

A NUTRITIONAL STUDY OF CHILDREN'S
DIETARY PATTERNS, GRADES 4-6

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CHAPTER I

INTRODUCTION

The critical importance of nutritional health has become a key issue in national food, agricultural, and health policies. The revelation that hunger existed in the United States during the affluent sixties shocked the American public. As a result, particularly after the telecast of the documentary "Hunger USA," both the Food Stamp and the School Lunch Programs were expanded and the School Breakfast Program was developed (Lee, 1978). The Secretary of Agriculture under Lyndon Johnson summed up the objective, "Never let it be said of the American people that we were able to put a man on the moon in the decade of the Sixties and failed to put food in the mouths of hungry children".

While the sixties were years of revelation, the 1970's have become years of defining and problem solving. The Senate Select Committee on Nutrition and Human Needs and such groups as the National Nutrition Consortium have been in the forefront in this effort as they have lobbied politicians, educators, and citizens for a combined assault on hunger and malnutrition. The immediate impact of this lobbying is impressive. By 1977, total national expenditures for nutrition programs reached \$8.4 billion per annum (La Chance, 1977, p. 487). More important than increased expenditures, however, is the question of actual effectiveness. Are the methods and organizations supported by the additional funding meeting the recognized needs of the populace, and are they

doing so in an efficient manner?

In partial response to the question, one must note the importance of nutrition education in general and at the elementary school level in particular. While School Lunch is without a doubt important at the middle and high school levels, studies by McWilliams (1967), and Giff, Washbon, and Harrison (1972) have shown that effectiveness is maximized at grades K-6. This effectiveness is attributed to at least two factors. First, lifelong dietary practices are usually established during this stage of development as students are still responsive to positive reinforcement. Second, as McWilliams (1967) notes, the student's elementary years correspond to the physiological process of storing nutrients in preparation for the rapid growth of adolescence. Thus, from both a physiological and educational (i.e., teachability) perspective, the elementary years are the critical, formative years in the dietary development of the individual. In the words of Senator McGovern (1974, p. 25), "an expanded nutrition program has to start with children in elementary school."

From another perspective, Peterson and Kies (1972) have examined the impact of the school environment on student eating patterns. Their conclusions stress not only the importance of a nutrition program at the elementary level, but a program which represents the integration of the lunchroom with the classroom experience. The strategy of this approach serves to maximize the effectiveness of the School Lunch Program as a whole.

La Chance (1977, p. 488) notes that institutional feeding programs such as the School Lunch and Breakfast Program not only assist families economically, but also effectively prevent malnutrition in children.

According to La Chance, this assistance and prevention is accomplished because the programs contribute 25 to 50 percent of the recommended allowances to a child's diet five days per week. A concurrent problem, however, is that not all children eat all of the School Lunch every day.

D. M. Hegsted (1977) supports La Chance's conclusions:

The school lunch program represents the simple realization that children must eat, and that, in a complex society, it may be simpler, easier, or more efficient to give them lunch at school. Yet, for deprived children, the nutritional aspects are clearly important (p. 10).

Hegsted (1977) sounds a warning also. If the public is not made aware of the successes of these programs, they could very well be voted down by a Congress that is increasingly sensitive to the overburdened taxpayer. The social programs of the 1980's must prove their value to the population or be discontinued. It is certainly with this spirit in mind that the Congress included a needs assessment requirement in the 1977 Amendment to the Child Nutrition Act, PL 95-166.

The legislation PL 95-166 mandates a needs assessment for each state. The process itself is to identify discrepancies between "what should be" and "what is," thus identifying nutrition education and training needs. One of the 15 identified categories focuses on "problems in dietary habits of children and areas where nutrition education may assist in positive changes." This category, as it pertains to both areas, closely approximates the purpose of this study.

Statement of the Problem

In Oklahoma, little research has been done into the effectiveness of the School Lunch Program. In the 1978-79 Annual Report, Oklahoma State Department of Education, for average daily attendance, 1,888

schools participated in the National School Lunch Program. An average of 349,321 meals were served daily in October 1978 and March 1979. The overall school participation rate for the state was 63.5 percent.

In 1970, Dobbins conducted a survey of school children in Oklahoma by 24-hour dietary recall, but statewide conclusions were difficult to make since the sample was not representative. In order to examine the effectiveness and to satisfy part of the requirement for the needs assessment, an additional statewide survey was needed. It was the purpose of this study to examine by 24-hour dietary recall intakes of a selected sample of Oklahoma elementary school students. A comparison between the dietary adequacy of students who participate in School Lunch and those who do not will assist in evaluating the program's effectiveness.

Objectives

The objectives of the study were:

1. To determine the percentage of children by sex in grades 4-6 who eat breakfast.
2. To determine the percentage of children by sex in grades 4-6 who eat the School Lunch.
3. To determine the percentage of children by sex in grades 4-6 who had 1, 2, 3 or more servings of the defined food groups.
4. To determine the percentage of children in grades 4-6 who had an adequate diet as defined by this study.
5. To determine the relationship between adequacy of diet and participation in School Lunch.
6. To determine the relationship between knowledge of the Basic

Four Food Groups and adequacy of diet.

7. To determine the relationship between adequacy of diet and sex.
8. To formulate suggestions and recommendations.

Hypotheses

For this study, the following null hypotheses were tested:

- H₁: There will be no significant difference in dietary adequacy of children according to School Lunch participation.
- H₂: There will be no significant difference in children's dietary adequacy according to knowledge of the Basic Four Food Groups.
- H₃: There will be no significant difference in dietary adequacy of children by sex.

Limitations

The following limitations were acknowledged by the researcher:

1. The study was limited to students selected from schools within the State of Oklahoma.
2. The study was limited to the students' memory of what they ate for the past 24 hours.

Assumptions

The assumptions of this study were:

1. It is assumed that all responses are truthful and not purposely slanted or biased.
2. Students were able to understand the questionnaire or were given sufficient help.

3. It is assumed that this survey was conducted on a Tuesday, Wednesday, or Thursday.

Definitions of Terms

In order to clarify specific meanings for this study, the following definitions are given:

Nutrition Education

. . . the process by which beliefs, attitudes, environmental influences, and understanding about food lead to practices that are scientifically sound, practical, and consistent with individual needs and available food resources (ADA, 1973, p. 429).

Basic Four

A food plan constructed to meet nutrient needs, with the exception of calories, and is specifically adapted to common dietary practices of the American population (Pike and Brown, 1975, p. 898).

Milk Group

Recommended Number of Servings

1 cup milk, yogurt
or calcium equivalent.

Children	3 or more
Teenager	4 or more
Adult	2 or more

Meat Group

2 ounces cooked, lean
meat, fish, poultry,
or protein equivalent.

Children	2 or more
Adult	2 or more

Fruit-Vegetable Group

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
Adult	4 or more

Bread-Cereal Group

Whole grain, fortified,
or enriched grain pro-
ducts are recommended.

Children 4 or more
Adult 4 or more

Adequate Diet Basic Four. For the purposes of this study, Adequate Diet was based only on the Basic Four Food Groups. Recommended servings were reduced to "three or more" to compensate for forgetting and for extra servings that could not be indicated on the questionnaire. For this study, Adequate Diet Basic Four was:

Milk and milk products -- 3 or more servings

Meat and meat substitutes -- 2 or more servings

Fruits and vegetables -- 3 or more servings

Breads and cereals -- 3 or more servings

Adequate Diet Basic Four + A and C. Dietary adequacy is based on 3 or more servings from the Basic Four Food Groups, adding separately servings of fruits and vegetables high in Vitamins A and C. For the purposes of this study, Adequate Diet Basic Four + A and C was:

Milk and milk products -- 3 or more servings

Meat and meat substitutes -- 2 or more servings

All vegetables and fruits -- 3 or more servings

High Vitamin C vegetables/fruits -- 1 or more servings

High Vitamin A vegetables/fruits -- 1 or more servings

Breads and cereals -- 3 or more servings.

CHAPTER II

LITERATURE REVIEW

"As the problems of the world community become increasingly crucial to our own health as a nation, the need for responsible food and nutrition policies can only grow in urgency in the months and years ahead" (Mayer, 1974, p. v). With these words, Dr. Mayer has crystallized the need for solutions to America's nutrition problems. These solutions can only be secured through the continual process of ongoing investigation.

With the expansion of social programs in the post-Great Society era, it has been found that more study is needed on the local and state level to pinpoint existing problems and to provide for future modifications. Studies begun in the late 1960's and previous research, represent the informational basis for this paper.

This chapter is divided into three sections. These are Nutrition and Learning Behavior, School Feeding Programs, and Nutritional Surveys. An understanding of these areas will further identify the relationship between participation in School Lunch and adequacy of diet.

Nutrition and Learning Behavior

An increasing global concern has developed concerning the relationship of social, cultural, and economic disadvantage with depressed levels of intellect and elevated rates of school failure. Pinpointing

one cause is difficult since the problem encompasses many variables. Factors such as value system, educational environment, and quality of instruction each contribute to the complex concern (Read, 1973).

Recent attention has been focused on the relationships between nutritional factors and intelligence and learning. Birch (1972, p. 773) states that "the nutrition of the individual is perhaps the most ubiquitous factor affecting growth, health, and development." A comprehensive study focusing on the relationships between learning and malnutrition was published in 1978 by the Florida Department of Citrus. The study defines malnutrition as "the state of impaired functional ability or development caused by an inadequate intake of essential nutrients or calories to provide for long term needs" (p. 4). Malnutrition is subdivided and defined as "severe" and "moderate."

Severe malnutrition in children refers to infantile marasmus and kwashiorkor, each of which results from prolonged protein and/or calories restriction in early childhood. . . . Moderate malnutrition is a state which exists when the quantity and/or quality of food intake is restricted (Florida Department of Citrus, 1978, pp. 4-5).

Although more studies exist on "severe malnutrition," "moderate malnutrition" is more prevalent in the world. The degree to which moderate malnutrition exists in the United States is not known; but studies clearly substantiate that large proportions of the population are undernourished. Leverton (1969) indicates that a borderline intake of specific nutrients affects the function of the central nervous system and can interfere with learning and performance.

Thiamine deprivation causes anxiety, irritability, depression and increased sensitivity to noise and pain. Inadequate amounts of nicotinic acid result in lassitude, apprehension and depression, or vitamin B₁₂ in mental confusion, of iodine in low basal metabolic rate and physical and mental languor. Insufficient iron results in lowered hemoglobin and reduced

capacity of the blood to carry oxygen needed for normal functioning to the tissues. In their early stages, mild forms of under-nutrition are accompanied by an increase in motor restlessness. In later stages, depression of motor activity sets in (p. 8).

Birch (1972, p. 782) reports that "children who are chronically undernourished exhibit a reduction in responsiveness and attentiveness. In addition, the undernourished child is easily fatigued and unable to sustain prolonged physical or mental effort."

Leverton (1969) identifies the school as a primary source in the maintenance of the nutritional well-being of the child to ensure optimal learning opportunities. "Its responsibilities and opportunities for this involve every aspect of the school's program, chiefly: 1) health service, 2) classroom teaching, 3) school feeding, and 4) parent and community involvement" (p. 8). Florida Department of Citrus (1978, p. 13) states that the "beneficial effects of serving breakfast to hungry children have been reflected by improved behavior and attentiveness in the classroom as well as improved school attendance." Thus, studies emphasize the importance of the school feeding program in the effectiveness of the educational process itself.

School Feeding Programs

Early in the 20th century, local organizations and state funds were financing school lunch programs. The earliest federal aid came from the Reconstruction Finance Corporation in 1932 and 1933 that granted loans covering labor costs in connection with the preparation and service of school lunches. Later in 1935, the Agricultural Adjustment Act (PL 74-310) aided the school lunch program by making surplus commodities such as wheat, dairy products, and meat available to needy

families and schools. The enactment of the National School Lunch Act (PL 79-396) in 1946 provided a commitment of cash and commodities with the establishment of nutritional guidelines and regulations. Congress foresightedly designed the program to reach all children regardless of socioeconomic status by financial support and the provision to provide free lunches for children who could not pay for them. "Even in the infancy of the national program, the Type A meal pattern was designed as a guide for planning lunches which would provide approximately one-third of a child's Recommended Dietary Allowances" (Martin, 1978, p. 390).

The evolution of School Lunch was enhanced in 1966 with the passage of the Child Nutrition Act (CNA). This act provided for the allocation of funds for a pilot breakfast program and the establishment of the meal service for preschool programs with the necessary equipment. The objectives of the act were:

In recognition of the demonstrated relationship between food and good nutrition and the capacity of children to develop and learn, based on the years of cumulative successful experience under the national school lunch program with its significant contributions in the field of applied nutrition research, it is hereby declared to be the policy of Congress that these efforts shall be extended, expanded and strengthened under the authority of the Secretary of Agriculture as a measure to safeguard the health and well-being of the Nation's children and to encourage the domestic consumption of agricultural and other foods, by assisting States through grants-in-aid and other means, to meet more effectively the nutritional needs of our children (PL 89-642, 1966).

The White House Conference on Food, Nutrition, and Health convened in December 1969. The conference not only addressed major issues but, by bringing these to the attention of the public, helped lay the groundwork for action and change. Dr. Mayer (1973) summarized the objectives of the conference.

The aim of the 1969 White House Conference was thus to evaluate the state of nutrition of the American people and formulate the basis for a national nutrition policy. The recommendations put forth by the conference had to cover four principal areas of concern: (1) food assistance for the poor, (2) nutrition and health programs, (3) the regulation of food production and supply, and (4) nutrition education (p. 5).

The Panel on Nutrition Teaching and Education first recommended the expansion of school feeding programs and their reinforcement with nutrition education programs. These proposals were based on the importance of the role of the school in the elimination of hunger and malnutrition. As stated by the panel,

A dynamic nutrition education program that begins in early childhood and continues through the elementary and secondary schools can help young children to acquire positive attitudes toward food and can help older children to assume responsibility for their own food selection and prepare them for adult and parental responsibility. As future citizens in a democracy, children must develop acceptable nutritional practices and a sense of social consciousness to enable them to participate intelligently in the adoption of public policy affecting the nutrition of people (White House Conference, 1970, p. 148).

In May 1974, the American Dietetic Association (ADA) published a position paper on child nutrition programs. This position paper outlined a 4-point model for child nutrition programs.

- (a) Assessing the nutritional needs of the child;
- (b) Meeting the needs of the child through foods served and the environment in which it is served;
- (c) Providing educational opportunities for the child to learn about food and its relationship to life, both physically and socially;
- (d) Planning educational activities about food and nutrition for parents of the children (p. 520).

The ADA (1974, p. 521) states that "the child nutrition program must focus on meeting the child's nutritional, physical, psychological, and social needs through food, while serving as a vehicle for the child's

learning about such interrelationships."

Martin (1978) reasons that:

. . . the single most significant force outside the nation's capital to influence school nutrition programs has been the American School Food Service Association (ASFSA), the 67,000 member professional organization for school foodservice personnel (p. 391).

The ASFSA (1978) Bylaws state its purposes as:

- (a) Maintain and improve the health and nutrition education of school children through nutritionally adequate and educationally sound, non-profit school foodservice programs;
- (b) Work for the highest standards of nutrition education and school foodservice programs;
- (c) Encourage and promote between school personnel and the general public such united efforts as will assure for every school child an opportunity for adequate nutrition education and school foodservice;
- (d) Encourage and develop the highest standards for school foodservice personnel by providing appropriate educational programs;
- (e) Improve the well-being of the Association members (p. 79).

In 1977 amendments were passed to the Child Nutrition Act in which

Congress stated:

- (1) the proper nutrition of the Nation's children is a matter of highest priority;
- (2) the lack of understanding of the principles of good nutrition and their relationship to health can contribute to a child's rejection of highly nutritious foods and consequent plate waste in school food service operations;
- (3) many school food service personnel have not had adequate training in food service management skills and principles, and many teachers and school food service operators have not had adequate training in the fundamentals of nutrition or how to convey this information so as to motivate children to practice sound eating habits; and
- (4) there is a need to create opportunities for children to learn about the importance of the principles of good nutrition in their daily lives and how these principles

are applied in the school cafeteria (PL 95-166).

The purpose of this section of the law is to give information on eligibility and to encourage participation in School Lunch and related child nutrition programs. Grants funded to state educational agencies will make possible the development of nutrition education programs for teachers and personnel. "Such nutrition education programs shall fully utilize as a learning laboratory the existing School Lunch and Child Nutrition Programs" (1977, PL 95-166).

The 1977 amendments to the Child Nutrition Act make available funds for nutrition education and training to each state on the basis of 50 cents per school child, a total of approximately 28 million dollars. Governmental legislation thus continues to support and legislate to maintain the important role the lunch program serves. Today, the ". . . school foodservice is the second largest away-from-home food market, with a value of \$7 billion Approximately 25 million children are served daily with 33 percent of the meals being free or at reduced price" (La Chance, 1977, p. 412).

Roberts (1935, p. 270) stated that "the school lunch was developed in the past as an educational measure as well as one for safeguarding the health of pupils." Roberts' early conception of the program's role was as today, more than a "fueling station."

Hinton (1964, p. 38) has stated that "a primary aim of nutrition education is the development of good food habits early in life." The lunchroom's purpose is multi-faceted; it can provide opportunities to expose students to new foods, provide guidance in food selection, and provide an effective way to measure the effectiveness of teaching by observing students' selections and eating patterns (Hinton, 1964).

School Lunch has a vital role to play. With united efforts and cooperation between government, educational agencies, teachers, administrators, and lunchroom personnel, the School Lunch system can provide a laboratory for nutrition education.

Nutritional Surveys

Nutrition-related surveys of children in other states can be useful in examining U.S. children in general. Studies support the idea that two focal areas of major nutritional concern deal with children's poor dietary patterns for both breakfast and lunch. Eating a poor breakfast or omitting the meal entirely appears to be one of the major food habit problems for children and teenagers. Estimates of numbers skipping breakfast vary from source to source. The Children's Foundation (1978) cites numbers from several sources as follows: (1) The Department of Health, Education, and Welfare estimates that one-fourth of this country's children go to school without breakfast, (2) the American Medical Association postulates that breakfasts of only one-fifth of the population are adequate, (3) a Massachusetts survey showed only 5 percent of the public school children eating a good breakfast with 18 percent eating no breakfast at all, (4) a 1977 Minnesota survey showed 8 percent of students ate no breakfast, and 68 percent ate a breakfast of empty calories, and (5) a Maine study showed 37 percent of students did not eat breakfast.

In a Louisiana study reviewed by Pollitt, Gersovitz, and Gargiulo (1978), one-fourth of the students in grades 1-6 in schools without breakfast programs skipped breakfast. Less than one-tenth of the students in schools with programs did not eat a morning meal. When

incidence of health problems was compared, more of the children in schools not participating in the breakfast program had problems with nausea, headaches, stomach aches, and coughs than those in participating schools. Students in nonparticipating schools also reported more times being angry, crying, and misbehaving.

The 1973 survey of Wisconsin students showed that 15.6 percent of responding students ate no breakfast, with the incidence of breakfast skipping being highest for older children (Nutter, 1975). Almost one-third of 10th to 12th grade girls ate no breakfast. The lack of breakfast obviously affected the day's total nutritional intake with 517 of the children who missed breakfast having no high Vitamin A or C food for the day. Many children, who had no after-dinner snack and no breakfast, went 17 to 18 hours without food. In comparison, 9 percent of the children ate no lunch.

A synthesis of these studies revealed that from 8 percent to 37 percent of the children did not eat breakfast. A poor breakfast (or none) has been ascribed to 75 to 95 percent of the school population.

In order to "identify the prevalence, magnitudes, and distribution of malnutrition and related health problems within the United States," the Ten-State Nutrition Survey (1972, p. 5) was initiated. A sample of 300,000 persons, representative of low income families and including some middle and high income families, was assessed between 1968 and 1970. Findings indicated that "a significant proportion of the population surveyed was malnourished or was at high risk of developing nutritional problems" (p. 6). However, malnutrition in different segments of the population varied in severity and in regard to the specific nutrients involved. Further,

. . . the characteristics of malnutrition are often unique to the local situation and to the specific subsegment of the population being surveyed. Nutritional solutions to the different types of malnutrition encountered will vary among different segments of the population having different social, cultural, and economic characteristics (Ten-State Nutrition Survey, 1972, p. 6).

In general, there was increasing evidence of malnutrition as income level decreased. Findings indicated, however, that although income was a major factor of nutritional status, social, cultural, and geographic differences were also important (Ten-State Nutrition Survey, 1972).

Among the age groups surveyed, adolescents between the age of 10 and 16 had the highest prevalence of unsatisfactory nutritional status. Male adolescents had more evidence of malnutrition than females. Elderly persons also showed evidence of increased nutritional deficiencies (Ten-State Nutrition Survey, 1972).

The nutritional status of children under the age of 17 was related to the educational level of the person responsible for buying the food. A high occurrence of low hemoglobin and hemotocrit was found in all segments of the population indicating low intake levels of iron (Ten-State Nutrition Survey, 1972).

School Lunch programs were found to be an important part of nourishment for children, especially those from low income areas. The School Lunch was found to substantially contribute to the total nutrient intake of school children and especially those among the black population (Ten-State Nutrition Survey, 1972).

A statewide nutrition survey of 80,000 public school children was conducted in Massachusetts in October 1969. The survey's purposes were to determine by 24-hour dietary recall the effectiveness of the School

Lunch Program and the dietary status of students. Results showed that 52 percent bought the School Lunch, 26 percent brought lunch from home, and 6 percent did not eat lunch at all (Callahan, 1971, p. 30). On the day of the survey only 53 percent consumed a satisfactory lunch. In general, boys had better diets than girls. The study revealed that 33 percent of the School Lunch participants received a good source of Vitamin A compared with 5 percent for students who did not participate. Similarly, 28 percent who ate the School Lunch ate a food high in Vitamin C as compared with 11 percent of students that had a high source of Vitamin C but did not eat the School Lunch (Callahan, 1971).

Results from the survey also showed that 24 percent of the students had an inadequate breakfast, 13 percent had no breakfast, and only 5 percent ate a good breakfast on the day of the survey. For grades 4-6, 31 percent had either a poor breakfast or none at all (Callahan, 1971).

The study further showed that students participating in the School Lunch Program had better dietary intakes than others. Callahan recommended that all students have the opportunity to participate in the lunch program and that more schools needed to implement breakfast programs.

The Wisconsin nutrition education study (Nutter, 1975) was extensive, covering students' food habits as well as information on teachers, principals, and cafeteria personnel.

The sample included replies from more than 4,500 students on three 24-hour food recall reports. General findings were:

1. More boys than girls had satisfactory eating patterns at all grade levels with differences being slight at elementary level and statistically significant at the secondary level.

2. When all groups were averaged, only 21.7 percent of the boys and 16.4 percent of the girls had satisfactory daily meal patterns as defined by the study.
3. Twenty-three percent of boys and 29 percent of girls reported consuming no milk or milk products during the 3 days of the survey. Fewer secondary than elementary children reported foods in this group.
4. Thirty-one percent of boys and 47 percent of girls reported eating no meat or meat alternates in the 3 days of the survey.
5. Investigators did not believe the reporting of breads and cereals was accurate.
6. Twenty-five percent of boys and 27 percent of girls did not consume adequate vitamin C rich foods. This, however, was a better response than found in some other comparable studies.
7. Seventy percent of the students did not consume any of the Vitamin A rich foods listed in the survey.
8. Consumption of iron rich foods decreased as grade level increased. Older girls who need the most iron had the lowest response for iron rich foods.
9. Sixteen percent of respondents skipped breakfast, and 9 percent did not eat lunch. Both breakfast skipping and lunch skipping were much more common at the secondary level than at the elementary level and were the most common for 10th and 12th grade girls. Of these girls, nearly one-third did not eat breakfast, and about one-fourth did not eat lunch.

A selected study can be cited to show that children's poor food habits are not a recent phenomenon. At the Governor's request, a nutri-

tion survey was made of 10,000 9- and 15-year-old school children in New York State (Trulson, Hegsted, Stare, 1949). The children were asked to keep a 3-day dietary record. Daily intakes for each child were then calculated for nutritional value.

Findings showed that elementary school children exhibited better food practices than children at the secondary level. Adolescent boys also made better food choices than adolescent girls. Students from high income level groups consumed more nutritious foods than those from lower income groups. Nutritional status was also increased for students attending academic schools as compared with vocational students. Only 22 percent of the grade school children met the recommended number of servings from all of the Four Food Groups (Trulson, Hegsted, Stare, 1949).

Although school feeding programs are discussed in several of the studies, it is difficult to make an accurate assessment of their effects on the nutrition of school children. In a comprehensive review of the literature, Pollitt and others (1978) concluded that on the whole, no serious attempts have been made to evaluate whether educational progress has been made in school feeding programs.

CHAPTER III

PROCEDURES

Chapter III describes the procedures used in the study, including population sample, instrument selection, data collection, data analysis, and statistical treatment of the data. The general purpose of the study is to assess the eating behavior of elementary students by survey research method. Whether participation in the School Lunch Program actually improves dietary status is the question of prime concern. Again, this assessment is based on provisions within the Child Nutrition Act and is designed to determine whether participation in the School Lunch Program does in fact improve dietary status. The research in this thesis is a portion of a larger research study that covered all grade levels.

Population Sample

The sample was chosen from all public schools in Oklahoma by a stratified random selection process. The first step in the sample selection was the development of a listing of all school districts in Oklahoma. The districts were then categorized into seven sizes according to daily attendance. The categories were 0-500, 501-1,000, 1,001-2,500, 2,501-5,000, 5,001-10,000, 10,001-20,000, and over 20,000 average daily attendance. The number of districts needed within each group was determined and randomly selected.

Cooperation was then solicited from the selected districts. This was done by letters sent to superintendents. If a district chose not to participate, then the first alternative, chosen from dropping down four names on the computer listing, was contacted. The following table indicates the districts that participated in the study by group. The cooperating districts were asked to furnish the name of a person to be responsible for administration of the surveys.

TABLE I
PARTICIPATING DISTRICTS BY ATTENDANCE GROUP

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

Using a sample size of 10,000 or 1.85 percent, 400 classrooms (based on 25 per classroom) needed to be surveyed. These 400 classrooms plus a 20 percent over-sample were allocated to the seven groups based on 1978-1979 average daily attendance. Table II identifies the group allocations.

TABLE II
ALLOCATED CLASSROOMS BY ATTENDANCE GROUP

Group 1	0 - 500	76 classrooms
Group 2	501 - 1,000	74 classrooms
Group 3	1,001 - 2,500	91 classrooms
Group 4	2,501 - 5,000	72 classrooms
Group 5	5,001 - 10,000	54 classrooms
Group 6	10,001 - 20,000	65 classrooms
Group 7	over 20,001	40 classrooms

The liaison was contacted and asked to provide lists of all teachers by grade level and school within the district. The lists were then compiled and categorized in groups 1-7. The classrooms needed from each district were determined and randomly selected by the computer.

A total of 472 classrooms was selected. This represented a 20 percent over-sample (to account for possible non-participation by some

selected classrooms) to assure a final total number of classrooms near 400. Since this study is focusing only on grades 4-6, the final total number of classrooms was 81, 935 boys, and 911 girls.

Instrument Selection

Due to the large sample size and to facilitate administration, the 24-hour recall method was selected in preference to other procedures. Findings by Gersovitz, Madden, and Wright (1978) testing internal validity of both 24-hour recall method and 7-day dietary record state that both methods provide about equally accurate results. Concurrently, Emmons and Hayes (1973) provide support that in evaluating elementary school children, the 24-hour dietary recall method proves to be very accurate. Results showed that children in Grade 4 were able to recall lunch eaten on an average of 80.6 percent.

The instrument used was a modification of a 24-hour dietary recall developed by Nutter for Wisconsin where it was administered in 1973. The survey was designed to assess eating patterns of students in grades K-12. This instrument was chosen for use in Oklahoma due to similar objectives and the comprehensive manner in which the Wisconsin instrument was tested. The Wisconsin Department of Public Instruction agreed to the use of the 1973 survey by Oklahoma State University.

The original instrument was modified in accordance with recommendations from the Wisconsin Department of Food and Nutrition Services to meet the objectives of the Oklahoma study (see Appendix A). The revised questionnaire consisted of 48 items answered by checking appropriate responses. The final question was open-ended to determine knowledge of the Basic Four Food Groups. The instrument included directions and

examples to assist response. A set of detailed instructions was also developed for the classroom teacher to assist in the administration of the questionnaire (see Appendix B).

The modified questionnaire was pretested with 24 children from a Stillwater elementary school. Observations of problems and questions were made by the researcher as the teacher administered the survey to the class. Final revisions of the questionnaire and instructions were made after the observations. The instrument was then approved for use by the School Lunch Section, Oklahoma State Department of Education.

Data Collection

A letter and response form were sent to the designated superintendents requesting agreement to participate in the survey (see Appendix C). To substitute for districts that refused to participate, the next district was chosen from the categorized listing of districts. After permission was received, the districts were asked to provide a listing of the schools, teachers, and the subject and grade the teachers were currently teaching. This information was then used to select the random stratified sample of classes needed to represent each grade category. The selected schools, teachers, and specific classes were compiled for each district.

The liaison for each district was then sent a cover letter (Appendix D) of instructions along with the questionnaire forms and return postage. Administration instructions were included for each teacher. Liaison persons were asked to obtain assistance for teachers in grades 1-3 to assist the students. The questionnaire was to be given the first period after lunch on either a Tuesday, Wednesday, or Thursday. If the

teacher did not have a class the first hour after lunch or if the teacher identified was no longer at the school, no class would be surveyed. The liaisons were responsible for collecting the completed forms and returning them to Oklahoma State University. Districts not returning the completed questionnaires by deadline were telephoned until responses were received.

Data Analysis

When responses were returned from the district, each class was checked, coded, and kept intact in one envelope per class. Student responses were keypunched, four cards per student questionnaire.

The questionnaire has two parts. One part, question 1 through 5 and 48 pertain to meals students ate, reasons for choice, and students' knowledge of the Basic Four and where they learned about good food.

The second portion of the questionnaire, 6-47, concerned the students' dietary recall for the past 24 hours. Two methods were used for triggering recall. Students listed what they remembered and then circled yes/no for foods eaten at "today's" lunch, "today's" breakfast, yesterday's dinner, and snacks.

Foods were arranged so that numbers 7-9 included the milk group; 10-18 represented selections from the meat group; 19-35 represented selections from the fruit and vegetable group; with questions 20, 24-27 representing high Vitamin A sources; and questions 20-22, 25, and 26 being high sources of Vitamin C. Questions 18, 36-39 included selections from the bread group and questions 40-47 were categorized as "other" or "extra" foods.

Responses were analyzed for the following:

- a. breakfast response (question 1) by school group, sex, and grade level;
- b. knowledge of Basic Four by source of nutrition education;
- c. reasons for not eating School Lunch by group, sex, and grade level;
- d. reasons for not eating breakfast by group, sex, and grade level;
- e. adequate diet defined as:
milk group - 3 or more servings (questions 7, 8, 9)
meat group - 2 or more servings (questions 10-18)
fruit and vegetable - 3 or more servings (questions 19-35)
bread and cereal - 3 or more servings (questions 18, 36-39)
by group, sex, and grade level;
- f. adequate diet with one or more vitamin A (questions 20, 24-27) foods and with one or more Vitamin C (20-22, 25 and 26) sources by group, sex, and grade level;
- g. both types of adequate diet by breakfast response;
- h. both types of adequate diet by the School Lunch response;
- i. both types of adequate diet by knowledge of Basic Four.

Statistical Treatment of the Data

Statistical tests and correlations for the questionnaire were designed prior to administering the surveys. Design and analysis were accomplished through the help of three statistical consultants and the university computer services. In order to identify the relationship between dietary adequacy of children to participation in the School Lunch Program, knowledge of Basic Four, and sex, the statistical procedure Chi Square was used. For the purposes of this study, a level of significance was established as ($p < .05$).

CHAPTER IV

RESULTS AND DISCUSSIONS

Description of Respondents

To determine the eating behavior of elementary students in Oklahoma grades 4-6, questionnaires were administered to selected classrooms. The questionnaire required only a yes or no response for each food listed. No attempt was made to determine the amount of food that was actually consumed. A total of 1,856 students responded to the survey-- 935 boys, and 911 girls. Responses by sex and attendance group are presented in Table III.

TABLE III
SURVEY RESPONDENTS GRADES 4-6 BY DISTRICT SIZE AND SEX

Group	District Size	Total	Boys	Girls
1	0 - 500	261	137	123
2	501 - 1,000	242	121	120
3	1,001 - 2,500	416	198	217
4	2,501 - 5,000	354	175	178
5	5,001 - 10,000	210	112	97
6	10,001 - 20,000	207	108	98
7	Over 20,001	166	84	78
TOTAL		1,856	935	911

Breakfast Patterns

The first question was, "Where did you eat breakfast?" Findings show that students were most likely to eat breakfast at home (78.3%). Only 7.4 percent of the students ate in the school breakfast program. Responses for students are shown in Figure 1.

Where did you eat breakfast?

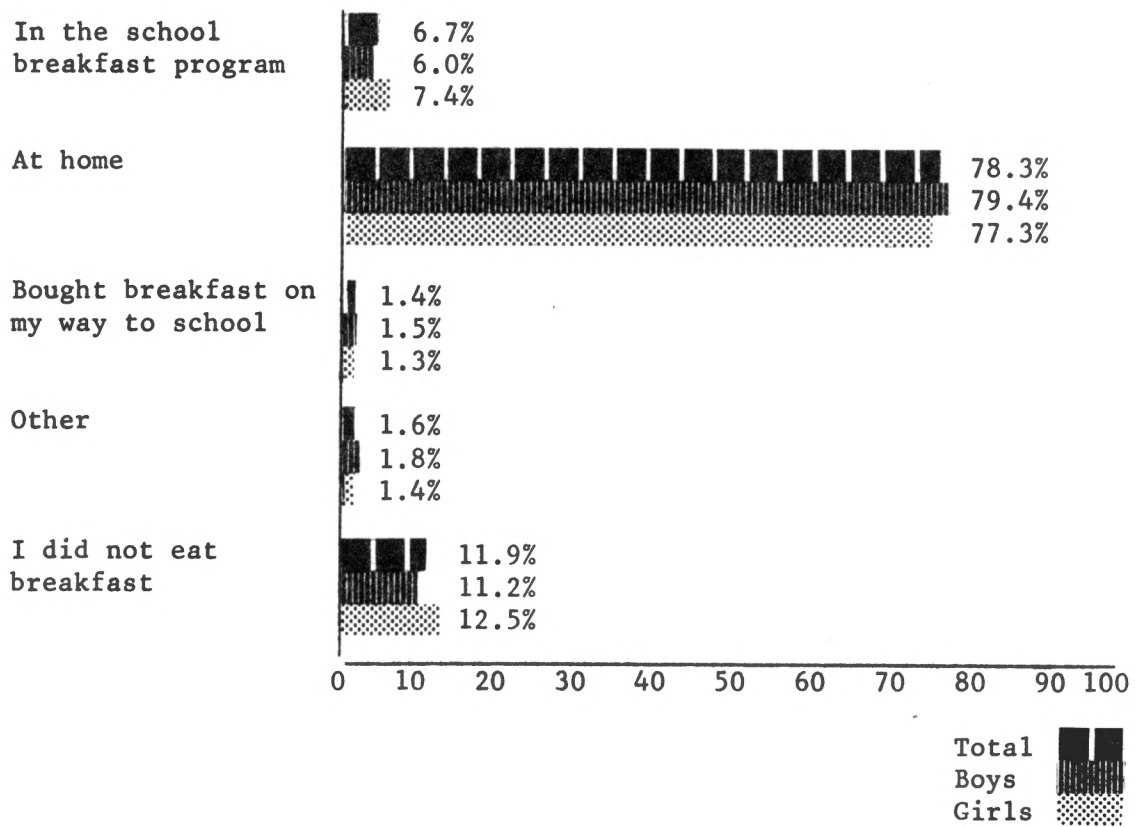


Figure 1. Student Breakfast Response by Sex, Grades 4-6

In Oklahoma only 28 percent of the schools have a breakfast program. This provides approximately 23 percent of Oklahoma students access to a School Breakfast Program. During October 1978 and March 1979, 533 schools served breakfast to an average of 39,058 students daily. The participation rate is minimal with an average of 7.1 percent for the state overall. The survey reported for Grades 4-6, an average participation rate of 6.7 percent. Thus the survey results closely parallel the overall participation rate for the state.

On the day of the survey nearly 12 percent of the students did not eat breakfast at all. It was as common for girls (12.5%) to miss breakfast as boys (11.2%). Callahan (1971) reported in grades 4-6 that 10 percent of the students surveyed arrived at school without breakfast.

Why then do children not eat breakfast? Students who did not eat breakfast in this survey were asked to check reasons from a list. They could check more than one reason so percentages total more than 100.

Not being hungry (63.2%) and not having time (36.8%) were the most common reasons for not eating breakfast. According to these responses, lack of availability of food (2.3%) was not a major problem for these students. This would suggest the need to continually emphasize the importance of breakfast to children. As cited previously (p. 10), a good breakfast can result in higher school performance. Responses for all students are shown in Figure 2.

Lunch Patterns

Students were asked, "Where did you eat lunch?" The most common place to eat was the School Lunch Program, with three-fourths of the

students eating there. This is slightly higher than the overall participation for School Lunch in Oklahoma, which was 63 percent for March 1979.

If you did not eat breakfast, indicate why.

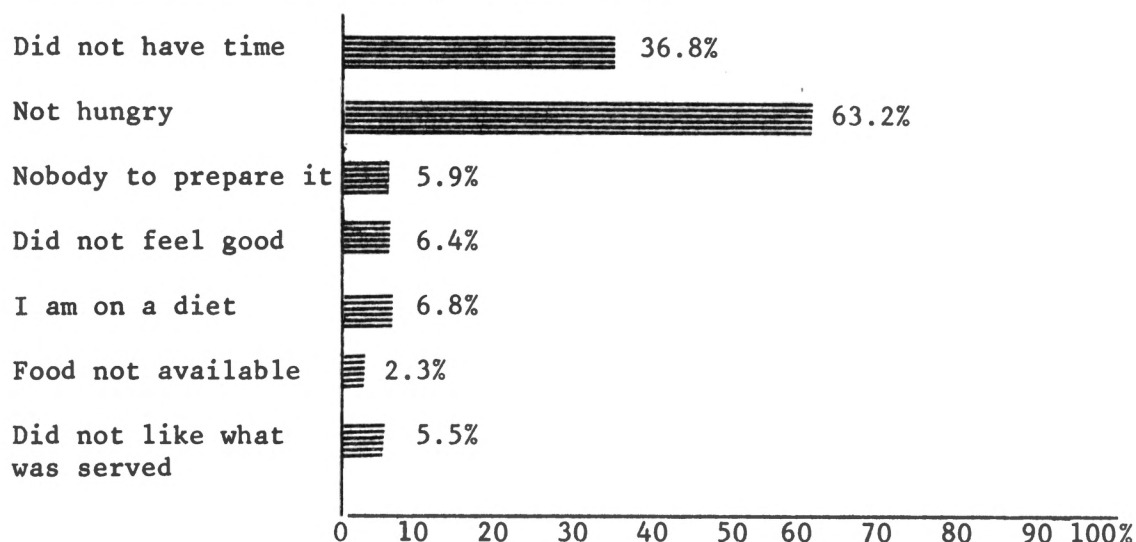


Figure 2. Students' Reasons For Not Eating Breakfast, Grades 4-6

The second most frequent response was for students to bring lunch from home. It was slightly more common for girls (14.9%) to bring lunch than boys (9.0%). Very few students went home for lunch (2.7%) or bought lunch away from school (1.2%). It should be remembered that most schools have a closed campus for grades 4-6.

Overall only 2.3 percent of the students did not eat lunch at all on the day of the survey. Fewer students missed lunch than had reportedly missed breakfast (11.9%). Nutter (1975) also reported an average of 3.0 percent that did not eat lunch on the day of the survey.

Similarly Callahan (1971), reported that only 1 percent of students in grades 4-6 had no lunch at all. All results are shown in Figure 3.

Where did you eat lunch?

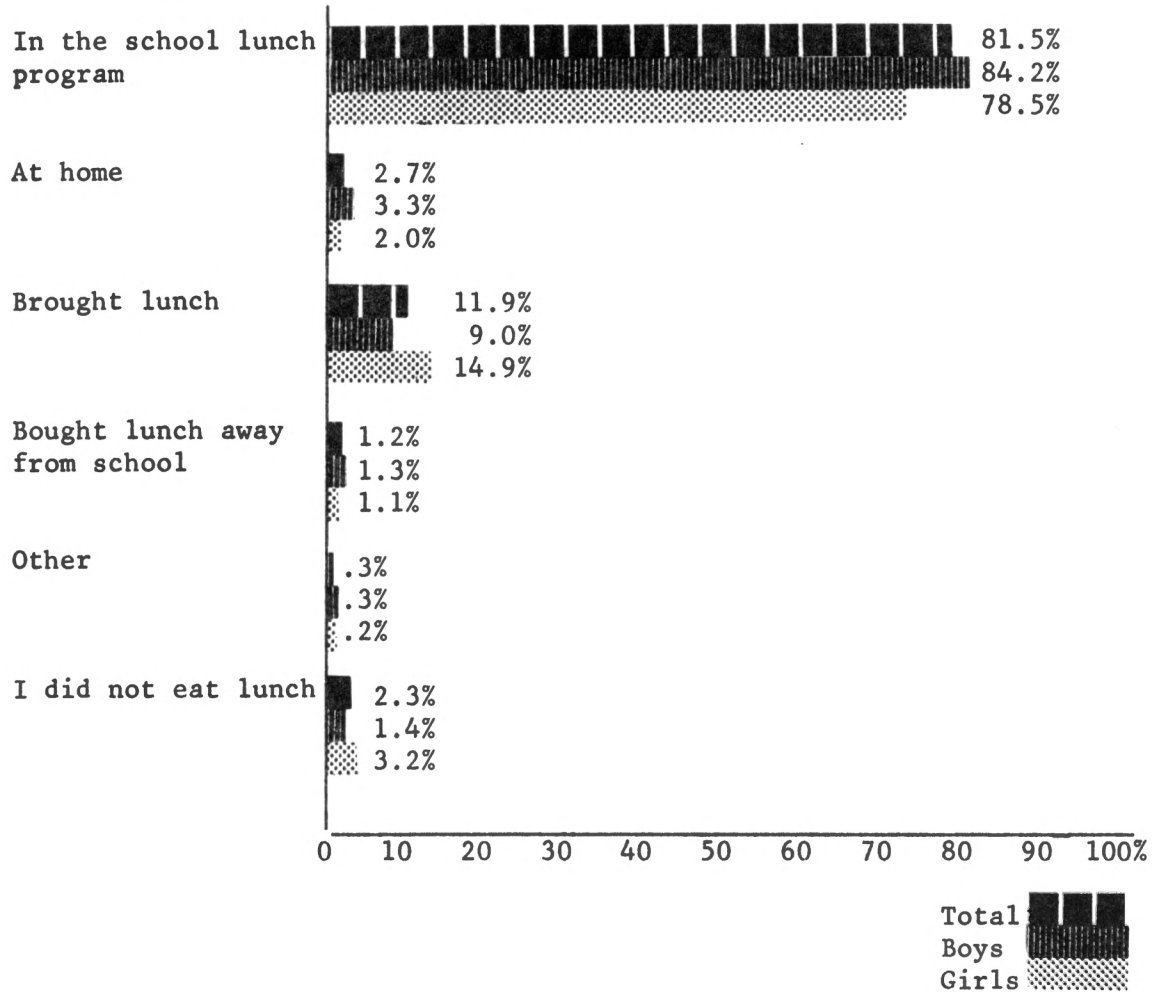


Figure 3. Student Lunch Response by Sex, Grades 4-6

Those students who did not eat the school lunch on the day of the survey were asked for their reasons. Students could check more than one answer. The responses are shown in Figure 4.

If you did not eat the school lunch today, indicate why.

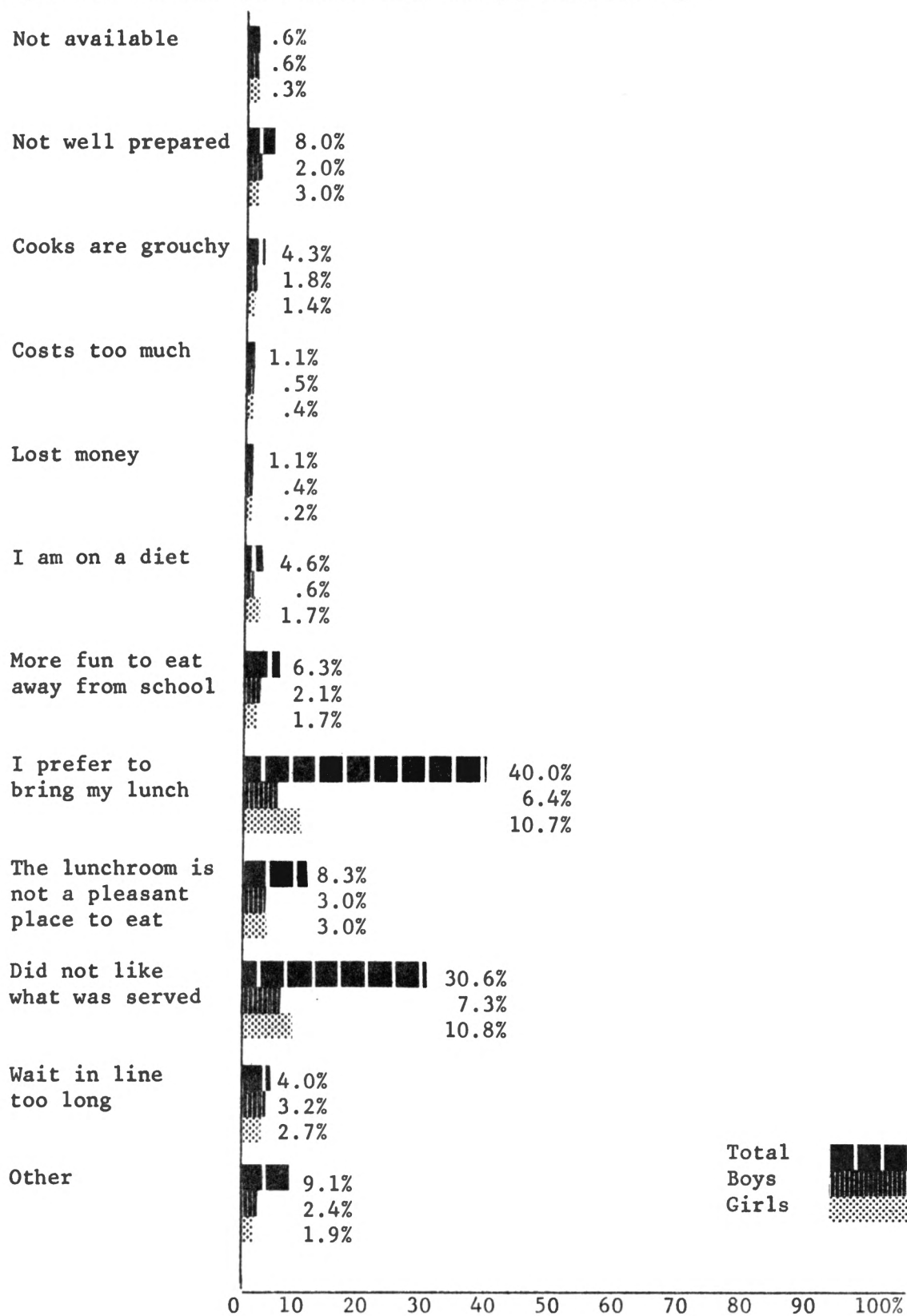


Figure 4. Reasons For Not Eating the School Lunch by Sex, Grades 4-6

It is important to remember that Figure 4 reflects only 327 students who did not eat the School Lunch on the day of the survey. Of these, the top three reasons for not eating the School Lunch on the day of the survey were: 1. I prefer to bring my lunch (40.0%), 2. did not like what was served (30.6%), and 3. other (9.1%). Students who marked "other" often wrote in reasons the same as or similar to those listed that they could have checked.

The second most common response "did not like what was served," indicates students' attitudes already are reflecting negative perceptions. Nutter (1975) and Callahan (1971) reported 31 percent and 43 percent of the students respectively "did not like what was served" as a reason for not eating the School Lunch. It is evident that nutrition education needs to begin early to create a positive basis for students as food patterns develop.

Data was analyzed to indicate the percentage of students who did not eat breakfast or lunch. A total of 0.5 percent of the students skipped both meals on the day of the survey. Of these students, 0.3 percent were boys, and 0.7 percent were girls. The data shows that fewer students skipped lunch than breakfast and only a very low percentage missed both meals.

Students Nutrition Information

Students were asked to check all sources for "How did you learn about what foods were good for you?" Student responses to sources of "good food" information have important implications. In all cases parents ranked first as an information source.

Teachers were ranked second, and TV was ranked third as a source of

nutrition information. A higher percentage of girls than boys identified both parents (83.9%) and teachers (80.1%) as sources of information. However, a slightly higher percentage of boys (50%) marked TV as a source of nutrition information than girls (46.7%). All student responses are shown in Figure 5.

How did you learn about what foods are good for you?

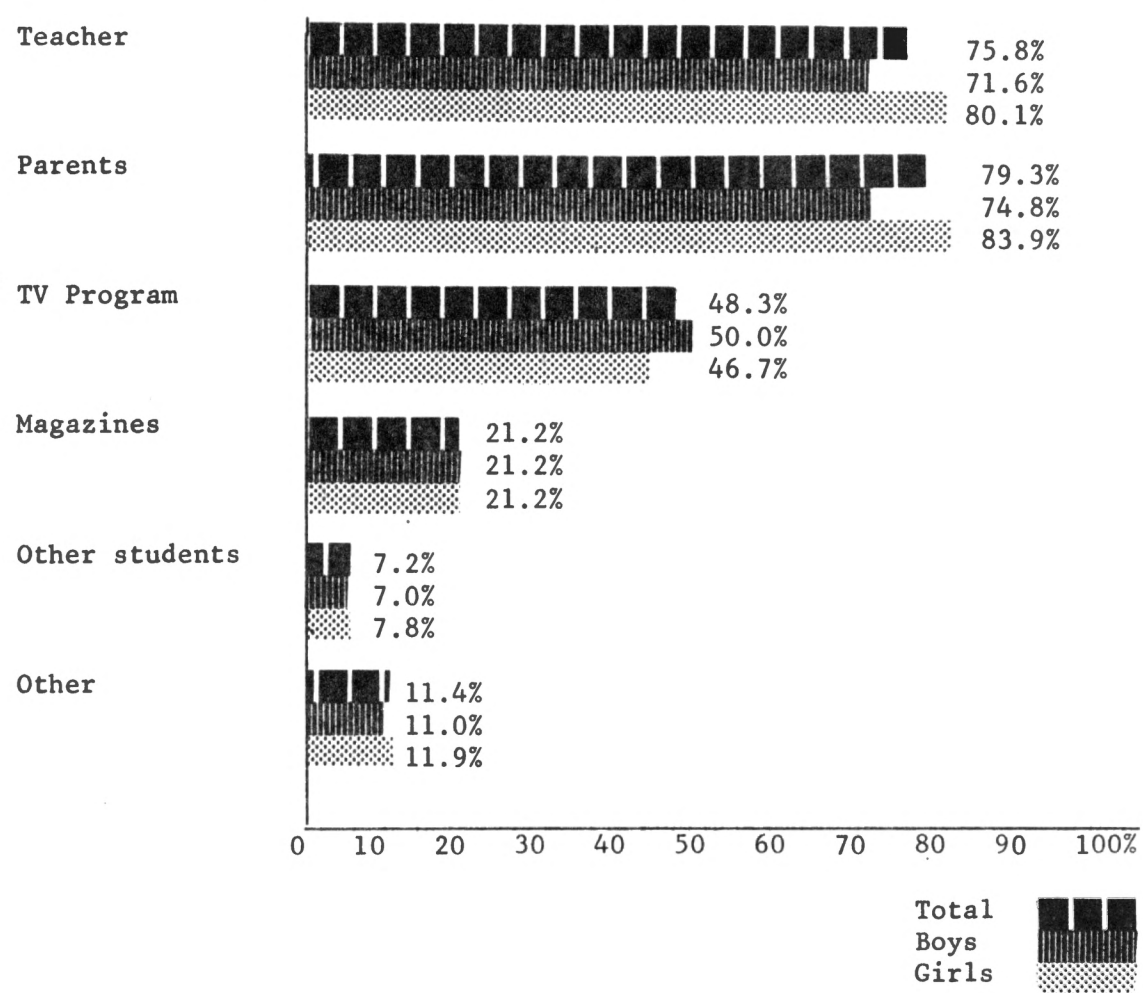


Figure 5. Sources of Nutrition Information Grades 4-6

With sources of "good food" information pinpointed, nutrition educators can more accurately focus nutrition education efforts. Educating parents and teachers plus working through the TV medium seem to be areas of prime concern.

Adequate Diet

As previously discussed, adequate diet was defined in two ways for the purposes of this study. Servings of milk, vegetables and fruits, and breads were reduced from the recommended number of four to "three or more" for purposes of this analysis. This reduction was used to compensate for possibilities of forgetting and for extra servings that could not be indicated on the questionnaire. Therefore, for purposes of this study the adequate diet - Basic Four was:

Milk and milk products - 3 or more servings;

Meat and meat substitutes - 2 or more servings;

Fruits and vegetables - 3 or more servings;

Bread and cereals - 3 or more servings.

A second operational definition of adequate diet was similar to that used by Nutter (1975) in the original instrument. In this definition, fruits and vegetables high in Vitamins A and C are given separate groupings. This categorization of high sources of Vitamins A and C corresponds to recent printings of the Basic Four in which the vegetable/fruit group is subdivided, with recommendations for four daily servings overall with one serving daily of a high Vitamin C food and one serving of a high Vitamin A fruit or vegetable at least four to five times per week.

Therefore, the second type of adequate diet analyzed was Basic Four

+ A and C which included:

- Milk and milk products - 3 or more servings;
- Meat and meat substitutes - 2 or more servings;
- All vegetables and fruits - 3 or more servings;
- High Vitamin C vegetables/fruits - 1 or more servings;
- High Vitamin A vegetables/fruits - 1 or more servings;
- Breads and cereals - 3 or more servings.

Of the 1,856 students completing the questionnaire 32.3 percent had the defined Adequate Diet Basic Four. There was a much lower percentage of students who had adequate diets when defined by Basic Four + A and C. Only 18.4 percent of the students met the criteria, 19.4 percent boys and 17.3 percent girls. Results are shown in Figure 6.

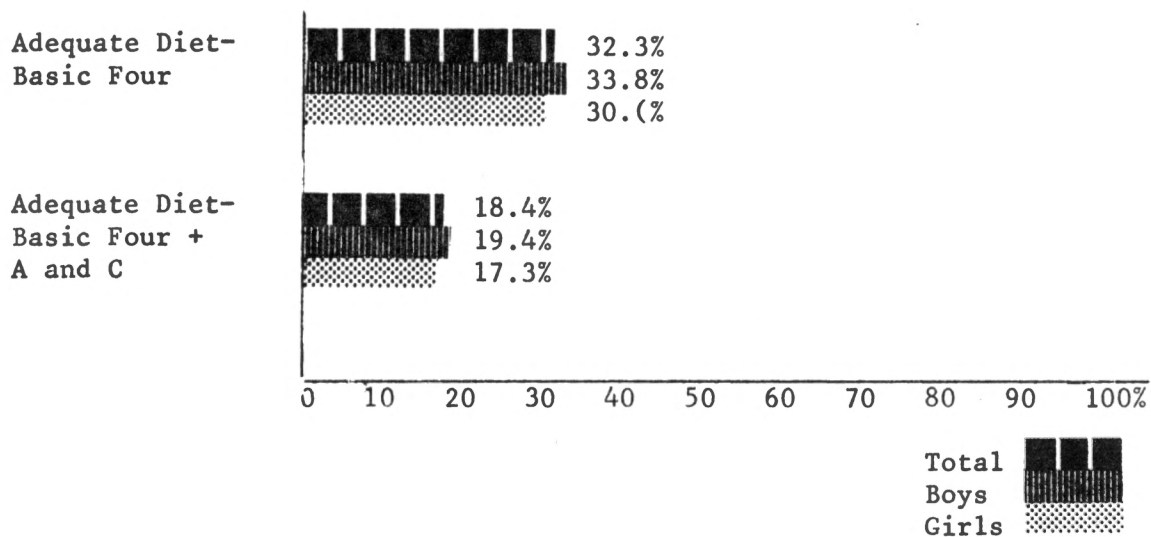


Figure 6. Adequate Diets of Students by Sex, Grades 4-6

The definition of Adequate Diet Basic Four + A and C was very similar to a Satisfactory Daily Eating Pattern used in the Wisconsin study (Nutter, 1975). Nutter reported students with satisfactory eating pattern as 14.3 percent boys and 10.4 percent girls.

Factors Related To Adequate Diet

Several factors were analyzed regarding their relationships to the adequate diets as defined in this study. Chi-square tests were used to determine significance.

Eating the School Lunch. One question considered was, "How important is School Lunch participation in determining adequate diets? i.e., Are students who eat the School Lunch more apt to have adequate diets than students who eat lunch elsewhere?"

Findings showed that students buying the School Lunch were more apt to have adequate diets. For Adequate Diet Basic Four + A and C, 19.4 percent of the students eating the School Lunch had adequate diets in comparison with 13.9 percent with adequate diets who ate lunch elsewhere. These figures showed a significance at the .05 level.

For Adequate Diet Basic Four, 34 percent of students eating School Lunch had adequate diets. Only 24.9 percent of students eating other lunches reported adequate diets, significant at the .05 level.

It is interesting to note that in both defined diets, there was no significant relationship between adequacy of diet with eating School Lunch in comparison to all lunch for the boys. Girls' diets however, reflected a significance at the .05 level showing that more girls had adequate diets when eating the School Lunch.

Callahan (1971) reported that students who ate the School Lunch had a 3 percent edge over other students. Results show there is a linear relationship between adequate diet and where students eat lunch. The School Lunch can make an important contribution to a child's total dietary status.

Knowledge of the Basic Four Food Groups. Students were asked to list the Basic Four Food Groups. Data was analyzed to determine whether knowing the Basic Four affected eating patterns in a positive manner. Results showed that there was no relationship between knowledge of the Basic Four and adequate diet for students in this study.

Sex. Data was analyzed to determine whether sex difference corresponded to dietary adequacy for both Adequate Diet Basic Four and Adequate Diet Basic Four + A and C. A total of 33.9 percent of boys and 30.9 percent of girls had Adequate Diet Basic Four. When Vitamin A and Vitamin C were added 19.4 percent of boys and 17.3 percent of the girls had adequate diets.

Nutter (1975) reported similar findings. The Wisconsin study showed that at all grade levels more boys than girls had satisfactory daily patterns but the sex difference for grades 4-6 were slight, yet statistically significant.

Although for this survey boys scored slightly higher than girls for both defined diets, no statistical significance was found between adequate diet and sex for grades 4-6.

Basic Four

Dietary adequacy for this study was based upon the Basic Four Food

Food Groups as defined earlier (p. 6). Students' number of servings were separated into individual food groups to better determine diet patterns.

Milk Group

Questions 7, 8 and 9 on the student questionnaire represented selections from the Milk Group. Adequate diet in this study required the selection of 3 or more servings from the Milk Group. The study showed that 60.8 percent of boys and 54.8 percent of the girls reported 3 or more servings of milk on the day of the survey. Figure 7 shows the breakdown of selection for the Milk Group by sex.

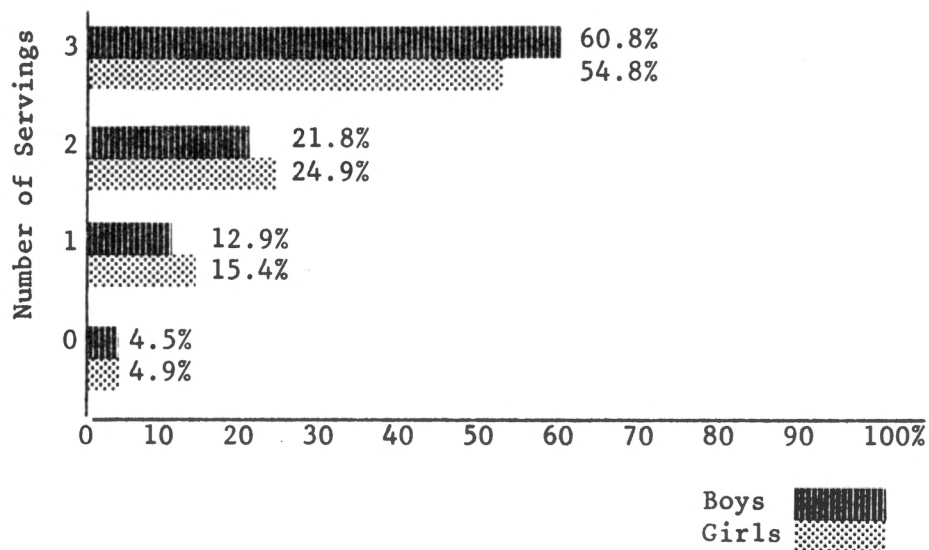


Figure 7. Students' Number of Servings From the Milk Group by Sex, Grades 4-6

The study by Callahan (1971) reported a higher consumption for grades 4-6, 80 percent of the students consumed 3 or more servings from the Milk Group on the day of the survey. Dobbins however reported in the 1970 survey in Oklahoma 1 out of every 3 students needed additional milk products to meet the requirements for an adequate diet. From Figure 7 it would seem that milk and milk product consumption in Oklahoma has improved but still needs improvement.

Sex according to this data did not seem to be a major factor. Boys did consume on the whole more milk than girls but sex differences were not statistically significant.

Meat Group

The Meat Group was represented by questions 10 through 18 in the students questionnaire. An adequate diet required 2 or more servings from these selections. A total of 93.7 percent of the boys and 93.6 percent of the girls consumed 2 or more servings of meat on the day of the survey. Results are shown in Figure 8.

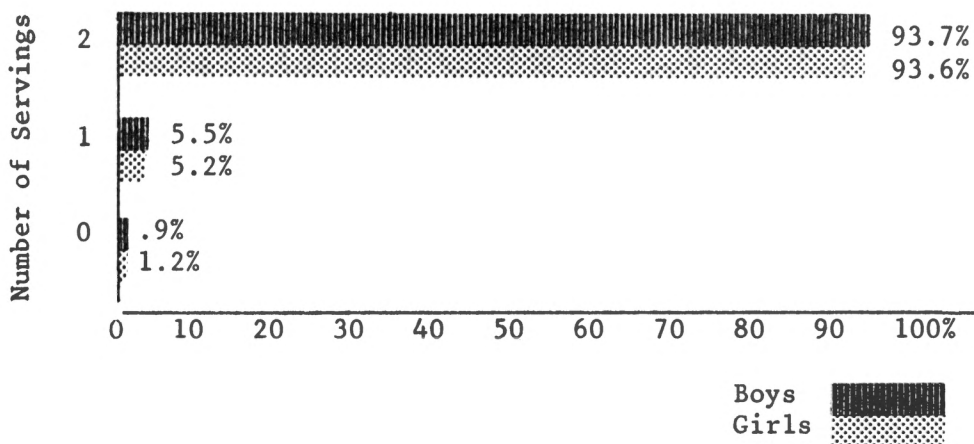


Figure 8. Servings From the Meat Group by Sex, Grades 4-6

Callahan (1971) reported 63 percent of the students in grades 4-6 ate the recommended 2 or more servings for the Meat Group. Nutter (1975) reported that boys in grades 4-6 ate meat and meat alternatives more frequently than any other age group.

Dobbins (1970) stated that the protein of students surveyed was adequate for nearly all students. Thus the results of the present study support the findings of Dobbins since nearly all students met the protein requirement on the day the survey was given.

Vegetables And Fruits

Servings of vegetables and fruits were recorded from responses on questions 19 through 35. For this group adequacy was defined as 3 or more servings. A total of 70.0 percent ate 3 or more servings of vegetables or fruits on the day of the survey. Of these 71.9 percent were boys and 77.1 percent were girls. Results are shown in Figure 9.

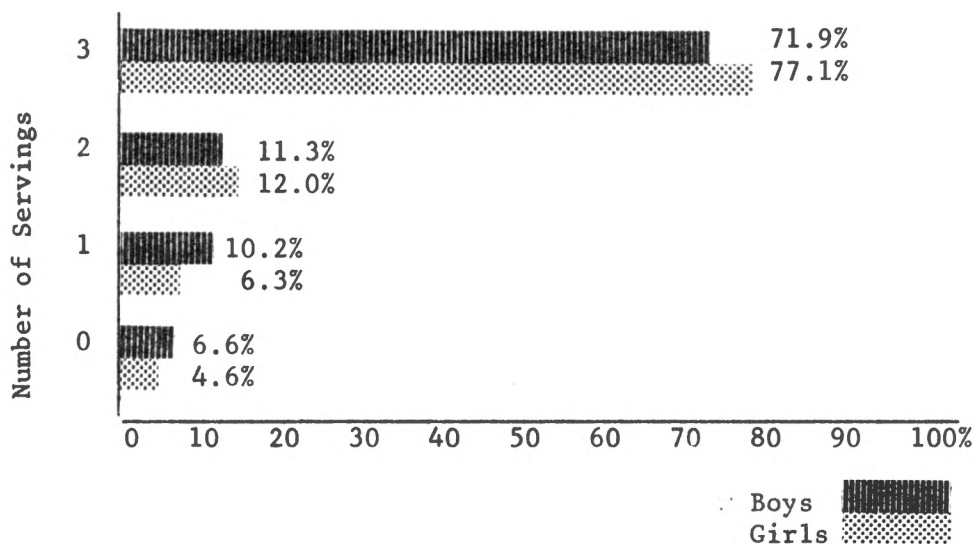


Figure 9. Servings of Vegetables and Fruits by Sex, Grades 4-6

Surprisingly girls tended to consume more vegetables and fruits than boys. In contrast Callahan (1971) reported that boys, 55 percent, ate more vegetables and fruits than girls, 52 percent. However, for both studies the sex differences were slight and not significant.

Vitamin A

The Basic Four recommends that a dark green leafy or deep yellow vegetable as a source of Vitamin A be included at least 3-4 times a week. Foods high in Vitamin A were thus tabulated separately to see what percentage of students included a high Vitamin A food in their diet. Questions 20, and 24 through 27 represented foods high in Vitamin A. For dietary adequacy, one serving or more was considered sufficient. A total of only 50.0 percent of the students--50.2 percent boys and 49.6 percent girls--ate one or more servings of a Vitamin A rich food on the day of the survey.

Similar findings were reported by Nutter (1975). Students in grades 4-6 consumed Vitamin A rich foods on the average of 43.1 percent.

Students in Massachusetts recorded slightly higher intakes. In grades 4-9, Callahan (1971) reported that 67 percent of the students included a source of Vitamin A in dietary intakes.

Although a daily supply of Vitamin A is not considered essential since the body can store Vitamin A, a continual supply is needed. Proper growth and development of bones, plus the formation of rhodopsin necessary in preventing night blindness, are some of the major functions of the vitamin. With only half of the students reporting intakes of Vitamin A rich foods, continued education should be encouraged.

Vitamin C

Foods high in Vitamin C included those listed in questions 20-22, 25, and 26. One or more servings was defined as adequate. A total of 50.0 percent of the students ate a food rich in Vitamin C. Of this percentage 53.7 percent were boys and 55.4 percent were girls.

The study by Dobbins (1970) reported that one-third of the students in Oklahoma were not getting adequate amounts of Vitamin C. This study reporting that only 50.0 percent of the students had adequate intakes of Vitamin C would indicate a problem still exists.

Unlike Vitamin A, Vitamin C is a water soluble vitamin and cannot be stored in the body. A daily intake of the vitamin is essential.

Breads and Cereals

The bread and cereal group was represented on the student questionnaire by questions, 18, and 36 through 39. An adequate diet included 3 or more servings from this group. Overall 60.0 percent of the students recorded 3 or more foods from the bread group. Of this percentage, 62.8 percent were boys and 60.4 percent were girls. Boys reported a slightly higher intake than girls, but not significant. Results are shown in Figure 10, page 45.

Summary

H₁: A significant relationship was identified at the .05 level between participation in the School Lunch Program and adequate diet. The data indicated that students who ate the School Lunch were more apt to have an adequate diet than students who ate lunch elsewhere.

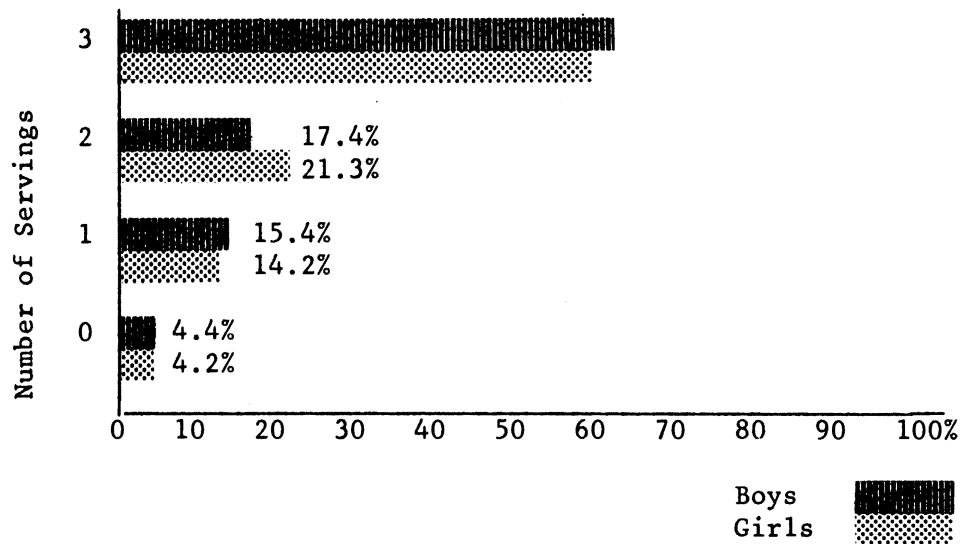


Figure 10. Bread and Cereal Servings by Sex, Grades 4-6

For both defined diets, Adequate Diet Basic Four, and Adequate Diet Basic Four + A and C, there was a significant relationship at the .05 level between dietary adequacy and the School Lunch Program. The null hypothesis was rejected.

H₂: There was no significant relationship at the .05 level between dietary adequacy and knowledge of the Basic Four Food Groups. Knowledge of the Basic Four was determined by students response to question 48 on the student questionnaire. Responses were then analyzed with dietary adequacy. The null hypothesis was accepted.

H₃: Analysis of data reported that there was no significant difference at the .05 level between dietary adequacy and sex. For this survey grades 4-6, sex was not seen to be a significant factor. The null hypothesis was accepted.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary of the Findings

The purpose of this study was to examine by 24-hour dietary recall food intakes of a selected sample of Oklahoma elementary students. A total of 1,856 students responded to the survey, 935 boys, and 911 girls.

The majority of the students ate breakfast at home. Only one-fourth of the schools offered breakfast programs, with the participation rate being approximately 7 percent. Over one-tenth of the students did not eat breakfast at all on the day of the survey. Girls were more apt to skip breakfast than boys.

The major reason given, (by nearly two-thirds of students) for not eating breakfast was not being hungry. One-third reported lack of time as the next most frequent cause.

Nearly all students ate some type of lunch. Over three-fourths of the students surveyed ate the School Lunch. Approximately one-tenth brought their lunch from home. More girls brought lunch from home and more boys ate in the School Lunch Program. Very few students skipped lunch entirely. The primary reasons given for not eating the School Lunch were preferring to bring lunch from home, and not liking what was served.

Over three-fourths of the students identified parents as the major

source of good food information. Teachers and TV were the next major contributors.

Slightly less than one-third of the students reported adequate diets as defined Adequate Diet Basic Four. For Adequate Diet Basic Four + A and C, less than one-fourth had adequate diets. In both defined diets sex did not make a significant difference.

Participation in the School Lunch Program did improve students' chances of having an adequate diet. A significant relationship at the .05 level was observed for students eating the School Lunch for both definitions of adequate diet.

There was no significant relationship between students' knowledge of the Basic Four and dietary adequacy. One-half of the students knew the Basic Four yet did not have adequate diets, and in comparison, approximately one-half knew the Basic Four yet did have adequate diets. No relationship was found when data was analyzed.

There was no significant relationship between dietary adequacy and the students' sex. Boys more frequently had better diets than girls for both Adequate Diet Basic Four and Adequate Diet Basic Four + A and C, but the difference was not statistically significant.

Students' diets were compared to the Basic Four Food Groups. Over one-half of the students met the required 3 or more servings for the Milk Group. Nearly all students had 2 or more servings from the Meat Group on the day of the survey. Over three-fourths of the students had 3 or more servings from the Fruit and Vegetable Group. However, only one-half of the students reported intakes of foods high in Vitamin A and Vitamin C. Nearly two-thirds of the students included 3 or more servings of the Bread Group in their diet. It would thus seem that students' diets

are primarily lacking selections from the Milk Group and the inclusion of Vitamin A and Vitamin C rich foods.

The question arises, Why are the overall diets so low when the individual food group totals are relatively high? The figures from each food group would seem to indicate better diets than were reported. This seeming discrepancy is due to the fact that a student, to have an adequate diet as defined for the purposes of this study, must have the defined number of servings from each group. If a student missed only one category, it could not be included in the adequate diet group.

Suggestions and Recommendations

On the basis of the findings, the following suggestions and recommendations are proposed by the researcher:

1. School breakfast programs need to be implemented into all school facilities. The relationship between hunger and learning is well established. Although food availability was not a major cause for students not eating breakfast, an ongoing program could encourage students to eat breakfast. Breakfast presently is a problem that needs to be addressed.
2. Provision should also be made for educational efforts to stress the importance of a good breakfast to children and parents. Lack of time and not being hungry were the major reasons given for skipping breakfast. For this age group, parental supervision is needed to encourage the formation of good food habits and attitudes. An understanding of breakfast's importance is vital for both the child and parent before change can take place.

3. It is suggested that students be allowed more involvement in the School Lunch Program. Using the lunchroom as a learning laboratory for nutrition instead of just a feeding place is vital. Cooperation between the teachers and the school food-service personnel to utilize the lunchroom as an educational tool is necessary.
4. Nutrition education must be made available to parents. Parents were reported as the major source of good food information, yet very few parents have had any education in nutrition. Programs developed through the Parent Teacher Association or short lectures made available to parents are needed to get nutrition information in the home.
5. Teachers, as the second most common source of good food information, also need nutrition education. Nutrition should be a required course in the teaching curriculum. Inservice training courses can also be used to continually educate teachers in nutrition. Teachers need to integrate nutrition into the present curriculum.

Conclusions

The results of the study led to the conclusion that the majority of the children in grades 4-6 are not eating nutritionally adequate diets. Nutrition education needs to be implemented at all grade levels. Students need an understanding of their bodies' needs and the role food plays.

Nutrition must cease being an overlooked subject. In order to teach nutrition to students, parents and teachers must first be educated

in nutrition.

Efforts need to be aimed at creating a positive attitude in students toward the School Lunch Program. The School Lunch can significantly improve children's diets if students are willing to eat in the program. Approaching the lunchroom as a learning laboratory and involving students in the lunchroom may assist in creating a positive atmosphere.

Recommendations For Future Research

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

1. How students' attitudes are established towards food and the School Lunch Program.
2. Guides for schools to establish the lunchroom as a learning laboratory.
3. What changes in students' diets are seen after the implementation of a nutrition education program.
4. Nutrition education programs for parents, determining most appropriate ways to reach parents, establish programs, and evaluate results.

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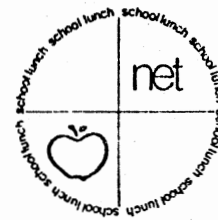
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APPENDICES

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) <input type="checkbox"/> Boy <input type="checkbox"/> Girl

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 checked="" type="radio"/> N	Y <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 checked="" type="radio"/> N	Y <input checked="" type="radio"/> N	Y <input checked="" type="radio"/> N
36. Bread, bun, biscuits	<input checked="" type="radio"/> Y <input type="radio"/> N	Y <input checked="" type="radio"/> N	Y <input checked="" type="radio"/> N	Y <input checked="" type="radio"/> N
7. Milk, any kind-including cocoa and egg nog.	Y <input type="radio"/> N	Y <input type="radio"/> N	Y <input type="radio"/> N	Y <input type="radio"/> N
8. Ice cream, milk shakes, pudding or custard.	Y <input type="radio"/> N	Y <input type="radio"/> N	Y <input type="radio"/> N	Y <input type="radio"/> N
9. Cheese, any kind-including cottage cheese or yogurt.	Y <input type="radio"/> N	Y <input type="radio"/> N	Y <input type="radio"/> N	Y <input type="radio"/> N
10. Plain meats such as beef (hamburger, meatloaf, steak), pork (ham), lamb, or veal.	Y <input type="radio"/> N	Y <input type="radio"/> N	Y <input type="radio"/> N	Y <input type="radio"/> N
11. Chicken or turkey.	Y <input type="radio"/> N	Y <input type="radio"/> N	Y <input type="radio"/> N	Y <input type="radio"/> N
12. Luncheon meat, bologna, weiners, or sausages.	Y <input type="radio"/> N	Y <input type="radio"/> N	Y <input type="radio"/> N	Y <input type="radio"/> N
13. Tuna salad, chicken salad, or ham salad.	Y <input type="radio"/> N	Y <input type="radio"/> N	Y <input type="radio"/> N	Y <input 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 H	Y H	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 H	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 H	Y N	Y N	Y H
24. Carrots, any kind, sweet potatoes or yams, pumpkin, yellow squash.	Y N	Y H	Y N	Y H
25. Greens-spinach, beet greens, turnip greens, mustard greens, collards, dandelion greens.	Y H	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 H	Y N	Y N
28. Apple, banana, pineapple slices, or pears.	Y N	Y N	Y N	Y H
29. Fruit cocktail or cranberries.	Y N	Y N	Y N	Y N
30. Jello salads with fruit or vegetable.	Y N	Y H	Y H	Y N
31. Celery sticks, cucumber slices, or green salad.	Y N	Y N	Y N	Y H
32. Green peas, asparagus, green beans, or lima beans.	Y H	Y N	Y H	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 H	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 H	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, turkey or 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.

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 SUPERINTENDENTS

J. D. GIDDENS
ASST SUPERINTENDENT
INSTRUCTION

JACK STRAHORN
ASST SUPERINTENDENT
STATE FEDERAL

S. H. MC DONALD
ASST. SUPERINTENDENT
FINANCE

State Department of Education

LESLIE FISHER, Superintendent
LLOYD GRAHAM, Deputy Superintendent
TOM CAMPBELL, Associate Deputy Superintendent
2500 North Lincoln Boulevard
Oklahoma City, Oklahoma 73105

Legislation for the Nutrition Education and Training Program was passed in November, 1977 as an amendment to the Child Nutrition Program Act. The State Department of Education is pleased to be participating in this vital program since school personnel and school children will be actively involved and benefiting from this funding. Benefits of the program will include: nutrition education in schools, food service management and skill training for school foodservice personnel, nutrition training of education and food service personnel, and classroom materials and curricula.

One part of the Oklahoma Nutrition Education and Training Program is the conduct of a needs assessment to provide for future programming. This assessment will be accomplished through a department contract with Oklahoma State University. Approximately 400 school districts have been selected by random sampling according to district size and location. Schools within the district have also been selected at random. It is important for you to know, if you agree to participate, that your principals, teachers, school lunch personnel, and students will be anonymous.

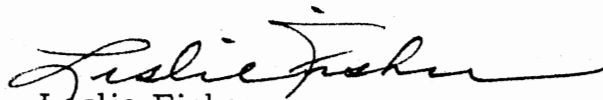
We are asking for your participation in this important program. I have enclosed a form and a self-addressed envelope for your response. As a participant school, your responsibilities will be as follows: (1) identify a coordinator (Liaison) to be responsible for this program in your school, (2) identify teachers and selected classes to respond to the survey, and (3) help administer the survey and return the forms to Oklahoma State University.

The person you identify will be the contact person for Oklahoma State University personnel to discuss the procedure to be used to administer the questionnaire to some of your principals, teachers, school lunch personnel, and selected class (grades one-twelve). We believe this will not require a great deal of time. If you desire, we hope you can solicit help in administering the survey from individuals in your community, such as PTA members, OSU County Extension Home Economists, student teachers, and perhaps others. Oklahoma State University will provide a complete set of instructions.

Oklahoma State University anticipates conducting the survey by mid-January. Enclosed is a self-addressed envelope and response sheet. I

will appreciate your cooperation in assisting us with this needs assessment survey.

Sincerely,

A handwritten signature in cursive script, appearing to read "Leslie Fisher". The signature is written in black ink and is positioned above the printed name and title.

Leslie Fisher
State Superintendent

We will _____ will not _____ participate in the
Nutrition Education & Training Program.

If you agree to participate, please provide the
following information by

District Name & Number _____

Contact Person Name: _____

Address: _____

Phone #: _____

APPENDIX D

LETTER TO LIAISON



Oklahoma State University

Department of Food, Nutrition and Institution Administration

STILLWATER, 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

VITA²

Laura Kelsey Wohlberg

Candidate for the Degree of

Master of Science

Thesis: A NUTRITIONAL STUDY OF CHILDREN'S DIETARY PATTERNS, GRADES 4-6

Major Field: Food, Nutrition and Institution Administration

Biographical:

Personal Data: Born in St. Louis, Missouri, August 4, 1951, the daughter of Mr. and Mrs. Rogers E. Wohlberg.

Education: Received a Bachelor of Science in Home Economics from Oklahoma State University in May, 1977, with a major in Food, Nutrition and Institution Administration; completed requirements for the Master of Science degree at Oklahoma State University in December, 1979.

Professional Experience: Dietary Aide, Stillwater Municipal Hospital, Stillwater, Oklahoma, August, 1975-April, 1976; Cafeteria Supervisor, Penrose Hospital, Colorado Springs, Colorado, September, 1977-January, 1978; Graduate Research Assistant, Food, Nutrition and Institution Administration, Oklahoma State University, Stillwater, Oklahoma, October 1978-June, 1979.