegetable	Milk, Fruit/ Vegetable, Protein/Meat	Milk, Grain Fruit/ Vegetable	Grain, Protein/ Meat	Milk, Protein/ Meat	Milk, Fruit/ Vegetable	Protein/ Meat, Grain	Milk, Grain	Grain, Fruit/ Vegetable	Milk	Protein/ Meat	Fruit/ Vegetable	Grain	No Food Group		
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%		
Boys N=1,109	43.28	12.89 (	7.84 total 28.85	5.23	2.89 )	3.43 (	2.80	1.62 total 11.36	1.44	1.35	0.72 )	3.88 (	1.89 total 8.93	1.89	1.26 )	7.57		
Girls N=1,037	32.21	10.80 (	8.29 total 26.04	4.34	2.60 )	6.56 (	2.60	2.70 total 16.68	2.41	2.03	0.39 )	3.76 (	3.09 total 11.19	2.99	1.35 )	13.89		
Total 7-9 N=2,146	37.93	11.88 (	8.06 total 27.49	4.80	2.75 )	4.94 (	2.70	2.14 total 13.93	1.91	1.68	0.56 )	3.82 (	2.47 total 10.02	2.42	1.30 )	10.62		

TABLE XV  
PERCENTAGE OF STUDENTS, GRADES 10-12 EATING SPECIFIC  
FOOD GROUP COMBINATIONS FOR DIETARY PATTERNS  
A, B, C, D, AND E FOR  
LUNCH

Sex	A		B				C						D				E
	Milk, Grain Protein/Meat/ Fruit/Vegetable	Milk, Grain, Protein/ Meat	Grain, Protein/ Meat, Fruit/ Vegetable	Milk, Fruit/ Vegetable, Protein/Meat	Milk, Grain Fruit/ Vegetable	Grain, Protein/ Meat	Protein/ Meat, Fruit/ Vegetable	Milk, Protein/ Meat	Milk, Fruit/ Vegetable	Grain, Fruit/ Vegetable	Milk, Grain	Fruit/ Vegetable	Protein/ Meat	Milk	Grain	No Food Group	
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	
Boys N=794	42.07	10.96 (	10.71 total 27.96	4.28	2.02 )	6.55 (	2.39	1.39 total 13.60	1.39	1.13	0.76 )	1.39 (	1.26 total 4.53	1.39 )	0.50 )	11.84	
Girls N=858	22.61	12.59 (	12.12 total 29.14	2.45	1.98 )	8.16 (	3.61	2.56 total 18.76	1.75	1.63	1.05 )	3.38 (	3.15 total 9.91	3.03 )	0.35 )	19.58	
Totals N=1,652	31.96	11.80 (	11.44 total 28.57	3.33	2.00 )	7.38 (	3.03	2.00 total 16.28	1.57	1.39	0.91 )	2.42 (	2.24 total 7.32	2.24 )	0.42 )	15.86	

grades 7-9 and only 22.61 percent of the girls in grades 10-12). Boys attained pattern A much more often (42.77 percent versus 27.86 percent of the girls in grades 7-12). Callahan (1971) reported that 47 percent of the girls in grades 10-12 ate a "good or satisfactory" lunch. Huenemann et al., (1966) reported that more girls than boys chose lunch as the meal they like best and that social factors were important considerations in planning students' lunches. Huenemann et al., (1967) also reported that nutritional knowledge of the four food groups did not noticeably improve girls' food practices. When 47 percent of the girls in grades 7-12 omit at lunch all foods from the fruit/vegetable group and 45 percent of the girls in grades 7-12 omit at lunch all foods from the milk group, the health risk of dietary deficiencies of calcium, riboflavin, and vitamins A and C is greatly increased.

Results of this study show a significant difference (level 0.0001) between the numbers and choice of food group ingestion at lunch of girls in grades 7-9 and girls in grades 10-12. There was also a significant difference (level 0.0001) demonstrated between the numbers and choice of food group ingestion at lunch of boys in grades 7-9 and boys in grades 10-12. Analysis indicated a significant difference between boys and girls dietary behavior by food group at both grade levels at lunch. Boys in grades 7-12 ate foods from more food groups than girls in grades 7-12 at lunch. Hypothesis IV is, therefore, rejected.

### Evening Meal-Plus-Snacks Patterns

The least evidence of meal-skipping by boys in grades 7-12 is associated with the evening meal-plus-snacks. Only 1.47 percent (1.53 percent of the boys in grades 7-9 and 1.39 percent of the boys in grades 10-12) indicated no food group consumption at the evening meal-plus-snacks. Virtually the same percentage of boys in grades 7-12 attained pattern A at the evening meal-plus-snacks (42.88 percent) as reported pattern A at lunch (42.77 percent). Boys were more likely to eat food from at least three of the four food groups at the evening meal-plus-snacks (76.61 percent) than at lunch (71.25 percent).

Table XVI shows the food group items and combinations, that have been defined for this study as A, B, C, D, and E, exhibited by boys in grades 7-9 and grades 10-12. Most often omitted at the evening meal-plus-snacks by boys was the bread/cereal group (17.22 percent of the boys in grades 7-9 and 17.63 percent of the boys in grades 10-12). This choice was followed by omission of the milk group (11.45 percent of the boys in grades 7-9 and 9.31 percent of the boys in grades 10-12). Whereas nearly half the boys in grades 7-12 (44.48 percent) consumed one or more foods from the fruit/vegetable group as snacks, nearly three-fourths of them (74.66 percent) indicated they ate one or more fruits or vegetable at the evening meal.

Pattern C at the evening meal-plus-snacks shows that boys prefer protein/meat-plus-fruit/vegetable combination

TABLE XVI  
PERCENTAGES OF BOYS, GRADES 7-9, AND GRADES 10-12 EATING  
SPECIFIC FOOD GROUP COMBINATIONS FOR DIETARY  
PATTERNS A, B, C, D, AND E FOR  
EVENING MEAL-PLUS-SNACKS

Grade	A		B				C						D				E
	Milk, Grain Protein/Meat/ Fruit/Vegetable		Milk, Fruit/ Vegetable, Protein/Meat	Grain, Protein/ Meat, Fruit/ Vegetable	Milk, Grain, Protein/ Meat	Milk, Grain Fruit/ Vegetable	Protein/ Meat, Fruit/ Vegetable	Milk, Protein/ Meat	Grain, Protein/ Meat	Milk, Fruit/ Vegetable	Milk, Grain	Grain, Fruit/ Vegetable	Protein/ Meat	Milk	Fruit/ Vegetable	Grain	No Food Group
	%		%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
7-9 N=1,109	43.01		17.22 (	11.45 total 34.63	4.78 )	1.17 )	6.76 (	4.60	2.52 total 15.51	1.08	0.27 )	0.27 )	2.98 (	1.35 total 5.32	0.81 )	0.18 )	1.53
10-12 N=794	42.70		17.63 (	8.31 total 32.49	6.05 )	0.50 )	7.30 (	5.42	3.02 total 17.63	1.13	0.50 )	0.25 )	4.03 (	1.13 total 5.79	0.38 )	0.25 )	1.39
Total 7-12 N=1,903	42.88		17.39 (	10.14 total 33.74	5.31 )	0.89 )	6.99 (	4.94	2.73 total 16.40	1.10	0.37 )	0.26 )	3.42 (	1.26 total 5.52	0.63 )	0.21 )	1.47

TABLE XVII

PERCENTAGES OF GIRLS, GRADES 7-9, AND GRADES 10-12 EATING  
SPECIFIC FOOD GROUP COMBINATIONS FOR DIETARY  
PATTERNS A, B, C, D, AND E FOR  
EVENING MEAL-PLUS-SNACKS

Grade	A	B					C					D				E
	Milk, Grain Protein/Meat/ Fruit/Vegetable	Milk, Fruit/ Vegetable, Protein/Meat	Grain, Protein/ Meat, Fruit/ Vegetable	Milk, Grain, Protein/ Meat	Milk, Grain Fruit/ Vegetable	Protein/ Meat, Fruit/ Vegetable	Milk, Protein/ Meat	Grain, Protein/ Meat	Milk, Fruit/ Vegetable	Grain, Fruit/ Vegetable	Milk, Grain	Protein/ Meat	Milk	Fruit/ Vegetable	Grain	No Food Group
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
7-9 N=1,037	39.83	15.91 (	14.75 total 37.03	5.69	0.68 )	9.55 (	2.80	2.60 total 17.26	1.45	0.58	0.29 )	2.41 (	1.06 total 4.82	1.16	0.19 )	1.06
10-12 N=858	29.60	21.33 (	9.56 total 37.53	5.48	1.17 )	10.84 (	6.18	3.50 total 22.73	1.52	0.47	0.23 )	3.85 (	1.98 total 7.11	0.93	0.35 )	3.03
Total N=1,895	35.20	18.36 (	12.40 total 37.26	5.59	0.90 )	10.13 (	4.33	3.01 total 19.74	1.48	0.53	0.26 )	3.06 (	1.48 total 5.86	1.06	0.26 )	1.95

(6.76 percent of the boys in grades 7-9 and 7.30 percent of the boys in grades 10-12) when only two food groups are represented. As with lunch, least often chosen was the bread/cereal-plus-fruit/vegetable combination (0.27 percent of the boys in grades 7-9 and 0.25 percent of the boys in grades 10-12). These results are shown in Table XVI.

Girls in grades 7-12 also tended to skip the evening meal-plus-snacks much less often than lunch (1.95 percent of the girls indicated no food group ingestion in the evening meal-plus-snacks and 16.46 percent said they ate nothing from the Basic Four at lunch). More girls in grades 10-12 (3.03 percent) than girls in grades 7-9 (1.06 percent) exhibited this pattern. Many more girls than boys, however, chose the intermediate patterns B, C, or D at the evening meal-plus-snacks. (See Table XVII.) Only 35.20 percent of the female students (39.83 percent of the girls in grades 7-9 and 29.60 percent of the girls in grades 10-12) attained pattern A on the survey day.

The first food eliminated by girls was the bread/cereal group; 18.36 percent of the girls exhibited this particular pattern B (15.91 percent of the girls in grades 7-9 and 21.33 percent of the girls in 10-12). The next food group omitted was the milk group (14.75 percent of the girls in grades 7-9 and 9.56 percent of the girls in grades 10-12 chose this pattern B). Results indicate, however, that over two-fifths (42.05) of the girls in grades 7-12 chose one or more milk group foods as snacks. There was no significant difference demonstrated between the girls in grade levels. Nearly 30

percent of the girls in grades 7-12 chose foods from the bread/cereal group as snacks. Girls in grades 7-9 said they ate one or more grain foods as snacks significantly (0.0005) more often than girls in grades 10-12. Many more girls in grades 7-9 than girls in grades 12-12 chose one or more fruits or vegetables as snacks; the difference was not as great at the evening meal. More girls in grades 10-12 than girls in grades 7-9 chose to eliminate the fruit/vegetable group at the evening meal.

There were only three more unpopular pattern combinations exhibited at the evening meal-plus-snacks than the pattern B that included milk-plus-bread/cereal-plus fruit/vegetable (0.68 percent of the girls in grades 7-9 and 1.17 percent of the girls in grades 10-12). This particular pattern B duplicates one of the most complete combinations (pattern A) for breakfast. Table XVII shows that two specific patterns designated C and that one specific pattern designated D were chosen by slightly more than one percent of the girls in grades 7-12. More than one-tenth of the girls in grades 7-12 eliminated both the milk and bread/cereal groups at the evening meal-plus-snacks (9.55 percent of the girls in grades 7-9 and 10.84 percent of the girls in grades 10-12.)

This study confirms that fewer teenagers skip the evening meal-plus-snacks than other meals. Although the difference was not significant (level 0.08), it should be noted that most of the students in grades 7-9 who eliminated one food group (pattern B) omitted the bread/cereal group first and then the milk group. Boys (17.22 percent) and girls (15.91 percent)

TABLE XVIII

PERCENTAGES OF STUDENTS IN GRADES 7-9 EATING SPECIFIC  
FOOD GROUP COMBINATIONS FOR DIETARY  
PATTERNS A, B, C, D, AND E FOR  
EVENING MEAL-PLUS-SNACKS

Sex	A	B					C					D				E
	Milk, Grain Protein/Meat/ Fruit/Vegetable	Milk, Fruit/ Vegetable, Protein/Meat	Grain, Protein/ Meat, Fruit/ Vegetable	Milk, Grain, Protein/ Meat	Milk, Grain Fruit/ Vegetable	Protein/ Meat, Fruit/ Vegetable	Milk, Protein/ Meat	Grain, Protein/ Meat	Milk, Fruit/ Vegetable	Grain, Fruit/ Vegetable	Milk, Grain	Protein/ Meat	Milk	Fruit/ Vegetable	Grain	No Food Group
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Boys N=1,109	43.01	17.22 (	11.45 total 34.63	4.78	1.17 )	6.76 (	4.60	2.52 total 15.51	1.08	0.27	0.27 )	2.98 (	1.35 total 5.32	0.81	0.18 )	1.53
Girls N=1037	39.83	15.91 (	14.75 total 37.03	5.69	0.68 )	9.55 (	2.80	2.60 total 17.26	1.45	0.58	0.29 )	2.41 (	1.06 total 4.82	1.16	0.19 )	1.06
Total N=2,146	41.47	16.59 (	13.05 total 35.79	5.22	0.93 )	8.11 (	3.73	2.56 total 16.36	1.26	0.42	0.28 )	2.70 (	1.21 total 5.08	0.98	0.19 )	1.30

TABLE XIX  
PERCENTAGES OF STUDENTS IN GRADES 10-12 EATING SPECIFIC  
FOOD GROUP COMBINATIONS FOR DIETARY  
PATTERNS A, B, C, D, AND E FOR  
EVENING MEAL-PLUS-SNACKS

Sex	A		B					C					D				E
	Milk, Grain Protein/Meat/ Fruit/Vegetable		Milk, Fruit/ Vegetable, Protein/Meat	Grain, Protein/ Meat, Fruit/ Vegetable	Milk, Grain, Protein/ Meat	Milk, Grain Fruit/ Vegetable	Protein/ Meat, Fruit/ Vegetable	Milk, Protein/ Meat	Grain, Protein/ Meat	Milk, Fruit/ Vegetable	Milk, Grain Fruit/ Vegetable		Protein/ Meat	Milk	Fruit/ Vegetable	Grain	No Food Group
	%		%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Boys N=794	42.70		17.63 (	8.31	6.05	0.50 )	7.30 (	5.42	3.02	1.13	0.25	0.50 )	4.03 (	1.13	0.38	0.25 )	1.39
				total 32.49					total 17.63					total 5.79			
Girls N=858	29.60		21.33 (	9.56	5.48	1.17 )	10.84 (	6.18	3.50	1.52	0.47	0.23 )	3.85 (	1.98	0.93	0.35 )	3.03
				total 37.53					total 22.73					total 7.11			
Total N=1,652	35.90		19.55 (	8.96	5.75	0.85 )	9.14 (	5.81	3.27	1.33	0.36	0.36 )	3.93 (	1.57	0.67	0.30 )	2.24
				total 35.11					total 20.28					total 6.48			

chose milk-plus-protein/meat-plus-fruit/vegetable first (16.59 percent). They then ate from the bread/cereal-plus-protein/meat-plus-fruit/vegetable groups (11.45 percent of the boys and 14.75 percent of the girls). The other B patterns were chosen by only 6 percent of the students in grades 7-9. Somewhat more of the boys (43.01 percent) than girls (39.83 percent) in grades 7-9 attained pattern A at the evening meal-plus-snacks. Results are shown in Table XVIII.

In grades 10-12, however, substantially more of the boys (42.70 percent) than girls (29.60 percent) attained pattern A for the evening meal-plus-snacks. When one food group was omitted (pattern B) it was the bread/cereal group first (19.55 percent of the students in grades 10-12). Girls (21.33 percent) exhibited this pattern much more often than boys (17.63 percent). When the milk group was eliminated (8.96 percent), boys in grades 10-12 (8.31 percent) were almost as likely to do so as girls in grades 10-12 (9.56 percent). Results are shown in Table XIX.

When pattern C was exhibited, boys in grades 10-12 ate foods from the protein/meat-plus-fruit/vegetable groups (7.30 percent) while 10.84 percent of the girls in grades 10-12 selected foods from the same groups. The remaining combinations of food groups making up dietary pattern C were chosen by about equal percentages of boys and girls in grades 10-12 (Table XVIII).

When only one food group was represented at the evening meal-plus-snacks, the protein/meat group was chosen by 1.94 percent of the boys and 2.00 percent of the girls in grades

10-12. The bread/cereal group was selected by only 0.30 of the students who ate one item for the evening meal-plus-snacks (Table XIX).

Huenemann et al., (1966) reported that the evening meal was the most preferred by teenagers because of the food usually served. Baird (1979) reported that 9 percent of the girls in grades 10-12 omitted lunch, as did 2 percent of the boys, giving as their reason, "I am on a diet." Analysis of the Oklahoma Needs Assessment (Baird, 1979) data by food groups showed that more than one-tenth of the students surveyed omitted both milk and bread/cereal groups at the evening meal-plus-snacks. Was dieting a major factor in the choice of over 200 girls to eliminate important sources of calcium, riboflavin, thiamin, iron and niacin as well as energy at the evening meal-plus-snacks?

#### Summary

H<sub>1</sub>: A significant difference was identified between the food group distribution patterns at breakfast and lunch for all students. The data indicated that in grades 7-9 and in grades 10-12 boys attained pattern A significantly more often than girls (level 0.0001). Boys in grades 10-12 also attained pattern A more often than girls in grades 10-12 at the evening meal-plus-snacks; girls exhibited pattern B and pattern C more often than boys (level 0.0001). The null hypothesis is rejected for these sample groups.

The results showed no significant difference was established between the dietary behavior, at the evening meal-

plus-snacks, of boys and girls in grades 7-9. In this instance the null hypothesis is not rejected.

H<sub>2</sub>: Analysis of data identified a significant difference at the 0.0001 level between the food group distribution pattern of most students in grades 7-9 and grades 10-12. Students in grades 7-9 were more apt to attain higher ranking dietary pattern than students in grades 10-12. Girls in grades 7-9 attained the more complete patterns (a higher acceptability rating) more often than girls in grades 10-12 (significance level 0.0001). Boys in grades 7-9 exhibited patterns A, B, or C (two or more food groups ingested) at breakfast and lunch significantly more often than boys in grades 10-12 (level 0.0001). Girls in grades 7-9 attained a higher rank of dietary behavior at the evening evening meal-plus-snacks than did girls in grades 10-12; the younger girls ate foods from all four food groups whereas the older girls ate foods from two or three food groups (level 0.0001). The null hypothesis is rejected for these groups.

There was no significant difference established for the food group dietary behavior at the evening meal-plus-snacks of boys in grades 7-9 and boys in grades 10-12 (level 0.7059). The null hypothesis is not rejected for boys at the evening meal-plus-snacks.

H<sub>3</sub>: Analysis of data showed a significant difference exists between the numbers and choices of food group ingestion of boys and girls in grades 7-9 at breakfast (level 0.0001). Results also indicate a significant difference exists between the numbers and choices of food groups

ingested at breakfast between boys and girls in grades 10-12 (level 0.0001). Girls in grades 10-12 tend to skip breakfast much more often and eat from fewer food groups than girls in grades 7-9 (level 0.0001). Boys in grades 10-12 tend to skip breakfast much more often and eat from fewer food groups than boys in grades 7-9 (level 0.0001). The null hypothesis is therefore rejected.

H<sub>4</sub>: The data indicated a significant difference at the 0.0001 level between the numbers and choices of food group ingestion of boys and girls in grades 7-9 at lunch. Results showed a significant difference (level 0.0001) between the numbers and choices of food group ingestion of boys and girls in grades 10-12 at lunch. Boys in grades 7-9 tended to include more food groups at lunch than boys in grades 10-12. Girls in grades 7-9 tended to include more food groups at lunch than girls in grades 10-12. Thus the null hypothesis is rejected.

H<sub>5</sub>: The data indicated a significant difference between the sexes in grades 10-12 (level 0.0002) at the evening meal-plus-snacks. More boys than girls ate desirable numbers of the Basic Four food groups than girls in grades 10-12. Significance (level 0.0001) can also be reported for girls in grades 7-9 and girls in grades 10-12. For these two groups the null hypothesis is rejected. No significance was shown at the evening meal-plus-snacks for boys, grades 7-9 and grades 10-12 nor for the sex of the student in grades 7-9. For these two groups the null hypothesis is not rejected.

## CHAPTER V

### SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

#### Summary

The purpose of this study was to analyze data, collected previously in the Oklahoma Needs Assessment (Baird, 1979), to determine the food group distribution patterns of Oklahoma adolescents. The analysis examined the 24-hour dietary recall food intakes of 3,798 students in grades 7-12 to determine when certain food groups were ingested. Responses of 794 boys and 858 girls in grades 10-12 and 1,109 boys and 1,037 girls in grades 7-9 were analyzed. The intent of the study was to test the following null hypotheses:

- H<sub>1</sub>: There will be no significant difference in the food group distribution patterns by sex of students.
- H<sub>2</sub>: There will be no significant difference in the food group distribution patterns of students by grade level.
- H<sub>3</sub>: There will be no significant difference in the number and choice of food groups provided by breakfast of students by sex and grade levels 7-9 and 10-12.
- H<sub>4</sub>: There will be no significant difference in the number and choice of food groups provided by lunch

of students by sex and grade levels 7-9 and 10-12.

H<sub>5</sub>: There will be no significant difference in the number and choice of food groups provided by the evening meal-plus-snacks of students' by sex and grade levels 7-9 and 10-12.

### Conclusions

#### Findings

The conclusions are organized according to each of the hypotheses by meal, breakfast, lunch and evening meal-plus-snacks.

H<sub>1</sub>: A significant difference was identified at the 0.0001 between the food group distribution patterns of students. The data indicated that in grades 7-12 boys tended to to attain more complete dietary patterns more often than girls at breakfast and lunch. The null hypothesis is rejected for breakfast and lunch. There was no significance established (level 0.3595) for the relationship between dietary behavior and sex of students in grades 7-9 for the evening meal-plus-snacks. Here the null hypothesis is not rejected.

H<sub>2</sub>: Analysis of data identified a significant difference at the 0.0001 level between the food group distribution pattern of students in grades 7-9 and grades 10-12 at breakfast and lunch. Students in grades 7-9 were more apt to attain higher ranking dietary patterns than students in grades 10-12 for breakfast and lunch. Girls in grades 7-9 ate foods

from more of the Basic Four food groups significantly more often (0.0001) than girls in grades 10-12. The null hypothesis is rejected for the aforementioned groups/meals. At the evening meal-plus-snacks no significance was found between dietary behavior and boys in grades 7-9 and boys in grades 10-12. For boys for this meal the null hypothesis is not rejected.

H<sub>3</sub>: Analysis of data showed a significant difference exists between the numbers and choices of food group ingestion of boys and girls in grades 7-9 at breakfast. Results also indicate a significant difference exists between the numbers and choices of food groups ingested at breakfast between boys and girls in grades 10-12. Girls tend to skip breakfast more often and eat from fewer food groups than girls in grades 7-9. Boys in grades 7-9 eat from all four food groups and omit breakfast less often than boys in grades 10-12. The null hypothesis is therefore rejected (level 0.0001).

H<sub>4</sub>: The data indicated a significant difference at the 0.0001 level between the numbers and choices of food group ingestion of boys and girls in grades 7-9 at lunch. Results showed a significant difference (level 0.0001) between the numbers and choices of food group ingestion of boys and girls in grades 10-12 at lunch. Boys in grades 7-9 tended to include more food groups at lunch than boys in grades 10-12. Girls in grades 7-9 tended to include more food groups at lunch than girls in grades 10-12. Thus the null hypothesis is rejected.

H<sub>5</sub>: The data indicated a significant difference between the sexes in grades 10-12 (level 0.0002) at the evening meal-plus-snacks. More boys than girls in grades 10-12 ate desirable numbers of the Basic Four food groups. Significance (level 0.0001) can also be reported for girls in grades 7-9 and girls in grades 10-12. For these two groups the null hypothesis is rejected. No significance was shown at the evening meal-plus-snacks for boys, grades 7-9 and grades 10-12 nor for the sex of the student in grades 7-9. For these two groups the null hypothesis is not rejected.

More than one-third of the girls in grades 10-12 and nearly one-fourth of the boys in grades 10-12 indicated that they consumed no food from the Basic Four food groups at breakfast. This compares with fewer students in grades 7-9 who exhibited the same pattern, 15.42 percent of the boys and 23.9 percent of the girls. The pattern was inverted for the most complete dietary pattern, A, where nearly one-fourth of the boys in grades 7-12 and less than one-seventh of the girls in grades 7-12 consumed the recommended servings of foods from the Basic Four food groups at breakfast.

Pattern C (two food groups represented) offers six possible food group combinations. With the exception of pattern E (no food group represented) more students chose the milk-plus-bread/cereal combination than any other pattern at breakfast. More than half of the students in grades 7-9 (58.29 percent) indicated no source of vitamin C (fruit/vegetable group) for breakfast. There were as many boys in grades 7-9 exhibiting pattern A, as there were girls

exhibiting pattern E at breakfast. In grades 7-9 more students exhibited pattern C at breakfast than any other pattern (29.22 percent of the boys and 28.45 percent of the girls).

In grades 10-12 more students exhibited pattern E at breakfast (22.54 percent of the boys and 36.48 percent of the girls indicated no food group ingestion) than any other pattern. When some food consumption was indicated, students in grades 10-12 also selected the milk-plus-bread/cereal combination of pattern C most often. Girls chose this pattern at breakfast almost as often as boys. Girls and boys in grades 10-12 were similar in their preference for the three-food-group pattern A for breakfast. Boys were much more likely to add the protein/meat group of the alternate pattern A for breakfast (12.85 percent of the boys and 5.13 percent of the girls). With iron an acknowledged adolescent dietary deficiency, nearly 70 percent of the girls in grades 10-12 indicated no source of vitamin C (fruit/vegetable group) which aids iron utilization at breakfast.

Fewer students in grades 7-9 omitted lunch than breakfast. Many more boys (43.28 percent of the boys in grades 7-9) exhibited pattern A than did the girls (32.21 percent) on the survey day. Very few students in grades 7-9 omitted the protein/meat groups or the bread/ cereal group at lunch. Many of the students omitted the fruit/vegetable group or the milk group at lunch. Over one-third of the students in grades 7-9 (39.44 percent) did not indicate some food from the fruit/vegetable group, the primary source of vitamin C

and vitamin A, at lunch. Nearly one-third (32.29 percent) of those in grades 7-9 eliminated the milk group, the principal food source of calcium and riboflavin at lunch.

About half as many students in grades 10-12 exhibited pattern E at lunch than at breakfast. Many more boys (42.07 percent of the boys in grades 10-12) ate foods from all four of the food groups, pattern A, than girls (22.61 percent). Many more girls than boys skipped lunch on the survey day. More girls than boys chose to eliminate the fruit/vegetable group, the milk group, or both the milk and fruit/vegetable groups at lunch. Nearly two-thirds (65.98 percent) of the students in grades 10-12 indicated no dietary source of calcium and riboflavin at lunch. Nearly half (42.85 percent) of the students in grades 10-12 omitted the the fruit/vegetable group, those foods richest in vitamins A and C, at lunch.

The participation rate was greater at the evening meal-plus-snacks than any other meal for both sexes and grade levels. Only 1.30 percent of the students in grades 7-9 reported no food group ingestion for the evening meal-plus-snacks as opposed to 2.24 percent of the older group. Almost as many girls in grades 7-9 (39.83 percent) as boys in grades 7-9 (43.01 percent) attained pattern A at the evening meal-plus-snacks. Seventy percent of those in grades 7-9 reported foods from the milk group; 64.11 percent reported foods from the protein/meat group; and 94.45 percent reported foods from the fruit/vegetable group for this meal period.

The evening meal-plus-snacks obviously provides most of

the nutrients this age group ingests. More than one-tenth of the students exhibited a pattern B, with no milk group. When 13.05 percent of them omit at the evening meal-plus-snacks the major dietary source of calcium and riboflavin, can the assumption of dietary adequacy be made for the other 86.95 percent of the students who indicated some milk group food at this time? When 16.99 percent, exhibiting another pattern B, omit important sources of niacin, thiamin and complex carbohydrate at the meal with the highest participation rate, there would still seem to be cause for concern.

Slightly more than one-third of the students in grades 10-12 exhibited pattern A at the evening meal-plus-snacks. More of the boys in grades 10-12 attained the most complete dietary patterns than girls (29.60 percent). More than two-fifths of the high school group eliminated the bread/cereal group at the evening meal-plus-snacks. More than one-fifth did not eat from the fruit/vegetable group, more than one-fourth did not eat from the milk group, but less than one-tenth did not eat from the protein/meat group at the evening meal-plus-snacks. Since 54.83 percent of the students in grades 10-12 did not choose milk group foods for snacks, 51.24 did not choose foods from the bread/cereal group for snacks, and two-thirds (66.38 percent) did not choose fruits or vegetables as snacks, variety in dietary selection at the evening meal is crucial.

### Implications

The results of this study led to the conclusion that

students in grades 7-9 and grades 10-12 do not act on their nutrition knowledge about the Basic Four food groups. If only the recommended number of servings from the Basic Four food groups is consumed, approximately 1,400 kilocalories have been ingested. It is recommended that growing children eat additional other foods as needed for energy. Therefore many of the Oklahoma students, especially but not exclusively female, in grades 7-12 have a misconception concerning their energy needs when they list "I am on a diet" as sufficient reason for omitting food groups from regular meals.

Although the results of this study confirm other findings that many teenagers do not eat the recommended servings of foods from the Basic Four food groups, there are many who are far from the brink of nutritional disaster. Selecting foods from the Basic Four is still the simplest way to plan adequate daily nutrition providing the known 50 or so essential nutrients for both the poorly fed adolescent and the well-fed adolescent.

The strongest meal association for the Basic Four food groups is that of the milk-plus-bread/cereal combination at breakfast. It was chosen by more of the students who ate something than any other pattern. The ease of preparation could be one important factor in this choice. Could the copious amounts of advertising this age group has absorbed from the electronic media during their lifetimes be a major factor influencing their choice of breakfast items, also? Fruit or fruit juice would seem to be a food item easy to prepare. However, 209 grade 7-9 students and 121 grade 10-12

students did not add any food item from the fruit/vegetable group that would have sufficed to complete the breakfast. Breakfast is the only meal at which milk was highly accepted by all students.

Was dieting a feasible reason for over 600 of the 1,895 girls to eliminate the major sources of calcium, riboflavin, and vitamins A and C from their choice of food at lunch? When three-fourths of the girls reported no vitamin C source at breakfast, how do their bodies utilize and conserve the sub-minimal iron intakes usually attributed to female teenagers' diets? Boys, with their larger muscle mass and longer growth period need more of the same nutrients yet even three-fourths of the boys in the survey showed no vitamin C source at breakfast. Has teaching about the Basic Four in the classroom been enough? Has ". . . classification of foods according to four food groups . . ." (Baird, 1979, p. 43) been a sufficiently effective activity?

The bread/cereal group is as weakly associated with the evening meal-plus-snacks as the milk group is strongly associated with breakfast. For both age groups omission of the bread/cereal group was the second choice for a dietary pattern at the evening meal-plus-snacks. Nearly one-fifth of those surveyed, 679 students, ate foods from the milk-plus-protein/meat-plus-fruit/vegetable food groups, but eliminated one of the principal sources of B vitamins, complex carbohydrate and fiber. When the results also showed that omission of the fruit/vegetable group was the second dietary pattern choice of both groups at lunch, the lack of dietary sources of

fiber, because of its disease-associated risk, becomes a daily concern. Although ingestion of the protein/meat group foods did not seem to be deficient, sufficient carbohydrate must be consumed to ensure that the protein ingested will be used for growth during this period of maximum physical development. The results of this study would not seem to support the conclusion regarding Oklahoma teenagers' dietary behavior.

Nutrition must become more than a cognitive concept. Food, its production, preparation, and consumption, occupies much of a society's time, effort, and resources. Effective nutrition education efforts also need to focus on the pragmatism of dietary behavior; the enjoyable as well as economical aspects of food. Nutrition education must become more concerned with the affective behavior of the learner--student or parent or teacher.

Just learning about the Basic Four food groups is not enough. Students who have positive laboratory experiences in foods, acting on their knowledge, are truly educated. Nutrition education is incomplete which does not allow, encourage, and program the practice--the application of knowledge--of foods and nutrition within the institution.

#### Recommendations

On the basis of the findings, the following recommendations are proposed as questions for further research:

1. What foods, or combinations of food, constitute a student's perception of a meal?

2. How can schools establish positive food experience curricula for students of both sexes?
3. How can parents and others in the community become knowledgeable partners with education in school feeding programs so that each reinforces the practical efforts of the other?
4. How can the electronic media best be used to further nutrition education of the public?
5. What are the food group distribution patterns of students in grades 1-6?
6. What are the nutrient-dense foods, other than the Basic Four food group items, that teenagers eat at mealtimes and snacks?

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APPENDIX A

STUDENT QUESTIONNAIRE

STUDENTS' FORM  
 OKLAHOMA NUTRITION EDUCATION SURVEY 1978-79\*  
 A COOPERATIVE PROJECT OF  
 OKLAHOMA STATE DEPARTMENT OF EDUCATION - SCHOOL LUNCH SECTION  
 AND  
 OKLAHOMA STATE UNIVERSITY - DIVISION OF HOME ECONOMICS -  
 DEPARTMENT OF FOOD, NUTRITION, AND INSTITUTION ADMINISTRATION



District Name	School Name	Grade
Teacher's Name		I am a: (please circle) <div style="display: flex; justify-content: space-around; width: 100%;"> <span>Boy</span> <span>Girl</span> </div>

**INSTRUCTIONS** - This is not a test. It is a survey to find out what kinds of foods you and many others like you eat every day. Each choice has a blank line beside it which you are to mark with a check if it is your answer. There is an example below to show you how to mark your answers:

EXAMPLE 1: DO YOU LIKE TO EAT SNACKS?

☒ Yes  
☐ No

- |   |  |
|---|--|
| <p>1. Where did you eat breakfast? (Check only one)</p> <p><input type="checkbox"/> In the school breakfast program</p> <p><input type="checkbox"/> At home</p> <p><input type="checkbox"/> Bought breakfast on the way to school</p> <p><input type="checkbox"/> Other (please specify) _____</p> <p><input type="checkbox"/> I did not eat breakfast</p> <p>2. If you did not eat breakfast, indicate why. (Check one or more)</p> <p><input type="checkbox"/> Did not have time</p> <p><input type="checkbox"/> Not hungry</p> <p><input type="checkbox"/> Nobody to prepare it</p> <p><input type="checkbox"/> Did not feel good</p> <p><input type="checkbox"/> I am on a diet</p> <p><input type="checkbox"/> Food not available</p> <p><input type="checkbox"/> Did not like what was served</p> <p>3. Where did you eat lunch? (Check only one)</p> <p><input type="checkbox"/> In the school lunch program</p> <p><input type="checkbox"/> At home</p> <p><input type="checkbox"/> Brought lunch</p> <p><input type="checkbox"/> Bought lunch at local store or restaurant away from school</p> <p><input type="checkbox"/> Other (please specify) _____</p> <p><input type="checkbox"/> I did not eat lunch</p> | <p>4. If you did not eat the school lunch today, indicate why. (Check one or more)</p> <p><input type="checkbox"/> Not available</p> <p><input type="checkbox"/> Not well prepared</p> <p><input type="checkbox"/> Cooks are grouchy</p> <p><input type="checkbox"/> Costs too much</p> <p><input type="checkbox"/> Lost money</p> <p><input type="checkbox"/> I am on a diet</p> <p><input type="checkbox"/> More fun to eat away from school</p> <p><input type="checkbox"/> I prefer to bring my lunch</p> <p><input type="checkbox"/> The lunchroom is not a pleasant place to eat</p> <p><input type="checkbox"/> Did not like what was served</p> <p><input type="checkbox"/> Wait in line too long</p> <p><input type="checkbox"/> Other (please specify) _____</p> <p>5. How did you learn about what foods are good for you? (Check <u>all</u> that apply)</p> <p><input type="checkbox"/> Teacher</p> <p><input type="checkbox"/> Parents</p> <p><input type="checkbox"/> TV program</p> <p><input type="checkbox"/> Magazines I have read</p> <p><input type="checkbox"/> Other students</p> <p><input type="checkbox"/> Other (please specify) _____</p> |
|---|--|

\*Funded by the Oklahoma State Department of Education, School Lunch Section, and the United States Department of Agriculture. Portions of this survey were adapted from the Wisconsin Nutrition Education Survey, 1974, funded by USDA Food and Nutrition Service.

6. Please list what you ate for each meal. If a food was served, but you did not eat it, do not put it on the list.

Today's Lunch	Today's Breakfast	Last Evening's Meal	Snacks since last night's meal

USING THE LIST THAT YOU MADE, ANSWER THE FOLLOWING QUESTIONS ABOUT WHAT YOU ATE. ANSWER THE QUESTION BY CIRCLING Y OR N FOR EACH MEAL. Y = YES N = NO

	Today's Lunch	Today's Breakfast	Last Evening's Meal	Snacks
EXAMPLE: If you ate a hamburger with a bun, and a glass of milk for lunch, and had milk for a snack, you would circle the following:				
7. Milk, any kind	<input checked="" type="radio"/> Y <input type="radio"/> N	Y <input type="radio"/> <input checked="" type="radio"/> N	Y <input type="radio"/> <input checked="" type="radio"/> N	<input checked="" type="radio"/> Y <input type="radio"/> N
10. Plain meats, such as beef	<input checked="" type="radio"/> Y <input type="radio"/> N	Y <input type="radio"/> <input checked="" type="radio"/> N	Y <input type="radio"/> <input checked="" type="radio"/> N	Y <input type="radio"/> <input checked="" type="radio"/> N
36. Bread, bun, biscuits	<input checked="" type="radio"/> Y <input type="radio"/> N	Y <input type="radio"/> <input checked="" type="radio"/> N	Y <input type="radio"/> <input checked="" type="radio"/> N	Y <input type="radio"/> <input checked="" type="radio"/> N
7. Milk, any kind-including cocoa and egg nog.	Y <input type="radio"/> <input checked="" type="radio"/> N	Y <input type="radio"/> <input checked="" type="radio"/> N	Y <input type="radio"/> <input checked="" type="radio"/> N	Y <input type="radio"/> <input checked="" type="radio"/> N
8. Ice cream, milk shakes, pudding or custard.	Y <input type="radio"/> <input checked="" type="radio"/> N	Y <input type="radio"/> <input checked="" type="radio"/> N	Y <input type="radio"/> <input checked="" type="radio"/> N	Y <input type="radio"/> <input checked="" type="radio"/> N
9. Cheese, any kind-including cottage cheese or yogurt.	Y <input type="radio"/> <input checked="" type="radio"/> N	Y <input type="radio"/> <input checked="" type="radio"/> N	Y <input type="radio"/> <input checked="" type="radio"/> N	Y <input type="radio"/> <input checked="" type="radio"/> N
10. Plain meats such as beef (hamburger, meatloaf, steak), pork (ham), lamb, or veal.	Y <input type="radio"/> <input checked="" type="radio"/> N	Y <input type="radio"/> <input checked="" type="radio"/> N	Y <input type="radio"/> <input checked="" type="radio"/> N	Y <input type="radio"/> <input checked="" type="radio"/> N
11. Chicken or turkey.	Y <input type="radio"/> <input checked="" type="radio"/> N	Y <input type="radio"/> <input checked="" type="radio"/> N	Y <input type="radio"/> <input checked="" type="radio"/> N	Y <input type="radio"/> <input checked="" type="radio"/> N
12. Luncheon meat, bologna, weiners, or sausages.	Y <input type="radio"/> <input checked="" type="radio"/> N	Y <input type="radio"/> <input checked="" type="radio"/> N	Y <input type="radio"/> <input checked="" type="radio"/> N	Y <input type="radio"/> <input checked="" type="radio"/> N
13. Tuna salad, chicken salad, or ham salad.	Y <input type="radio"/> <input checked="" type="radio"/> N	Y <input type="radio"/> <input checked="" type="radio"/> N	Y <input type="radio"/> <input checked="" type="radio"/> N	Y <input type="radio"/> <input checked="" type="radio"/> N

	Today's Lunch	Today's Breakfast	Last Evening's Meal	Snacks
14. Fish, including fish sticks, tuna, fried fish, shrimp.	Y N	Y N	Y N	Y N
15. Egg.	Y N	Y N	Y N	Y N
16. Black eyed peas, baked beans, split peas, or bean soup.	Y N	Y N	Y N	Y N
17. Peanut butter, or nuts of any kind.	Y N	Y N	Y N	Y N
18. Combination main dishes like stew or meat pie, pizza, spaghetti, tacos, burritos, noodles, macaroni, or rice dish with meat, chicken, turkey, or fish.	Y N	Y N	Y N	Y N
19. Fruit or juice (orange, tangerine, grapefruit).	Y N	Y N	Y N	Y N
20. Strawberries, canteloupe, watermelon, and other melon, fresh or frozen.	Y N	Y N	Y N	Y N
21. Tomatoes, any kind, or coleslaw, raw green pepper.	Y N	Y N	Y N	Y N
22. Any of the following fruit drinks: Tang, Hi C, Awake, Del Monte Fruit Drink, Hawaiian Punch.	Y N	Y N	Y N	Y N
23. Other fruit drinks.	Y N	Y N	Y N	Y N
24. Carrots, any kind, sweet potatoes or yams, pumpkin, yellow squash.	Y N	Y N	Y N	Y N
25. Greens-spinach, beet greens, turnip greens, mustard greens, collards, dandelion greens.	Y N	Y N	Y N	Y N
26. Broccoli.	Y N	Y N	Y N	Y N
27. Peaches, canned purple plums, or apricots.	Y N	Y N	Y N	Y N
28. Apple, banana, pineapple slices, or pears.	Y N	Y N	Y N	Y N
29. Fruit cocktail or cranberries.	Y N	Y N	Y N	Y N
30. Jello salads with fruit or vegetable.	Y N	Y N	Y N	Y N
31. Celery sticks, cucumber slices, or green salad.	Y N	Y N	Y N	Y N
32. Green peas, asparagus, green beans, or lima beans.	Y N	Y N	Y N	Y N
33. Okra, corn, or cauliflower.	Y N	Y N	Y N	Y N
34. Raisins, prunes, dried apricots, or other dried fruit.	Y N	Y N	Y N	Y N
35. White potatoes, including french fries.	Y N	Y N	Y N	Y N
36. Bread, buns, biscuits, any kind. (remember to include bread from sandwiches)	Y N	Y N	Y N	Y N

	Today's Lunch	Today's Breakfast	Last Evening's Meal	Snacks
37. Dry or cooked breakfast cereals.	Y N	Y N	Y N	Y N
38. Rice, noodles, spaghetti, macaroni <u>without meat</u> , <u>chicken</u> , <u>turkey</u> or <u>fish</u> .	Y N	Y N	Y N	Y N
39. Crackers, such as Saltines, Graham, and similar items.	Y N	Y N	Y N	Y N
40. Pop, soda, soft drink. (Not diet)	Y N	Y N	Y N	Y N
41. Potato or corn chips, pretzels and other similar snack items.	Y N	Y N	Y N	Y N
42. Doughnuts, sweet rolls, cookies, cakes.	Y N	Y N	Y N	Y N
43. Fruit pies.	Y N	Y N	Y N	Y N
44. Custard or cream pies (including pumpkin).	Y N	Y N	Y N	Y N
45. Candy, chocolates, mints, ice cream toppings.	Y N	Y N	Y N	Y N
46. Jam, jelly, syrup, honey.	Y N	Y N	Y N	Y N
47. Margarine or butter.	Y N	Y N	Y N	Y N

48. List the 4 Basic Food Groups.

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APPENDIX B

INSTRUCTIONS FOR TEACHERS

## instructions for teachers

First please read all instructions.

Instructions to give the students:

1. Explain what the questionnaire is:

This is not a test. The questions and answers will tell us what kinds of food you eat each day and when you eat them. The class has been randomly selected to participate in a unique survey. It is the first time in Oklahoma that a food intake survey has been made which is representative of all public school age students.

2. Hand out the questionnaire. Ask students NOT to make any marks on the sheets until you have explained how to mark the answers.
3. Read page one instructions slowly with the students. Are there any questions? Instruct students to answer each number in sequence.
4. At this time please let students fill this section of the questionnaire in before proceeding to page two.
5. Have students open the questionnaire. Read the instructions for question six with the students.

Following is an example to clarify the instructions for the students. Please emphasise the students are to mark only the foods they ATE.

Ex. If for dinner last night your mother served

Baked Chicken  
Mashed Potatoes  
Peas and Cranberry Salad

BUT you only ATE the Chicken and Mashed Potatoes  
You would NOT list or mark the peas and cranberry salad.

6. Read the instructions with the students following the meal lists. Go over the example given. Are there any questions? You may want to write the example on the blackboard and go through it again.

Please explain that "Snacks" include all foods eaten at other than regularly designated meal time (between breakfast and lunch, before breakfast, after last evening's meal.

Ex. Drinking a glass of milk with cookies before going to bed.

Remind students to include the bread in sandwiches.

7. If there are no further questions the students may continue filling out the questionnaire. Please feel free to help the students, answering questions, as they fill in the questionnaire.

### Attention Teachers' Grades 1-3:

Individuals that will be assisting you in administering the questionnaire should go through the instructions individually with the child.

APPENDIX C

LETTER TO LIAISON

# Oklahoma State University

Department of Food, Nutrition and Institution Administration

SHILLWATER, OKLAHOMA 74074  
(405) 624-5039

March 1, 1979

Dear Friend:

Thank you for your acceptance to participate in a needs assessment survey as a part of the Nutrition Education and Training Program. This is a joint effort of the State Department of Education and Oklahoma State University. Over the last couple of months, you have received correspondence and/or phone calls regarding this very important program and your response has been greatly appreciated.

It is now time for you as liaison person to conduct the needs assessment for your district. A list of selected schools and teachers is enclosed. We are mailing to you under separate cover enough survey instruments for your principals, teachers, and students. The following information is important as you oversee the administration of this survey.

- 1) A list of teachers has been identified for you - please have them all complete the questionnaire.
- 2) A list of all the schools in the survey has been identified for you - please have the principal in each of those schools complete a questionnaire.
- 3) With respect to the teachers identified for the survey, we would like for them to administer the student questionnaire to their class which is the first hour immediately after lunch on Tuesday, Wednesday, or Thursday prior to March 23. As soon as you have completed these, please return them.

Some additional information which may be helpful in administration of this survey:

- 1) If the teacher identified is no longer in your school system, do not survey that class.
- 2) If the teacher identified has no students the hour after lunch, have the teacher fill out his/her own form but no forms need be administered to students.
- 3) If you run out of student questionnaires, please call.
- 4) The teachers of first, second, and third grades will undoubtedly need assistance in administering the questionnaire as students will need individual help. You may wish to call on parents, aides, high school home economics students, student teachers, or other building personnel for assistance with the survey.
- 5) Be sure that each teacher receives one of the white sheets of instructions for administering the student form.
- 6) Once you have the survey all completed, please mail it back. Return postage is enclosed for your convenience.

Please return all forms, used and extras by March 23 at the latest.  
If you have any problems, please call me collect.

Sincerely yours,

*Michael J. Hopkins*

Michael J. Hopkins  
Public Service Specialist  
Home Economics Extension  
(405)624-6840

VITA!

Janet Chambers Gregory

Candidate for the Degree of  
Master of Science

Thesis: A STUDY OF THE FOOD GROUP DISTRIBUTION PATTERNS OF  
CHILDREN, GRADES 7-12

Major Field: Food, Nutrition and Institution Administration

Biographical:

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Education: Received a Bachelor of Science in Home  
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