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FACTORS AFFECTING PARTICIPATION IN
CHILD NUTRITION PROGRAMS

by

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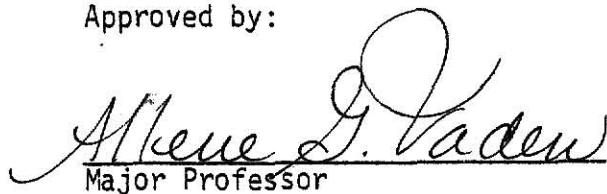
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TABLE OF CONTENTS

	Page
ACKNOWLEDGMENTS	ii
LIST OF TABLES	vii
INTRODUCTION	1
REVIEW OF LITERATURE	3
Historical Background	3
School Lunch Programs	3
Special Milk Program	5
School Breakfast Program	5
Legislation and Current Status of Child Nutrition Programs	5
Overview of Legislation	5
Current Status of the Programs	11
Nutritional Standards for Child Nutrition Programs	12
Meal Requirements	12
National School Lunch Program	12
School Breakfast Program	16
Special Milk Program	17
Studies on Nutrient Content of School Meals	17
Nutritional Impact on Students' Dietary Intakes from Participation in Child Nutrition Programs	20
National School Lunch Program	20
School Breakfast Program	23
Participation in Child Nutrition Programs	24
Reports of the USDA National Advisory Council on Child Nutrition	25

1971 Report	25
1972 Report	26
1973 Report	29
1974 Report	31
1975 Report	32
1977 Report	33
General Accounting Office (GAO) Report on School Lunch Program	33
Participation Trends	34
NSLP Availability in Schools	35
Student Participation	36
Studies on Factors Affecting Participation in School Lunch Program	37
Price of Meals	38
Non-price Factors	39
School Breakfast Participation	42
METHODOLOGY	44
Overview of the Study	44
Project Approval Procedures	45
The Study Sample	46
The Instrument	48
Initial Development and Pretest	48
Final Instrument	49
Section I	49
Section II	50
Section III	50
Section IV	50

	Page
Distribution of the Research Instrument	50
Data Analysis	52
RESULTS AND DISCUSSION	60
General Information on Schools	60
Child Nutrition Program Operating Characteristics	63
Alternatives to Lunch	70
School Meal Facilities and Promotion	72
Facilities and Operations	72
Student Involvement and Acceptance	74
Menu Alternatives	78
Food Production Controls	80
Analysis of Lunch Quality Variables	81
Participation in NSLP	84
Participation in the School Breakfast Program (SBP)	92
Participation in the Special Milk Program (SMP)	97
SUMMARY AND CONCLUSIONS	101
REFERENCES	106
APPENDIXES	112
A. Initial Correspondence	113
B. Pretest Correspondence	116
C. Final Instrument	119
D. Correspondence to Accompany Research Instrument	127
E. Letters of Support from State Directors	132
F. Letter to Principals of Kansas Schools in Needs Assessment Project	136
G. Follow-up Correspondence	138

	Page
H. Coding of Questionnaire Data	140
I. Supplemental Tables (Tables 30-41)	145

LIST OF TABLES

Table	Page
1. Distribution and return of survey questionnaires	52
2. Computation of variables for analysis of data on participation in child nutrition programs	53
3. Computation of lunch quality variables	56
4. Distribution of school types by state	61
5. Distribution of school types by city/town/area population	61
6. Distribution of school types by area population and state	62
7. Analysis of variance of selected school characteristics	62
8. Least squares means for selected school characteristics data	64
9. Percentages of students bussed, walking, and riding bicycles or in cars to school	65
10. Percentages of survey schools operating child nutrition programs	66
11. Analysis of variance of data on child nutrition program operating characteristics	67
12. Least squares means for child nutrition program characteristics data	68
13. Extent of availability of alternatives to USDA lunch program by type of school	71
14. Place of food preparation by type of school	72
15. Length of lunch period by type of school	73
16. Number of serving lines used for lunch by type of school	74
17. Method of collecting meal receipts by type of school	74

Table	Page
18. Practices related to student involvement and acceptance of school lunch program	75
19. Practices related to food quality and service in school lunch program	79
20. Analysis of variance of lunch alternatives, student acceptance, and food quality scores	82
21. Least squares means for lunch alternatives, student acceptance, and food quality scores	83
22. General linear model analysis of covariance for effects of selected variables on school lunch participation	85
23. Partial regression coefficients and standard error from analysis of effects of selected variables on school lunch participation	86
24. Least squares means and standard error for lunch participation variables	87
25. General linear model analysis of covariance for effects of selected variables on school breakfast participation	93
26. Partial regression coefficients and standard error from analysis of effects of selected variables on school breakfast participation	94
27. Least squares means and standard error for breakfast participation variables	95
28. Analysis of variance of special milk program participation variables	98
29. Least squares means for special milk program participation variables	99
30. General linear model analysis of covariance for effects of selected variables on elementary school lunch participation	146
31. Partial regression coefficients and standard error from analysis of effects of selected variables on elementary school lunch participation	147
32. Least squares means and standard error for elementary school lunch participation variables	148

Table	Page
33. General linear model analysis of covariance for effects of selected variables on secondary school lunch participation	149
34. Partial regression coefficients and standard error from analysis of effects of selected variables on secondary school lunch participation	150
35. Least squares means and standard error for secondary school lunch participation variables	151
36. General linear model analysis of covariance for effects of selected variables on school lunch participation in combined schools	152
37. Partial regression coefficients and standard error from analysis of effects of selected variables on combined school lunch participation	153
38. Least squares means and standard error for combined school lunch participation variables	154
39. General linear model analysis of covariance for effects of selected variables on elementary school breakfast participation	155
40. Partial regression coefficients and standard error from analysis of effects of selected variables on elementary school breakfast participation	156
41. Least squares means and standard error for elementary school breakfast participation variables	157

INTRODUCTION

Among the largest foodservice programs operating in the United States is the National School Lunch Program (NSLP), serving approximately twenty-eight million meals per day (1). Three million children in one-fifth of the nation's schools participate in the School Breakfast Program (SBP) (2). The Special Milk Program (SMP) has been in existence since 1954 with more than 84,000 schools participating (1). All three of these programs, which are supported by federal funds administered through the Food and Nutrition Service (FNS) of the United States Department of Agriculture (USDA), have as primary objectives, safeguarding school child health and strengthening the agricultural economy (3).

The expanded use of the term "accountability" and the recent emphasis on nutrition education have made participation statistics in child nutrition programs more important than ever before. Heimstra (4) contended that factors associated with participation have been studied in many surveys to determine why students do or do not participate. He emphasized that few surveys have been designed to obtain data from random samples that could be analyzed empirically. Heimstra also stated that perhaps the problems in projecting costs and participation in the child nutrition programs are due to non-economic variables affecting program participation, changes in program design that have occurred, or lack of sufficient historical data. Further research to determine the frequency of participation will assist in clarifying factors affecting participation.

Heimstra (4) stressed that research and evaluation of food programs have not kept pace with increasing size and costs. This assessment is true with respect to impacts on participants as well as on agriculture and the food marketing industry. He concluded that finding the rate of participation in food programs is an important research need.

The objective of this study was to assess factors affecting participation in child nutrition programs. Schools in Iowa, Kansas, Missouri, and Colorado were selected randomly and asked to participate in a mail survey. Child nutrition program participation data for the study were from school lunch, breakfast, and special milk records for October 1979. Specific objectives of the study were:

- (a) to compare participation rates in the school lunch and breakfast programs in relation to a number of selected variables (price, extent of bussing, location and size of school, percentage of free and reduced price meals served, and several variables that measure program quality);
- (b) to determine the alternatives to the NSLP that are available to students;
- (c) to assess data on school facilities and institutional arrangements being used in school foodservice programs; and
- (d) to study activities and functions identified as components of school foodservice program quality.

REVIEW OF LITERATURE

Historical Background

School Lunch Programs

Bard (5) explained that the initial school lunch program was a municipal soup kitchen set up in Munich in 1790 for unemployed workmen. Thousands of school children were observed to be undernourished and "lackluster" in class. They were invited to partake of the soup.

School feeding was practiced in Europe for more than a century and a half before the idea was brought across the Atlantic and became established in America. French officials encouraged operation of school canteens beginning in 1849 (5, 6). Cronan (7) reported that by 1882 the law for compulsory primary education in France made the provision of school funds for lunches mandatory. Participation was open to all children regardless of ability to pay; however, 32 per cent of the meals were paid for by the children in Paris in 1909 and a total of 38,531 children were participating. The average cost per meal was 3.5 cents and the average charge per meal to paying students was 2.9 cents (8).

An officer of the British army stated that only two out of every five men who wished to become soldiers were physically fit for the Boer War in England in 1902 (7). This lack of physical fitness found in the young men of England became a national issue and Parliament recommended that lunches be supported whenever possible by private funds, making public funds available when costs could not be met by other means. Gunderson (8) stated that in 1900 Holland became the first country to

adopt national legislation specifically to provide school lunches. This legislation was enacted because the lack of food and clothes was preventing children from attending school regularly.

Cronan (7) reported that in 1903, Switzerland passed a federal law which provided for the distribution of food and clothing to poor school children. By 1906, cities in Switzerland were given permission to use state funds for school meals. Nearly all other European countries joined in the school feeding movement by 1909. By this date, other systems were developed in Austria, Belgium, Denmark, Finland, Norway, and Sweden and development was beginning in Spain and Russia.

Bard (5) contended that school lunches in U.S. schools on a mass scale have never equaled those of several European nations as measured by financial support, rate of participation, and adequacy of facilities. The first feeding program in the United States is credited to the Children's Aid Society of New York City in 1853. The Starr Center Association, a benevolent organization, started another program in 1894 for penny lunches in a poor school district of Philadelphia (6, 8).

Not until the severe economic and agricultural crisis of the 1930's was the United States federal government prompted to provide assistance for the school lunch program. Several cities in Missouri were given Reconstruction Finance Corporation loans to pay labor costs of preparing and serving school lunches. Similar assistance was granted to thirty-nine states through the Civil Works Administration and Federal Emergency Relief Administration by the end of 1934 (5). Federal assistance became essential, and Congressional action was taken in 1935 to aid both agriculture and the school lunch program (5, 8).

Special Milk Program

In 1939, the experimental Penny Milk Program was initiated in fifteen Chicago schools to test the feasibility of increasing consumption of milk through distribution at school as a means of increasing producer income from sale of fluid milk. Milk was sold to children at one cent per half-pint. The handlers were reimbursed from federal funds. A milk program was initiated in New York City in 1940. By the close of the 1941-42 school year, 731,000 children were receiving milk daily under the program (6).

School Breakfast Program

In 1966, Congress recognized that many children who were missing their morning meal had impaired ability to learn. In response, a pilot breakfast program was established. In areas of "severe need," Congress permitted reimbursement of up to 80 per cent of all operating costs, food expenses, and labor to the participating school districts (9).

Legislation and Current Status of Child Nutrition Programs

Overview of Legislation

The National School Lunch Act, P.L. 396, which established the National School Lunch Program (NSLP), was passed by Congress in 1946 (10); thus, the interim cash assistance program that Congress initiated in 1935 (8) became permanent legislation. The National School Lunch Act authorized a grant-in-aid program to the states and placed responsibility for further expansion and improvements of school lunch programs in the educational agency in each state (11). The purposes of the law were to safeguard the health of the nation's children and encourage the domestic

consumption of nutritious agricultural commodities and other food (10). Under Section 32 of P.L. 396, purchase and distribution of commodities became a mainstay of the national program (8). Schools were required to follow these standards in return for federal cash and commodity assistance:

1. the program should be non-profit,
2. lunches served should meet nutritional requirements, and
3. free or reduced price lunches should be served to children unable to pay the full lunch price (12).

The Special Milk Program (SMP) was begun in 1954 with the enactment of P.L. 83-690 which provided that funds from the Commodity Credit Corporation be used to increase the consumption of fluid milk by children in non-profit schools of high school level and lower (13). The basic structure of the school nutrition program remained static during the twenty years from 1946 to 1966 with the exception of the beginning of the SMP (6). In 1962, however, a major amendment to the National School Lunch Act (14) was passed by Congress seeking to make the school lunch program more effective in reaching needy children with a free or reduced price lunch. This program was not funded, however, until 1966 (11). Special assistance in the form of cash reimbursement for meals served free or at reduced prices to needy children was included in the 1962 legislation. The formula for appropriation of federal funds to the states was revised to reward those states making the greatest effort toward increasing participation (8, 14).

A new dimension was added to school foodservice with passage of the Child Nutrition Act of 1966. A pilot breakfast program and federal assistance for equipment were covered by funds appropriated by the Act (8, 15). The School Breakfast Program (SBP) was initiated as a two year

pilot program. Also, under the provisions of the Child Nutrition Act of 1966 (15), the SMP was made a part of the Child Nutrition Programs.

Hunger within the nation became the focus of several task force groups in 1967. Investigations were started in the Mississippi Delta to determine the extent of hunger in the United States. Results of this study by the U.S. Senate Poverty Subcommittee stimulated publication of Hunger USA which spotlighted the existence of hunger in the nation and identified "hunger counties" in America (16).

Five women's organizations sponsored the publication of the results of a study concerning the NSLP in 1968 (17). The study was conducted in forty selected communities across the nation and revealed that goals of the program were unattainable due to the limitations built into the system.

Bard (5) criticized school lunch program operations and described the effects of malnutrition on children in her book published in 1968. Failures of anti-poverty legislation were pointed out, and recommendations were given for expansion of the program. Bard further stated that the school lunchroom was one of the underdeveloped areas in American education, being starved for facilities and for funds to serve the proper food in the right amount to children who needed it.

Another force bringing hunger to the attention of the nation was the nationally televised documentary, "Hunger in America," telecast in 1968 (18). Congress, reacting to public concern about hunger, created the Senate Select Committee on Nutrition and Human Needs in July 1968. Surveys conducted by the Committee showed federal food programs often failed to reach needy people (19).

Calling the White House Conference on Food, Nutrition, and Health in 1969 reflected the nation's concern for malnutrition. The conference was designed to focus national attention on the nation's nutrition problems (5).

These activities stimulated a series of enactments that brought about a sweeping overhaul of all school feeding programs. The Child Nutrition Act was amended in 1968 to extend the breakfast program through fiscal year 1971 (8). In 1969 the Food and Nutrition Service was established within USDA to concentrate on the administration of federal food programs (19).

New amendments to the National School Lunch and Child Nutrition Acts in P.L. 91-248 brought about significant changes, particularly concerning the requirement for providing free and reduced price lunches for needy children (8, 20). The law stated that every child from a low income home should be served a meal at school. Minimum eligibility standards for free and reduced price meals based on family income also were established. Funds were appropriated for nutritional training and education for school foodservice workers, cooperators, and participants of the programs. A National Advisory Council was created to make a continuous study of the operations of programs carried out under the National School Lunch Act and Child Nutrition Act of 1966 (20).

P.L. 91-295 (21), enacted in 1971, authorized appropriations for the SMP on a permanent basis. The Child Nutrition Programs also were extended to reach pre-school and poor children in non-school group situations in the summertime. According to Martin (1), the programs, which for twenty years had provided only one meal a day during the school year, assumed the dimensions of a comprehensive child nutrition program.

P.L. 92-433, enacted in September 1972, also extended and expanded the breakfast program to all public and non-profit private schools (22).

In 1973, P.L. 93-150 provided additional federal financial assistance for the NSLP (23). This amendment increased the national average payment from eight to ten cents per lunch with a forty-five cent reimbursement for free lunches and ten cents less for reduced price lunches. An escalator clause was included to require USDA to review rising food costs periodically and to assign reimbursement in relation to higher costs.

In addition, P.L. 93-150 tied the determination of eligibility to receive free milk to the income poverty guidelines (23). Any child qualified to receive a free lunch also was qualified to receive free milk. P.L. 93-347 (24) provided open-ended funding for the SMP with a minimum rate of reimbursement per half-pint of milk at five cents to be adjusted on an annual basis to reflect changes in the Consumer Price Index.

In 1975, P.L. 94-105 addressed food waste in the school lunch programs (25). A provision commonly referred to as "offer versus serve" was included in the bill. The provision stated that senior high school students were not required to accept offered foods that they did not intend to consume. Students served a Type A lunch were required to select only three of the five components of the meal (26). The lunch, however, continued to be priced as a unit whether the student selected a complete or partial meal (25, 27). Additional amendments to the National School Lunch Act and the Child Nutrition Act of 1966 included in P.L. 94-105 excluded margarine as a required component of the Type A meal and mandated the service of reduced price lunches to eligible children from

families with incomes below 195 per cent of the income poverty guidelines (11, 25). The legislation also made the SBP a permanent program by stating that the purpose and intent of the Congress was to make breakfast available in all schools where it was needed to provide adequate nutrition for children in attendance.

P.L. 95-166, enacted in 1977, further amended the National School Lunch Act and the Child Nutrition Act of 1966 (28). This law authorized the Secretary of Agriculture to carry out a program of nutrition information and education as part of foodservice programs for children. Other amendments in P.L. 95-166 revised the summer food program to make it more effective and contained a number of other improvements to the regular school lunch and breakfast programs. The purpose of one amendment was to strengthen the administration of the program, achieve greater accountability of program funds, and eliminate abuses of the program. Another amendment to the bill made the "offer versus serve" provision optional for service in junior high schools. In addition, the Secretary of Agriculture was given the authority to regulate the sale of competitive foods in the schools.

USDA proposed regulations to implement P.L. 95-166 that specified prohibition of the sale of soda water, frozen desserts, candy, and chewing gum to children on school premises until the last lunch period was ended (29). The final rule, issued in January, 1980, restricted the sale of foods of minimal nutritional value from the beginning of the school day to the end of the last lunch period (30). Foods of minimal nutritional value were defined as those that provide less than 5 per cent of the U.S. Recommended Daily Allowances (RDAs) for each of eight specified nutrients per 100 calories and per serving.

P.L. 95-627 was enacted in 1978 to expand non-profit foodservice programs for children in institutions providing child care (31). The amendment changed the reimbursement rate for reduced price meals. The Secretary of Agriculture also was authorized to conduct a study to determine the cost and feasibility of requiring schools to offer a choice of menu items within the required meal patterns.

Current Status of the Programs

In 1976, Heimstra (32) reported that 25.5 million students were participating in the NSLP. Of this number, 10.8 million students were receiving free and reduced price lunches. A statistical study on the NSLP prepared by USDA/FNS (33) indicated that 92,840 schools were participating in the NSLP in 1978. The average daily attendance for the schools was 41 million, and of this number, 29.6 million students were participating in the NSLP. Martin (1) stated that the school lunch program was available to over 90 per cent of all children enrolled in elementary and secondary schools in 1978. In October 1979, USDA/FNS reported that 93,357 schools were participating in the NSLP (34). This number of schools involved 29.6 million participating students, 37.8 per cent of the children being served free lunches and 6.5 per cent being served reduced price lunches.

About 20,000 schools, or 20 per cent of the total number of schools in the nation, offered the SBP in 1978. The program had grown 10 per cent each year for the previous three years (35). Kotz (36) reported that the serving of free school breakfasts expanded from a \$5.5 million dollar program serving 300,000 children in 1968 to a \$200 million dollar program serving more than three million children in 1978. In October 1979, USDA/FNS (34) stated that 30,761 schools were participating in the

breakfast program. The number of children participating reached 3.5 million with 84.3 million of the total number of children served receiving free or reduced price breakfasts.

Milk consumption in schools increased nearly ten-fold over the twenty-three years from 1946 to 1969 (8). In 1946-47 there were 228 million half-pints of milk served as Type C lunches. In 1969-70 there were 2.7 billion half-pints of milk served in the schools under the SMP. In 1975, 8.2 million students were certified for free milk on a national basis (11). At that time, 2.4 million half-pints of milk were being served free to qualified children; only 29 per cent of the children who were eligible were receiving free milk. During the peak month of 1972, 93,812 outlets were participating in the SMP compared with 87,969 in 1975. The number of half-pints of milk served, however, decreased from 286.8 million in 1972 to 246.4 million half-pints served in 1975. The trend continued through 1979 with 85,360 outlets participating.¹

Nutritional Standards for Child Nutrition Programs

Meal Requirements

National School Lunch Program. Daniels (37) defined meal patterns as the specifications for the types of foods and minimum amount of each food that must be served on school lunch menus. She reported that since its inception in 1946, the NSLP has used a meal pattern as a simple guide designed to protect the nutritional quality of the lunches served.

Originally, there were three approved meal patterns for the National School Lunch Program: Type A, Type B, and Type C (37). The

¹USDA preliminary report of 1979. Telephone conversation 5/15/80.

Type A pattern was designed to provide one-third or more of the Recommended Dietary Allowances (RDA's), as specified in 1943, for a nine to twelve year old child. The Type B pattern was designed to provide a supplementary lunch in schools where adequate facilities for preparation of a Type A lunch were not available. The Type C pattern consisted of one-half pint of whole milk served as a beverage. Over the years, the Type B and Type C patterns were dropped and the Type A pattern became the only lunch pattern for the NSLP.

Since the Type A pattern was introduced in 1946, several reviews have resulted in minor changes in the pattern (37). The Type A pattern has been reviewed and evaluated each time the RDA's have been revised by the Food and Nutrition Board of the National Research Council, National Academy of Sciences. New information from studies of children's food consumption and food preferences and studies of the nutritive value of school lunches also have stimulated review of the pattern. The original patterns and the revisions by years are outlined in the following text (6, 7, 37-40).

1946 - The Type A pattern consisted of

1. one-half pint of whole milk,
2. two ounces of fresh or processed meat, poultry, fish or cheese; one-half cup cooked dry beans or peas; four tablespoons of peanut butter; or one egg,
3. three-fourths cup serving of two or more vegetables or fruits, or both,
4. one serving or portion of bread made of whole-grain or enriched meal or flour, other breads made out of enriched meal or flour could be served such as cornbread, biscuits, rolls, or muffins,
5. two teaspoons of butter or fortified margarine.

The Type B menu met the Type A specification for milk and bread but called for only half the portion in the other groups. The Type C lunch was one-half pint of whole milk, which could supplement lunches children brought from home.

- 1958 - Revisions in the pattern stipulated that the meat or meat alternate must be served in the main dish or in the main dish and one other menu item. Also, schools were required to serve two or more vegetables or fruits, or a combination of both. The revisions limited the amount of full strength vegetable or fruit juice schools could serve to meet the fruit and vegetable requirement.
- 1963 - Service of vitamin A, vitamin C, and iron-rich foods was emphasized in the guidelines.
- 1969 - A change was made in the butter or margarine requirement reducing the amount required from two teaspoons to one teaspoon.
- 1971 - Guidelines were issued recommending the amounts of food to meet differing nutritional needs of children of specified ages. Recommendations included reductions in portion sizes for children from three to ten years of age and increased portions for secondary students.
- 1973 - All types of fluid milk were authorized in the program, rather than only fluid whole milk.
- 1974 - Guidelines were issued defining and expanding bread and bread alternates.
- 1976 - The "offer versus serve" legislation was implemented and allowed senior high students to select as few as three of five food items included in the Type A lunch. In addition, the butter or margarine was deleted as a required component.

In October 1977, a review of the Type A pattern was conducted by the Consumer and Food Economics Institute of the Agricultural Research Service and USDA/FNS (37). As a result of the review, USDA proposed revised school lunch patterns. The major purposes of the proposed changes were to meet the needs of children of varying ages more adequately and bring the lunch requirements into conformance with the 1974 revisions of the RDA. The new meal pattern also was designed to contain only a moderate amount of fat, and foods high in concentrated sugar were not recommended for school lunches. Service of an iron-rich food and a vitamin C-rich food was recommended daily and a vitamin A-rich food twice a week. Use of iodized salt in food preparation was recommended.

Lunch patterns were proposed for five age groups (37). The groups were classified as: Group I, preschool children (ages one and two); Group II, preschool children including kindergarten (ages three, four, and five); Group III, school grades one through three (ages six, seven, and eight); Group IV, school grades four through six (ages nine, ten, and eleven); and Group V, school grades seven through twelve (ages twelve and above). The new lunch patterns were field tested between August, 1978, and February, 1979.

In August 1979, final regulations on some of the 1977 proposed changes were issued (41). The designation of the NSLP meal as the pattern was defined as "lunch pattern." The now discontinued "Type A" lunch originated in the early days of the program when there was more than one type of meal pattern.

Current regulations specify four components that schools must include in school lunches to obtain federal reimbursement. The four components are meat or meat alternate, fruit and/or vegetable, bread or bread alternate, and milk (41).

To meet the nutritional needs of different ages, 1979 regulations encouraged school food authorities, if consistent with state policy, to serve younger children less and older children more than the specified quantities of foods. These regulations (41) effected other changes in the NSLP.

1. The list of bread alternates was expanded to include enriched or whole-grain rice, macaroni, noodles, or other enriched or whole-grain pasta products, and other cereal grains such as bulgur and corn grits.
2. Schools were required to serve lowfat milk, skim milk, or buttermilk.

3. It was recommended that schools not offering a choice of foods serve no one form of meat or meat alternate more than three times a week.
4. School food authorities were required to devise a program of student involvement.
5. School food authorities were required to devise a program of parent involvement.

Further validations from field test results were considered necessary before full publication and implementation of the meal pattern regulations were published.

The second and final round of changes in the meal pattern for school lunch were promulgated on May 16, 1980 (42). This final regulation contained the following amendments.

1. Recommended different portion sizes for different age/grade groups of children,
2. Allowed schools to serve lunch to children age one to five years, at two service periods,
3. Increased the required quantities of certain meat alternates to be nutritionally equivalent to meat and other meat alternates, and
4. Changed the bread requirement to specify the number of servings required by week and to increase the total number of servings required.

School Breakfast Program. P.L. 89-642, also known as the Child Nutrition Act of 1966 (15), appropriated funds to enable the Secretary of Agriculture to formulate and carry out a pilot program to assist states through grants-in-aid and other means to initiate, maintain, or expand nonprofit breakfast programs in schools.

Requirements for the pilot program (40) stated that each breakfast provide a minimum of one-half cup serving of fruit or vegetable juice; one slice of whole-grain or enriched bread or three-fourths cup of

cereal, or an equivalent combination; and one-half pint of fluid milk used as a beverage, on cereal, or both. To improve the nutritional well-being of participating children, service of an ounce or equivalent serving of meat alternate was recommended as often as practicable.

The breakfast menu pattern has remained the same through the years since 1966. The goals of the SBP have also remained static, but the program has expanded to include preschool children (43).

Special Milk Program. P.L. 83-690 (13), enacted in 1954, provided that funds from the Commodity Credit Corporation be used to increase the consumption of fluid milk by children in non-profit schools. In the 1974 RDA's, the National Academy of Sciences identified the over consumption of fat as a dietary concern (13). USDA believed that the level of fat in child nutrition programs should be decreased. By serving unflavored fluid lowfat milk, skim milk, or buttermilk instead of whole milk, it was estimated that schools would reduce the percentage of calories derived from fat in the lunch alone by 4 to 10 per cent. The final regulation (30) required schools to make unflavored fluid lowfat milk, skim milk, or buttermilk available to children participating in the SMP, as well as lunch and breakfast programs. Schools could comply with this requirement by serving only unflavored fluid lowfat milk, skim milk, or buttermilk or by serving these types of milk in addition to another type of milk.

Studies on Nutrient Content of School Meals

Various research studies have evaluated the nutritional contribution of the NSLP menu pattern. In a study by Meyer et al. in 1951 (44), lunches were collected from fifteen schools in seven states to determine

their nutritive values. Chemical analysis of the lunches determined that for calories, fat, protein, riboflavin, calcium, and ascorbic acid the majority of the lunches met at least one-third of the RDA's. Only one-third of the lunches met the RDA for thiamine.

Murphy et al. (45) reported on the nutrient content of lunches served to sixth graders in a nationwide sample of 300 schools in the United States in the fall of 1966. Nutrient values were determined by laboratory analyses. The lunches served on an average exceeded the nutritional goal of one-third of the 1968 recommended allowances for vitamin A, thiamine, riboflavin, niacin, vitamin D, and vitamin B₁₂ for children ten to twelve years of age. Average vitamin B₆ content equalled the nutritional goal. Riboflavin, which was safeguarded in the lunches by the milk requirement of the Type A pattern, in all cases exceeded the goal. In the schools where the lunch provided substantially less of some vitamins than was desirable, the vitamins most often short of the goals were vitamin B₆, vitamin A, vitamin D, and thiamine. In more than half of the schools in the study, lunches failed to meet the goal for one or more of these four vitamins. Only a small proportion of the schools served lunches providing less than one-fourth of the day's allowances for one or more vitamins. All other schools served lunches that could be considered at least reasonably satisfactory in terms of vitamin content. In summary, the study indicated that lunches based on the Type A pattern usually provided satisfactory amounts of vitamins.

As part of a nationwide study of the nutrient content of Type A lunches, total fat, fatty acids, total sterols, and minerals also were evaluated (46, 47). The lunches contained an average of 31.8 grams of fat, which provided 39 per cent of the calories. Laboratory analyses of

mineral content indicated that on the average lunches were adequate for calcium, phosphorus, sodium, and potassium. Less than 10 per cent of the lunches met the goal for iron for girls, but about 80 per cent of the lunches provided the required iron for boys. Magnesium was found to be at a level less than the goal. For trace minerals, Murphy et al. (48) found marginal or low amounts of chromium and copper, adequate amounts of manganese, and adequate amounts of zinc. Caloric value of the lunches was found to be related to the levels of several minerals and vitamins. Lunches low in calories also tended to be low in one or more of the vitamins, usually thiamine and vitamin B₆ (45).

Head et al. (49) collected meals from twenty-one schools throughout North Carolina. The meals were analyzed for protein, fat, calories, vitamin A, ascorbic acid, thiamine, riboflavin, iron, and calcium. Relative to the Type A goal of one-third of the RDA's for nutrients, all meals were inadequate in calories and a high proportion of the meals were low in ascorbic acid and iron.

In 1973, USDA/FNS contracted with Colorado State University to develop a nutrient standard method (NSM) for planning procedures as an alternative to the Type A lunch pattern (50, 51). USDA/FNS specified a nutrient standard that was based on one-third of nine indicator nutrients and half of the protein as specified by the 1968 RDA's. Preliminary testing of the method showed it to be usable by school lunch menu planners and provided menus meeting certain minimal nutrient constraints.

Further comparison of the two menu patterns by Jansen et al. (52) noted nutrient deficiencies consistent with earlier school studies. Total number of calories and thiamine and iron contents were all deficient when compared with the school lunch nutritional goals. The

number of schools where the lunches furnished less than 60 per cent of the standard for calories, iron, and thaimine was significantly less for NSM menus than for Type A menus.

Jansen et al. (53) evaluated the nutritional value of individual food items in school lunch, from the time of mixing ingredients for menu items to service of the meal in sixteen high schools using four types of delivery systems with four schools per system. The four types of systems studied were: (a) on-site preparation and service, (b) central preparation and hot bulk delivery, (c) central preparation with chilled preportioned delivery, and (d) frozen preportioned delivery. The results of the study suggested that the four delivery systems studied were capable of placing food with comparable nutritional value on a serving line provided proper attention was given to all factors known to affect nutritional quality. The differences in all nutrient levels as a function of individual schools indicated nutrient levels in food varied significantly with food preparation practices.

Nutritional Impact on Students' Dietary Intakes from Participation in Child Nutrition Programs

Many researchers have studied the nutritional impact on children's dietary intakes caused by participation in child nutrition programs. This section is a summary of several of these studies.

National School Lunch Program

Callahan (54) conducted a study of the lunch patterns of Massachusetts students to determine whether those buying the Type A meal were eating more nutritious lunches than those who ate lunch at home or brought sack lunches. About 75 per cent of the children who participated

in school lunch ate a satisfactory or good lunch; only 24 per cent who ate at home and 48 per cent of those who brought sack lunches had adequate lunches. The Type A lunch surpassed all other lunch alternatives in nutrient adequacy, even though it could not be considered a good source of vitamin A or ascorbic acid.

Emmons et al. (55) conducted a study of 884 elementary school children in two rural upstate New York school districts in 1970 to determine whether children identified as eligible for free lunches were those most in need of the nutritional benefits of the program. The researchers stated that economic need was not concomitant with nutritional need.

In another study, Emmons et al. (56) measured the impact of school breakfasts and lunches on the nutritive intake, biochemical measurements, and physical growth of elementary school children during one academic year. The results of the study indicated that for children who continuously received poor diets at home, school feeding programs could help them obtain an adequate diet at least during the academic year. School lunches were found to provide significantly more protein, calcium, vitamin A, thiamine, riboflavin, niacin, and ascorbic acid than did bag lunches from home.

In 1972, Valenti (57) studied the contributions of the school lunch compared to the nutritional needs of tenth graders in sixteen Louisiana high schools. Valenti computed the difference in nutritive value of food served to students and plate waste. The calculations determined that protein, ascorbic acid, and calcium were consumed in amounts to meet one-third of the RDA's.

Johnson et al. (58) developed a food record technique, which was used by Grettenberg to evaluate (59) the nutrient intake of 403 high

school juniors. Nutrient intakes of students who participated in school lunch were higher for nine of the twelve nutrients studied than were intakes of non-participants. Mean intakes of protein, vitamin A, riboflavin, vitamin B₁₂, and ascorbic acid of all students were above the recommended allowances for boys and girls, ages fifteen to eighteen years.

Using a 24-hour recall, Stringfellow evaluated (60) the quantity and quality of dietary intakes of adolescents. School lunch participants had higher intakes of calories and all nutrients except vitamin A, calcium, and ascorbic acid than non-participants. Iron intakes of participants were lower than the allowance, whereas non-participants' intakes of thiamine and iron were below allowances.

In another study of students' nutrient intake, Head and Weeks (61) determined nutrients served in the Type A lunch and nutrients in plate waste by laboratory analysis. Relative to the Type A goal, protein, riboflavin, vitamin A, and calcium intakes of secondary school students were satisfactory. Iron intakes were adequate for elementary, but not for secondary students.

The Field Foundation has had a special concern for problems of hunger and malnutrition in the United States for over ten years (36). The concern began in 1967 with a sponsorship of a team of physicians whose investigation revealed widespread hunger and malnutrition in depressed communities of the nation. Several publications resulting from the investigation brought the hunger problem in America to the attention of many people. A decade later, in 1977, the Foundation again supported a group of physicians who returned to the same regions visited by the initial group to assess conditions of hunger and malnutrition. Summarizing findings in 1977, the Field Foundation medical team stated

that their first impression of the state of nutrition in the U.S. was that there were far fewer grossly malnourished people than ten years ago. In the opinion of the team school lunch, breakfast, and other nutrition programs made the difference.

Price et al. (62) in a study of school children in the state of Washington found that participants in the school lunch program had significantly higher intakes for five of ten nutrients than partial or nonparticipants. Nonparticipants, however, had significantly higher intakes of iron. Biochemical data from the study showed few problems of malnutrition among the children in the sample.

In a recent study of high school sophomore and junior level students, Howe and Vaden (63) found that participants in the lunch program had significantly higher intakes of calcium than did nonparticipants based on a 24-hour dietary recall. Participants also consumed significantly higher amounts of protein, calcium, iron, vitamin A, thiamine, and riboflavin at lunch than did nonparticipants. Lunch intakes of the participants met or exceeded the goal of one-third of the Recommended Dietary Allowances for all nutrients evaluated except for iron, thiamine, and niacin. Nonparticipants of school lunch, however, failed to consume adequate calories and all nutrients except protein studied in relation to the nutrient goal.

School Breakfast Program

Nutrient contributions of school breakfast have not been studied to the same extent as school lunch. Emmons et al. (56) noted that school breakfasts provided higher levels of all nutrients studied than school milk supplemented by snacks brought from home. Over one-quarter of the children's allowances for protein, calcium, thiamine, riboflavin, and

ascorbic acid were supplied by the school breakfasts. In the Washington state study by Price et al. (62), they found that the school breakfast program significantly increased children's intakes of vitamin C. They further stated that the breakfast program has particular potential for increasing intakes among participants since it was estimated that more than 7 per cent of the eight to twelve year old children in Washington state were going to school without breakfast.

In the literature, the nutritional contribution of school breakfast often is examined in terms of classroom behavior and health of the children rather than specific nutrients. In a paper prepared by the USDA Economic Analysis and Program Evaluation Staff (11), some of these attitudes were summarized in the statement that increased participation in child nutrition programs may contribute to healthier, more attentive, and more responsive children able to profit from the educational system. The authors also stated that a healthy, well-nourished child is less susceptible to infections, thus losing less time from school and thereby gaining increased learning opportunities.

Participation in Child Nutrition Programs

The child nutrition programs offered in most of the nation's schools make nutritious meals available for school children. Low participation levels in these programs, however, have been cause for concern among professionals in foodservice management and child nutrition. In this section, participation in the programs as reported by the USDA National Advisory Council on Child Nutrition, established in 1971, is reviewed (64-69). Another national level report from the General Accounting Office (GAO), U.S. Comptroller General also is summarized (3).

Factors affecting participation are discussed based on findings from various studies on child nutrition programs.

Reports of the USDA National Advisory
Council on Child Nutrition

Public Law 91-248 (20) authorized a National Advisory Council on Child Nutrition. The function of the Council was to make a continuing review of the child nutrition programs administered by USDA and other related programs to determine how they could be improved. Participation in the programs has been a concern of the Council since its establishment in 1971. Key aspects of the Council reports related to participation published between 1971 and 1977 (64-69) were reviewed and are cited in the following sections. The Council recognized a number of areas for improvements in the programs over the years: emphasizing nutrition education, reaching schools without programs, upgrading school foodservice personnel, revising nutritional standards for child nutrition programs, implementing advance funding authority, increasing student participation in child nutrition programs, increasing school involvement in summer feeding programs, strengthening state administration, reducing plate waste, and improving meal quality.

1971 Report. The first annual report was submitted to Congress in 1971 (64). At that time, areas in need of improvement were identified. One of two priority areas was that of reaching schools without programs.

The Council recommended that USDA and the state departments of education concentrate on extending the child nutrition programs to schools without such programs so that within three years all schools would be participating and all school children from low income families would have access to free and reduced price meals under the program.

The review of the performance of the states in carrying out provisions designed to extend the programs to no-program schools was completed by the Council and needed improvements were identified. Specifically, the Council found that an insufficient amount of nonfood assistance funds were being used to reach needy schools that were without foodservice, that state plans of child nutrition operations showed inadequate efforts to reach nonparticipating schools, and that the advance funding provisions, which gave states funds for long-range planning, had not been implemented. In accordance, the National Advisory Council recommended these statements.

1. In line with the new regulations on nonfood assistance funds, the U.S. Department of Agriculture and the state departments of education should concentrate the use of these funds in schools that currently offer no foodservice and give priority to those with the largest numbers of needy students.
2. The states should set more realistic expansion targets in their state plans and concentrate on reaching the neediest schools first, so that within three years, all schools needing a school lunch or school breakfast program would be participating.
3. In connection with the first two recommendations, more accurate data should be collected on the number of needy children and their location in terms of the schools they attended and whether or not these schools offered foodservice.
4. USDA, state, and local officials should continue to explore how new foods and approaches could assist in reaching nonparticipating schools, including those where constructing kitchen facilities was not a viable alternative.
5. USDA and state and local officials should emphasize further the need for schools receiving federal assistance to reach all attending eligible children with free and reduced price meals.
6. The provisions of Public Law 91-248 authorizing advance funding should be implemented.

1972 Report. The annual report of 1972 (65) stated that USDA had given major attention to the need to reach schools without foodservice programs. A survey in October 1971 conducted by the states on

characteristics of the 18,000 no-foodservice schools examined size of school enrollments and whether the schools were public or private, rural or urban, and needy or nonneedy.

A joint memorandum was sent by USDA and the Office of Education of the U.S. Department of Health, Education, and Welfare in November 1971, to all State School Foodservice Directors and State Title I Coordinators urging full cooperation in initiating foodservice programs in all Title I schools. Title I schools, under the Elementary and Secondary Education Act of 1965, were so designated based on a high percentage of economically needy and educationally deprived children attending the schools. A survey resulting from the joint memorandum showed that as of the previous school year over 4,000 Title I schools were not offering foodservice.

The Council's concern for reaching schools without foodservice was transmitted in a March, 1972, letter to state governors, chief state school officers, state school foodservice and food distribution directors, interested federal agencies, and nongovernmental organizations. The U.S. Catholic Conference's cooperation was sought through the transmittal letter since many of the schools without foodservice were parochial schools. The Conference began working closely with USDA Food and Nutrition Service early in 1972 to reach these schools. A conference was held in September 1972 in Chicago to discuss program expansions with representatives from no-program parochial schools and USDA. A number of these schools began making plans to start foodservice programs.

According to the Council's 1972 report, the administration included in the May 1972 child nutrition legislative proposals a provision to reserve half of the nonfood assistance funds for exclusive use in schools without foodservice. Even though the administration's proposals were not

acted upon fully, this particular provision was incorporated in H.R. 14896 that was signed on September 26, 1972 as Public Law 92-433. The new law provided that the 25 per cent state and local matching requirement under the program could be waived for especially needy schools without foodservice. Other provisions in Public Law 91-248 assisted the drive to reach schools without foodservice. These provisions involved making the SBP available to any school that wanted to participate and further improved the funding structure of the SBP and NSLP such that states and schools were assured that assistance was available for expanded program activities.

In the 1972 report, the Council concluded that insufficient attention was being given to the important need of making school foodservice programs attractive in terms of meal quality and eating arrangements to make children desire to participate. At that time only 57 per cent of the children in schools with the lunch program were participating, and the number of non-needy children participating appeared to be declining slightly.

The Council stated that improving the capability of foodservice personnel should help improve participation. The efforts made to upgrade the status and training of school foodservice personnel were considered to have a substantial impact on increasing participation. The support of school administrators, teachers, and other school personnel also was deemed important in achieving high participation in school foodservice programs.

The Council also endorsed an FNS study to isolate factors affecting participation in high schools and test means of increasing participation. The Council was especially interested in USDA and the state departments

of education utilizing various participation studies and projects to develop action oriented programs throughout the country aimed at achieving a high degree of student participation in the child nutrition programs.

1973 Report. During 1973, USDA continued its major nationwide drive launched in the summer of 1972 to reach schools without foodservice. State agencies and FNS regional offices increased their activities. A number of surveys, mass mailings, personal visits, workshops, and meetings were conducted according to the 1973 Council report (66).

Various efforts of voluntary organizations to assist in reaching no program schools were reviewed by the Council. Obtaining local community support and the changing of attitudes was considered a requisite to overcome resistance. The Junior Chamber of Commerce opened the National Center for Improved Child Nutrition during 1973. The purpose was to help mobilize and assist local chapters in the drive to expand school foodservice. The U.S. Catholic Conference established an advisory group for Catholic school foodservice. The Conference was instrumental in obtaining the assistance of the Council for American Private Education (CAPE). CAPE is a nonprofit organization established by the major denominations and most of the independent private schools to work toward the common goal of quality education. The Women's Auxiliary to the American Medical Association and the American Legion also were involved in supporting school foodservice actively.

The General Accounting Office (GAO) report to Congress, "Progress and Problems in Achieving Objectives of the School Lunch Program," was reviewed by the Council in June 1973. The GAO report recommended that more accurate information on the number and needs of schools not

participating be obtained and efforts should concentrate on motivating these schools to participate, especially those schools not participating for reasons other than lack of funds.

According to the 1973 report, FNS developed a system of priority classifications for the states and USDA regions to aid in maximizing the effectiveness of their efforts in extending the programs to schools without foodservice. The system grouped schools by relative needs and desires to begin the program and helped channel the efforts of volunteer groups into areas where they could be most effective.

FNS also evaluated state administration of nonfood assistance funds to measure impact during 1973. Another project conducted by FNS in 1973 was the survey required by Public Law 92-433 on unmet equipment needs in schools eligible for the Nonfood Assistance Program.

Other efforts of USDA/FNS reported to the Council were development of a handbook entitled "Free and Reduced Price Meal Handbook," designed to assist state and local officials in complying with federal regulations and in reaching children from low income families. FNS also undertook a study prompted by the need to increase the participation of non-needy as well as needy children. The objective was to determine the factors that influence participation of children in the NSLP in the secondary schools.

The Council urged USDA and state educational agencies to continue the nationwide drive to extend the child nutrition programs to schools without foodservice. The Council emphasized that nonparticipation by schools in the lunch program was due less to problems of developing and funding suitable systems and more to problems of gaining the attention of school officials and other local community members and changing their attitudes toward either the need for, or priority of establishing foodservice

programs. The assistance of voluntary organizations in the drive to reach non-program schools was particularly important in view of the changing attitudes. The Council recommended that USDA and state educational agencies strengthen efforts to increase the level of student participation in schools with foodservice programs. The Council supported the extension of participation studies in every state and urged continued priority for them.

1974 Report. According to the 1974 Council report (67), the number of volunteer organizations and their activities increased. Some of the new organizations involved in promoting school foodservice were Pennsylvania Federation of Women's Clubs, the National Congress of Parents and Teachers, and the National Milk Producers Federation. Two groups of schools were reported to be a continuing problem, private schools and small public schools. These two categories represented more than two-thirds of the schools without foodservice.

FNS reported to the Council that the state agencies and the FNS regional offices were surveyed and they documented the reasons why schools did not participate in the NSLP. The reasons stated were: the high number of students bringing lunches, lack of school interest, lack of building space for a kitchen or dining area, lack of equipment, or school officials belief that the school was too small to support a school foodservice.

From 1973 to 1974, data in the report indicated that the percentage of schools participating in the NSLP increased from 86 to 87 per cent. Schools without foodservice decreased from 10 per cent in 1973 to 9 per cent in 1974. Based on the study carried out by FNS in 1973 that identified key factors in high and low participation schools, several

FNS regional offices reportedly produced information packets for use by states working with low participation schools. Individual school projects met with varying degrees of success. The amount of increased participation was reported to be in direct proportion to the amount of interest and input at the local level. The number of successful projects showed that given the proper amount of local interest and support, school lunch programs in high schools could cater to the needs and lifestyles of high school students and also meet USDA's Type A requirements for the program.

The 1974-75 plan focused on a smaller number of states that were willing to make the necessary commitment for increasing participation. Approximately five states in each of the five FNS regions were encouraged to be part of the project. Plans also were made to expand the project to all states for the 1975-76 school year and to make increasing participation part of on-going state program operations.

1975 Report. In the 1975 Council report (68), USDA/FNS indicated that the overall increase in the NSLP had not been accompanied by a decline in the number of schools without foodservice in 1975 for two reasons. First, schools with some form of foodservice, but not the NSLP, were included in FNS outreach efforts for no-program schools. These schools, however, were not included in the original list of no-program schools, thus no decline in that list was registered when they joined the program. Secondly, data collection systems in the state had improved, and as a result, a large number of private schools that had not been previously recorded had been identified.

FNS also reported that some schools probably would not choose to operate a lunch program. Preliminary documentation showed the major

reasons to be small student enrollment, lack of interest, no building or space for equipment, and students going home for lunch.

As a result of these findings, the Council recommended that USDA dismantle the extra effort aimed at no-program schools. While the Council did recommend that USDA continue its work in the few remaining states with large numbers of no-program schools, it concluded that the weight of USDA's staff time and resources should be applied to increasing student participation and minimizing plate waste.

1977 Report. The Seventh Annual Report of the National Advisory Council on Child Nutrition (69) turned attention away from specific methods of increasing participation. Instead, nutrition education and proposed regulations for the new meal patterns were emphasized, both of which could affect participation. The special concerns of the Council for meal quality and competitive foods also were related to participation levels.

General Accounting Office (GAO) Report on School Lunch Program

In 1977 the General Accounting Office (GAO), U.S. Comptroller General, published a report that identified shortcomings in both the evaluation and performance of the NSLP (3). The report recommended specific actions for improving the effectiveness and efficiency of program services. Areas discussed included school child health, nutritional needs of children, operating efficiency, and the relationship of the program to the Nation's agricultural economy.

The aspects of the GAO report relevant to participation in the NSLP are summarized in this section. According to GAO, many authorities have expressed a desire to improve participation levels, however, the question

remains as to how it can be accomplished. Several key questions were posed that served as the basis for examining whether or not the program met its legislative objective.

1. Did the program support the health of school children?
2. Did the program increase demand for agricultural commodities?
3. Did children in need of nutrition eat the lunches?
4. Were lunches provided as inexpensively as possible?

Data reviewed indicated that the number of schools serving the NSLP lunch had increased in recent years, however, the increase in the number of participating students was not proportional. While the participation levels of regular price students had declined, the number of children eligible for free and reduced price meals had increased, thus, overall participation levels remained static.

Participation Trends. Statistical trends showed continuous growth in the number of U.S. school children between 1946 and 1970. The trend peaked at 52.1 million students in 1970, and by 1975, school enrollment had declined by approximately 1.2 million students. The drop in birth rates during the 1960's was associated with further declines indicated by the census projections. The 1980 enrollment in regular day schools was expected to be between 45 and 47 million compared with 50.9 million students enrolled in 1975. According to GAO (3), the current shift of students from elementary to secondary schools (where lunch program participation has traditionally been lower), and the continuing decline in U.S. enrollment creates downward pressures on NSLP participation levels.

NSLP Availability in Schools. In 1950, only 54,000 schools participated in NSLP (3). By 1975, the program had increased to include 89,000 schools with a combined enrollment of 44.8 million students or approximately 81 per cent of the nation's schools and 88 per cent of the school children. In 1974, USDA reported that 86 per cent of the nation's school children were enrolled in NSLP schools. Of the remaining 14 per cent, 4 per cent attended schools without a program, with the exception of a milk program in some schools.

The 18,000 schools without foodservice were categorized by USDA in these three groups.

1. Over half were private, nonprofit schools with a combined enrollment equal to 49 per cent of all children attending such institutions.
2. One-third of the schools had enrollments of less than 100 students.
3. Students in these schools were more likely to live in urban areas and/or come from more affluent families. Although 25 per cent of the children in NSLP were eligible for free or reduced price lunches, only 10 per cent of the children in schools without foodservice were considered economically needy.

GAO reported that USDA has placed greatest priority on assisting schools without foodservice capability for expanding the programs' availability, especially schools with a high proportion of needy children. Nonfood assistance funds have been used to assist schools in low income areas to establish, maintain, or expand school foodservice programs. State and local sources have provided at least 25 per cent matching funds for capital expenditures on equipment, which could be waived for especially needy schools without foodservice. These funds have provided an important means for overcoming physical or financial constraints and bringing new schools into NSLP, even though progress has been slow.

Increased difficulty in overcoming the attitudinal reasons for schools not joining NSLP were described by USDA as follows:

1. school administrators and/or teachers are against school lunches,
2. children walk home for lunch, and
3. some private schools have too many competing demands for available resources to be used in a lunch program or simply want to operate free of federal or state assistance.

In the Comprehensive Study of the Child Nutrition Programs (70), cited by GAO, USDA concluded that there are a number of schools, especially private schools, that probably would never initiate a program. Reasonable efforts to reach these schools would continue and reasons for nonparticipation would be documented.

Student Participation. According to data reviewed by GAO (3), the number of participating students remained fairly constant during the 1971-75 period although the student enrollment in NSLP schools increased. In 1975, 25.4 million students, or 56.7 per cent of the NSLP enrollment, participated in the program. In 1975, the nonparticipants in NSLP, 19.4 million children, accounted for 75.9 per cent of all U.S. school children who did not eat school lunch. These figures appear to indicate that the NSLP enrollment itself presents the greatest opportunity for further increases in program participation, rather than increases derived from additional schools in the program.

Although the NSLP has been serving free or reduced price lunches to children unable to pay the regular price since it began in 1946, prior to 1968 these provisions were not carried out effectively. GAO reported that congressional funding for free lunches in 1968 and 1970 gave significant impetus to increased free lunch participation. Public Law 91-248 (20), enacted in 1970, mandated that free lunches be served to

needy children and provided specific guidelines for determining eligibility for free and reduced price lunches. The serving of reduced price lunches remained a state option.

Data indicated three million needy children were receiving free lunches prior to 1968. From 1971 to 1975, the number of children participating in free and reduced price programs increased by 2.8 million. In the same time period, participation in the regular price program declined by 2 million students. Thus, the increasing number of children eligible for free and reduced price programs, as well as the higher participation rates in these categories were cited by GAO as an important influence in maintaining NSLP's overall level of participation (3).

Studies on Factors Affecting Participation in School Lunch Program

In a report on the evaluation of Child Nutrition Programs (11), USDA/FNS officials stated that participation in the NSLP is lower than it should or could be. The report indicated that even though the SBP expanded rapidly after its inception, it remains small relative to the NSLP. The SMP participation figures have been cause for concern since 1969 when participation began to decline. As a result, considerable effort has been expended in both understanding the nature of the factors associated with participation and increasing the level of participation. Because of the nutritional benefits of the Child Nutrition Programs to dietary intakes of children, increasing participation in school lunch has been the objective of several projects (72, 73). Attempts have been made to increase participation in the SBP also (74, 75). Doucette (76) contended that low participation is a key problem of the school lunch

program, and identification of the factors affecting participation is necessary.

Price of Meals. According to the U.S. Comptroller General's Report to Congress in 1977 (3), one of the factors affecting participation is the price charged for the NSLP. In a negative vein, the same report cited that while the number of schools serving the school lunch has increased in recent years, there has not been a proportional increase in the number of participating students. The participation of students paying the full price has declined; however, since the number of children eligible for free and reduced price meals has increased, overall participation levels have tended to remain constant. The report also concluded that many school administrators believe that price is important to participation rates and increased federal subsidies would lower meal costs, thus improving participation.

Bachemin (77) investigated factors affecting participation of tenth grade students in certain Louisiana school foodservice programs and found that the price of school lunch did not appear to affect participation. West and Hoppe (78) evaluated the effect on participation of regular price charged to non-needy students in public school for the NSLP plate lunch. The authors reported that a 4 to 6 per cent average drop in participation was associated with a 10 per cent increase in "real" prices. Braley's study (79) analyzed the effect of price changes on participation in the Fairfax County, Virginia school lunch and breakfast programs. Braley concluded that a 6 per cent decrease in participation may be expected when a ten cent increase in meal price is implemented.

In the USDA study (80) of high school participation in child nutrition programs, two-thirds of the students indicated they believed the

price of the lunch was "about right." Howe (81) reported that high school students stated that buying a school lunch ticket was cheaper than going out to eat. Students classified as nonparticipants in the lunch program sometimes purchased school lunch because of insufficient funds to eat away from school. Garrett (82) found that the low meal price was a strong influence in school lunch participation. Robin (17) reported a major factor in low participation in the school lunch program was the price of the school lunch and state school lunch directors believed price increases affected overall participation markedly.

Non-price Factors. Attitudes of teachers, administrators, and school foodservice personnel are among non-price factors identified in the literature as influences on school lunch participation (3, 83). Leverton (84) asserted that managements' awareness of children's needs and preferences tends to increase participation.

Menu variety or choices in the menu pattern are other influences cited as affecting daily participation (3, 85). Law et al. (85) stated that fast service and quality food were especially important to secondary school students. West and Hoppe (78) summarized influential non-price factors on participation as permission to leave school premises at noon, distance of schools from children's homes or commercial eating establishments, transportation arrangements at noon, and availability of low priced milk to accompany sack lunches.

Grant (86) found in Louisiana high schools that school lunch programs offering a menu choice had slightly higher participation and fewer students not eating lunch than in programs offering only Type A lunch. The USDA study (80) of high school participation in child nutrition

programs indicated that school foodservice personnel seemed hesitant to offer choices on Type A lunches because of additional labor and cost.

According to Grant's study (86), in schools offering a menu choice, a larger number of students participated than in schools offering only a no choice Type A lunch. Bachemin (77) found that more students in high participation schools considered the food the right temperature, the milk cold, and the appearance of the food appetizing than did those in low participation schools.

Research findings disagree on the effect closed or open campus policies have on participation; i.e. students may not leave school grounds during lunch period. Printiss (83) reported that schools with a closed lunch period had a higher rate of participation than those with an open lunch period. Hundrup (87) found that whether the school had an open or closed campus had little effect on participation.

In a report of the USDA study on high school participation (80), results indicated that while a closed campus was considered the answer to high participation, most of the surveyed low participation schools operated with a closed campus policy. The high participation schools with an open campus were often in rural areas with no attractions to draw the students away from school.

Bachemin's study (77) in Louisiana indicated closed campuses were an influential factor in high participation schools. Law et al. (85) in support of the studies of Bachemin (77) and Grant (86) reported that students most often ate the school lunch because of a closed campus policy.

Merchandising the Type A lunch was regarded as an important factor in increasing participation in the Comptroller General's report on the

school lunch program (3). In a USDA study of high schools (80), high participation schools had made an effort to "sell" the Type A lunch through appropriate display and attractive and accessible service approaches. About 90 per cent of the low participation schools in the study had an active a la carte program that was supported by the administration as more profitable than the NSLP. In the same study, results indicated that in low participation schools a Type A lunch was difficult to purchase because so much emphasis was placed on a la carte sales.

Law et al. (85) indicated that not liking to eat lunch at all and not liking to wait in line were principal reasons for low participation, especially among high school students. According to some studies (3, 85), students who do not eat school lunch perceive the quality of the food as "fair" or poorly prepared. Law et al. (85) reported that insufficient time for eating, crowded and cramped conditions, and small servings were other reasons cited by high school sophomores for not eating school lunch. Nonparticipants in Howe's study of high school sophomores and juniors (81) reported they did not have enough time, disliked the food, were not hungry, or had other things to do during the lunch hour.

Printiss (83) stated that participation decreased as the age of the kitchen and dining room increased. The USDA study (80) reported a similar finding contending that students often related the "oldness" of the facilities to uncleanliness, thus reducing participation.

In Howe's study of high school sophomores and juniors (81), students were asked about the atmosphere of the school cafeteria. The overall lunchroom atmosphere was rated as good by 44.3 per cent of the

participants and 36.5 per cent of the nonparticipants in the study. Students were asked to indicate the basis for rating of the school lunchroom atmosphere. Among the reasons given for a good to excellent rating were: "friends are there," "teachers are friendly," "it is fun and interesting," "it is relaxing," "colors in the cafeteria are good," and "people get along well." Among the reasons for rating the atmosphere fair to poor were: "It is crowded and noisy," "people throw food," "needs more color or pictures," "sometimes it is dirty," "students have poor manners," "there are long lines," and "it is an uncomfortable and unfriendly place."

An interest in joining a student advisory council was indicated by 69.2 per cent of the participants in Howe's study (81). Over 65 per cent of the nonparticipants also expressed interest in such an organization. Participants and nonparticipants in the study were asked what suggestions they had for improvements in the school lunch program. Among the suggestions were: "improve the preparation of food," "raise the price of lunch to cover the cost of higher quality food items," "involve the students in menu planning," "enlarge the cafeteria," "add another lunch period to reduce the number of students in the cafeteria at one time," "install a sound system," "regulate the temperature of the lunchroom in spring and winter," and "serve food choices for vegetarians."

School Breakfast Participation

The SBP, enacted in 1966, authorized breakfasts for needy children traveling long distances to school (40). Legislation enacted since that time has expanded the program which is now available to all public and private nonprofit schools.

In a study of meal price and participation in child nutrition programs in Fairfax County, Virginia (79), a substantial decrease in paid breakfast program participation resulted after a ten cent price increase, which was a 50 per cent increase. Based on the limited data presented in the study, participation in the breakfast program is more responsive to price increases than in the paid lunch program.

Data from a 1977 FNS study (11) indicated that participation in the SBP was greatest in the southeast region of the United States, with 37 per cent of students participating. The midwest region had the lowest participation with 25 per cent of the students taking advantage of the program. Seasonal variation in breakfast program participation was reported. After school sessions began in the fall, trends showed that participation increased until a peak was reached during March. After the March peak, participation edged downward until the end of the school year.

The Children's Foundation (35) asserted that participation in the breakfast program could be improved if the programs were operated to prevent students feeling stigmatized as "welfare waifs." Attractive and comfortable cafeteria environments, good promotion, and positive attitudes about breakfast were other influences believed to affect participation levels.

METHODOLOGY

Overview of the Study

The objective of this study was to assess factors affecting participation in child nutrition programs. The instrument for the study was adapted from a questionnaire provided by the Economic Evaluation Staff of USDA/FNS, which was developed for a proposed national study of factors affecting participation in child nutrition programs. This study was designed to modify and pretest the questionnaire and utilize the revised instrument to collect data from a selected sample of schools in one USDA/FNS region.¹

The sample for the study was selected from public schools in four states within the ten state USDA/FNS Mountain Plains Region. Five states with the largest populations and the highest degree of urbanization selected initially were Colorado, Iowa, Kansas, Missouri, and Nebraska. The states not included in the sample were Montana, North Dakota, South Dakota, Utah, and Wyoming. Subsequently, Nebraska was excluded from the initial selection because of the large number of school districts ($N = 1,115$) in comparison with the other states and did not have consolidated districts as did the others.

¹To date, funds have not been provided for the national study. USDA/FNS officials encouraged conduct of this pilot study for the purposes cited.

Project Approval Procedures

Initial approval for the project was secured from the director of the Economic Analysis and Program Evaluation Staff, USDA/FNS.¹ Subsequent approval was sought from the staff of the Office of Policy, Planning and Evaluation. Officials of the latter agency approved the project and offered to provide assistance in drawing the sample and designing data analysis.² Support for the project also was sought from the Regional Administrator in the USDA/FNS Mountain Plains Regional Office (Appendix A). State school foodservice directors in Colorado, Iowa, Kansas, and Missouri were reached by telephone to explain the project and elicit their support. A confirmation letter explaining the project (Appendix A), the thesis proposal, and preliminary instrument were mailed to the state school foodservice directors in the four states. State directors were asked to write a letter of endorsement for the study to be sent with the questionnaire to the sample schools in their states. The Kansas director was unwilling to write such a letter but did issue a verbal statement of approval that was used in the cover letter to Kansas schools. Missouri and Iowa directors provided letters to include in the mailing. The Colorado school foodservice director submitted the preliminary questionnaire to the Colorado Data Acquisition Board and upon obtaining approval, submitted a letter of endorsement to accompany the questionnaires sent to Colorado schools. The state directors were updated periodically on the progress of the study by letter and telephone.

¹Conference with Dr. Stephen J. Hiemstra, November 1978.

²Correspondence from David de Ferranti, March 19, 1979.

The Study Sample

The sample was drawn by members of the Economic Analysis Branch, Office of Policy, Planning and Evaluation at USDA/FNS from a national computer listing of public and private schools. The sample was limited to public schools because of the relatively small number of private schools in the states chosen for the study. Schools involved in a USDA study in the past three years were excluded in accordance with a USDA policy stating a school is not asked to be involved in a USDA affiliated study more than once in three years. Two hundred schools from each of the four states were drawn from the listing for the study sample. In each state, 140 schools were elementary and 60 were secondary schools based on the distribution of levels of schools in the four states encompassed by the study. The listing of schools was stratified by elementary (grades K-8 or any school that included grades below grade 9) and secondary (grades 9-12 or any school that included grades 9 or above) classifications before the random sample was drawn.¹

Educational directories were requested by telephone from each of the state school foodservice directors. The names of school superintendents (or school principals, in Colorado) were identified for each of the school districts because the sample list provided by USDA did not include this information. A higher response rate was expected if the questionnaires were personally addressed to the superintendent or principal. Schools not listed in the directories, which were more current than the USDA listing, were deleted from the sample. As a result, three schools

¹Correspondence from Dr. J.C. Chai, Head, Special Nutrition Section, Economic Analysis Branch, Office of Policy, Planning and Evaluation, USDA/FNS.

in Kansas were deleted, eight in Missouri, nineteen in Iowa, and nine in Colorado.

Twelve schools in Kansas participating in the ongoing Nutrition Education and Training Program, Needs Assessment Project, were excluded from the USDA listing. The Kansas Nutrition Education and Training Program, Needs Assessment Project is an ongoing process designed to determine the need for nutrition education in the state. Kansas State University contracted with the Kansas Department of Education to research the nutritional attitudes and dietary habits of children, teachers, and school foodservice personnel across the state as one phase of the project.

The ninety-seven elementary schools in Kansas which agreed to take part in the Nutrition Education and Training Program, Needs Assessment Project also were included in the sample, because of the ease of data collection. To obtain the sample for the project, an approximate 10 per cent stratified random sample of elementary schools throughout the state of Kansas was selected for the study.

Initially, Unified School Districts (USD) were selected at random from each Board of Education District (BED) and then individual schools were selected randomly from the USD's. The number of schools selected from each BED was proportional to the number of schools in each BED. In selecting which schools would be chosen for this study, simple random sampling within each of ten BED's was used with the following exceptions:

1. one or more schools from the largest USD were selected so the largest USD in each BED would be represented,
2. minor adjustments were made to include some schools with breakfast programs, and
3. the one school district in the state not participating in the NSLP was added.

Based on suggestions from Kansas School Foodservice Specialists, the initial list of schools was modified slightly. Also, if permission was not granted for a particular school to participate in the Needs Assessment Project, the school was replaced at random with a different school from the same USD, if possible, or from another randomly selected USD.

The resultant sample ($N = 846$) included 282 schools in Kansas, 192 in Missouri, 181 in Iowa, and 191 in Colorado. More than one school from a single district was selected in many cases.

The Instrument

Initial Development and Pretest

The preliminary instrument obtained from USDA/FNS had been developed by the USDA/FNS Economic Evaluation Staff and reviewed by a USDA advisory council. USDA/FNS officials were consulted on interpretation and clarification of items in the survey, as was a member of the faculty of Washington State University who was one of the developers of the proposed survey.

A selected group of school foodservice directors in Kansas were requested by telephone to assist with a pretest of the preliminary instrument, and all agreed to participate. A follow-up memorandum, the preliminary questionnaire, and directions for completing the questionnaire were sent to each school foodservice director (Appendix B). Each director was asked to complete a separate questionnaire for a secondary school and an elementary school in their district. They responded also to a questionnaire evaluation form. Based on feedback from the school foodservice directors, several revisions were made in the instrument.

The first section on school characteristics and program information was simplified, and a section pertaining to program activities was added. The review group suggested that the average daily attendance figure in the first section might not be available in all schools. For purposes of this study, an estimate was requested.

After the second revision, the instrument was submitted to one of the school foodservice directors who had been involved in the pretest. She had no further recommendations.

Final Instrument

The final research instrument (Appendix C) was printed in booklet form with the first page printed on official letterhead indicating the title of the study and identifying the sponsor. All data requested were from October, 1979, records. According to USDA/FNS officials,¹ data from October or April are customarily used in school foodservice research since these months are the most uninterrupted by school holidays. The final instrument comprised four sections.

Section I. The first section consisted of fourteen items that provided a description of school characteristics and program information. Data on grades taught at the school, number of students enrolled, and an estimate of average daily attendance were requested. Information also was requested on types of child nutrition programs available; number and cost of lunches, breakfasts, and special milk units served; number of days meals were served in October; number of students with free and reduced price meal applications on file; and a la carte item information.

¹Conference with Stephen J. Hiemstra, Economic Analysis and Program Evaluation Staff, USDA/FNS.

Section II. The twelve items in the second section provided information on the alternatives to school lunch and breakfast that were available in the school. The type of information requested included: availability of snack bars, the proximity of fast food outlets and vending machines, percentages of sack lunches brought to school, and students leaving the campus at noon.

Section III. The twenty-two items in the third part of the instrument concerned type of school meal facilities available and requested ratings of activities and functions identified as components of a successful school foodservice program. Several of the latter items were adapted from the instrument used by Hallett (88) in her research concerning school foodservice director's program evaluations and related factors.

Section IV. The fourth section of the instrument included items regarding the characteristics of the geographic area. Information requested included the population of the area and the method of transportation used by students to and from school.

Distribution of the Research Instrument

The research instrument, a cover letter explaining the study (Appendix D), and the letter of endorsement from the state school foodservice director was sent to the superintendents of the districts of selected schools in Iowa and Missouri (Appendix E). A self-addressed envelope with prepaid postage to facilitate the return of the questionnaire was enclosed.

In Kansas, packets sent to schools on the USDA listing included the research instrument, a cover letter explaining the study that included a statement of approval from the Kansas state school foodservice director

(Appendix D), and a self-addressed envelope with prepaid postage. The packet also was sent to the superintendent of the district.

Questionnaires with a cover memorandum (Appendix D) and a prepaid postage return envelope were delivered to the Needs Assessment Project principals in Kansas by the project coordinator during on-site data collection visits to each school in the sample. The principals were asked to complete the questionnaire with the assistance of the school foodservice manager and district director.

In Colorado, the questionnaires were sent to the principals of the schools selected since the Colorado state director volunteered to send a letter of approval to district superintendents of participating schools. The principals received a cover letter explaining the study (Appendix D), and a letter of endorsement from the Colorado state school foodservice director which contained a stamp of approval from the Colorado Data Acquisition Board (Appendix E), and a prepaid postage return envelope with the questionnaire.

Three to five weeks after mailing the questionnaires, a telephone follow-up was instituted. Superintendents of districts not returning the questionnaires in Kansas, Iowa, and Missouri were called. In Colorado, school principals not responding were called as were Kansas school principals who were part of the Needs Assessment project. An additional questionnaire(s) was mailed to districts or schools upon request.

Two to three weeks after the telephone follow-up, a letter (Appendix D) was sent to schools that had been reached by phone but failed to respond. Additional questionnaires were mailed at the request of the school superintendent or principal.

Table 1 shows distribution and return of the survey questionnaires. The overall return was 85.3 per cent (N = 722). The return rate ranged from 73.3 per cent in Colorado to 94.3 per cent in Kansas.

Table 1: Distribution and return of survey questionnaires

state	sample no.	no. distributed	no. returned	
			N	%
Colorado	200	191	140	73.3
Iowa	200	181	169	93.4
Kansas	297	282	266	94.3
USDA list ¹	200	185	169	91.4
NET schools ²	97	97	97	100.0
Missouri	200	192	147	76.5
total	897	846	722	85.3

¹Schools in sample from list provided by USDA/FNS.

²Schools included in Needs Assessment Project, Kansas Nutrition Education and Training Program.

Data Analysis

Each questionnaire returned was coded and keypunched on five 80 column computer cards as shown in Appendix H. Cross tabulations were compiled for all items on the survey instrument by school type.

Variables were computed on school characteristics and participation in the National School Lunch Program (NSLP), School Breakfast Program (SBP), and Special Milk Program (SMP) (Table 2). Also, three variables were computed from the section of the questionnaire on alternatives to

Table 2: Computation of variables for analysis of data on participation in child nutrition programs

variable	variable label	computation
<u>general variables:</u>		
school enrollment	SIZE	Σ of students enrolled at each grade level
% of students bussed to school	BUSS	Σ of TRANS1* + TRANS2** * % bussed >30 min. ** % bussed <30 min.
% of students enrolled qualifying for free meals	STU-QF	$\frac{\text{no. of approved free applications (FREE-APP)}}{\text{no. of students enrolled}}$
% of students enrolled qualifying for reduced price meals	STU-QR	$\frac{\text{no. of approved reduced price applications (RED-APP)}}{\text{no. of students enrolled}}$
<u>breakfast participation variables:</u>		
average daily participation	ADP-BRFT	$\frac{\text{total no. brft. served (TOT-BRFT)}}{\text{days of operation (DAYS)} \times \text{average daily attendance (AV-ATTND)}}$
% meals served, free	BRFT-FSV	$\frac{\text{total no. of free brft. served (TOT-FB)}}{\text{TOT-BRFT}}$
% meals served, reduced price	BRFT-RSV	$\frac{\text{total no. of reduced price brft. served (TOT-RB)}}{\text{TOT-BRFT}}$
% meals served, paid	BRFT-PD	$1 - \text{BRFT-FSV} - \text{BRFT-RSV}$
% ADP, free		$\text{ADP-BRFT} \times \text{BRFT-FSV}$
% ADP, reduced price		$\text{ADP-BRFT} \times \text{BRFT-RSV}$
% ADP, paid		$1 - \text{BRFT-FSV} - \text{BRFT-RSV} \times \text{ADP-BRFT}$

Table 2: (cont.)

variable	variable label	computation
<u>lunch participation variables:</u>		
average daily participation (based on enrollment)	ADP-EN LUNCH	$\frac{\text{total no. lunches served (TOT-LUN)}}{\text{SIZE} \times \text{DAYS}}$
average daily participation (based on attendance)	ADP-LUNCH	$\frac{\text{TOT-LUN}}{\text{DAYS} \times (\text{AV-ATTND} - \text{OUT-STU})^*}$ *no. of students out of school at lunch
% meals served, free	LUN-FSV	$\frac{\text{total no. of free lunches served (TOT-FL)}}{\text{TOT-LUN}}$
% meals served, reduced price	LUN-RSV	$\frac{\text{total no. of reduced price lunches served (TOT-RL)}}{\text{TOT-LUN}}$
% meals served, paid	LUN-PD	$1 - \text{LUN-FSV} - \text{LUN-RSV}$
% ADP, free		$\text{ADP-LUN} \times \text{LUN-FSV}$
% ADP, reduced price		$\text{ADP-LUN} \times \text{LUN-RSV}$
% ADP, paid		$1 - \text{LUN-FSV} - \text{LUN-RSV} \times \text{ADP-LUN}$
<u>special milk program participation variables:</u>		
average daily participation	ADP-MK	$\frac{\text{total no. milk served (TOT-MK)}}{\text{DAYS} \times \text{AV-ATTND}}$
% served, free	MK-FR	$\frac{\text{total no. milk served free}}{\text{TOT-MK}}$
% served, reduced price	MK-R	$\frac{\text{total no. milk served reduced price}}{\text{TOT-MK}}$
% served, paid	MK-PD	$\frac{\text{total no. milk served paid}}{\text{TOT-MK}}$

lunch, student involvement, and food quality (Table 3). The intent of the analysis was to use school type, state, and area population as key variables for analysis of data; however, all but one of the combined schools were in the less than 10,000 population size. Therefore a new variable was developed that combined school type and population size.

General linear model analysis of variance was used to analyze the following variables (refer to Tables 2 and 3 for computations):

School characteristics:

- no. of students enrolled (SIZE)
- average daily attendance (AV-ATTND)
- percentage of students bussed (BUSS)

Program operating characteristics:

- days of operation (DAYS)
- no. of students out of school at lunch (OUT-STU)
- % of students enrolled qualifying for free lunch (STU-QF)
- % of students enrolled qualifying for reduced price lunch (STU-QR)
- lunch price (LUN-PRICE)
- breakfast price (BRFT-PRICE)

Other variables:

- lunch alternatives (ALT-LUN)
- student acceptance (STU-ACCP)
- food quality (FOOD)

Special milk program (SMP) participation variables:

- average daily participation in SMP (ADP-MK)
- % of milk served
 - free (MK-F)
 - reduced (MK-R)
 - paid (MK-PD)

Independent variables in the analyses were state and school type by area population:

Table 3: Computation of lunch quality variables

variable/label	computation			
alternatives to lunch (ALT-LUN)	Σ of variable weights listed below			
	<u>section</u> ¹	<u>item</u>	<u>label</u>	<u>weight</u> ²
	I	13	ALACARTE 2	
	II	1	SNACK BAR	
		2	SNCK-LOC	
		4	VENDING	yes = 3
		5	VEND-LOC	no = 1
		6	SACK-LCH	
		8	LEAVE	
		10	FAST-FD	
		7	PERCENT	
		9	ESTLEAVE	score as coded
		12	FF-LOC	reverse score (i.e., 4=1, 1=4)
student acceptance and involvement (STU-ACCP)	Σ of variable weights listed below			
	<u>section</u>	<u>item</u>	<u>label</u>	<u>weight</u>
	III	2	MEALS	
		13	PANELS	yes = 3
		22	ADVISORY	no = 1
		14	MENU-PLN	
		15	STU-EVAL	score as coded
		16	INVOLVED	1=rarely
		17	EVENTS	2=occasionally
		18	TOURS	3=regularly
		3	LUNCHRM	response 1 and 3 = 1; 2 = 3
		4	PERIOD	response 1 = 1; 2 = 3

¹Refers to section and item number in survey instrument.

²Weight = score for item response.

Table 3: (cont.)

variable/label	computation			
food quality (FOOD)	Σ of variable weights listed below			
	<u>section</u>	<u>item</u>	<u>label</u>	<u>weight</u>
	III	10a	ALTERNAT	
		10b(1)	TYPEA1	
		(2)	2	
		(3)	3	
		(4)	4	yes = 3
		(5)	5	no = 1
		11	CHOICE	
		12a	CHOICE1	
		b	2	
		c	3	
		19	WASTE	score as coded
		20	RECIPES	1=rarely
		21	SERVING	2=occasionally
				3=regularly
		1	PREPAR5	on site = 5;
				other = 1

State:

School type by area population:

	<u>population</u>	<u>school type</u>
1. Colorado	1. 500,000 or more	a. elementary b. secondary
2. Iowa	2. 50,000 to 499,999	a. elementary b. secondary
3. Kansas	3. 10,000 to 49,000	a. elementary b. secondary
4. Missouri	4. less than 10,000	a. elementary b. secondary c. combined

General linear model analysis of covariance was used to analyze lunch and breakfast program participation variables (Table 2). For analysis of NSLP participation data, independent variables included two classification variables (state and school type by area population) and the following continuous variables:

school enrollment (SIZE)
 % of students bussed to school (BUSS)
 % of students enrolled qualifying for free meals (STU-QF)
 % of students enrolled qualifying for reduced price meals (STU-QR)
 lunch price (LUN-PRICE)
 alternatives to lunch (ALT-LUN)
 student acceptance and involvement (STU-ACCP)
 food quality (FOOD)

NSLP participation variables analyzed were the following:

average daily participation (based on enrollment) (ADP-EN)
 average daily participation (based on attendance) (ADP)
 % ADP, free
 % ADP, reduced price
 % ADP, paid
 % meals served, free (LUN-FSV)
 % meals served, reduced price (LUN-RSV)
 % meals served, paid (LUN-PD)

Additional analysis was completed of NSLP data for each school type (elementary, secondary, and combined) separately, using general linear model analysis of covariance. Two classification variables (state and area population) were used in analysis of elementary and secondary school data. Since combined schools were in one population area size, state was

the only classification variable in analysis of data from those schools. The continuous variables were those in the analysis of data from the overall sample of schools.

General linear model analysis of covariance also was used to analyze SBP participation data. State and school type by area population were classification variables. Continuous variables were those used in analysis of NSLP data with three exceptions. Alternatives to lunch, student involvement, and food quality scores were excluded from SBP analyses because the items used to compute these variables were related to service and food production of school lunch. The following SBP participation variables were analyzed:

- average daily participation (ADP-BRFT)
 - % ADP, free
 - % ADP, reduced price
 - % ADP, paid
- % meals served, free (BRFT-FSV)
- % meals served, reduced price (BRFT-RSV)
- % meals served, paid (BRFT-PD)

Analysis by school type separately was computed for elementary schools only. The number of breakfast programs in secondary and combined schools ($N = \leq 10$) was inadequate for reliable analysis.

RESULTS AND DISCUSSION

General Information on Schools

In selection of the study sample, schools were stratified by elementary and secondary types. The returned questionnaires indicated that in many schools surveyed, the school foodservice provided meals to students in both elementary and secondary grades and thus, the foodservice often cannot be defined by type of school. Table 4 summarizes the distribution of school types by state. Data indicate that 20.5 per cent of the questionnaires were returned from combined schools, or those serving both elementary and secondary students with the same foodservice operation. Schools were found in all three categories in all states. The number of combined schools typifies the predominately rural economy of the mid-western states.

The distribution of school types by city, town, or area population (Table 5) shows that a sizeable number of schools are in smaller rural communities. Only one combined school was found in a populous area and the remainder were in the smaller communities (i.e., <10,000 population). Table 6 presents data to show the distribution of school types based on area population and state.

Differences were found in selected school characteristics based on state and school type by area population (Table 7). Analysis of variance of number of students enrolled, average daily attendance, and percentage of students bussed varied significantly in relation to both variables.

Table 4: Distribution of school types by state

state	N	type of school ¹		
		elem. (N=460)	sec. (N=114)	combined (N=148)
		% of schools		
Colorado	140	61.4	18.6	20.0
Iowa	169	55.0	18.4	26.6
Kansas	266	73.0	13.5	13.5
Missouri	147	59.2	14.3	26.5

¹Elem. = schools which include grades below grade 9 only.

Sec. = schools which include grade 9 or above.

Combined = schools which include elementary and secondary grades.

Table 5: Distribution of school types by city/town/area population

population of city/ town/area	type of school		
	elem. (N=460)	sec. (N=114)	combined (N=148)
% of schools			
500,000 or more	8.4	8.0	>1.0
50,000-499,999	22.2	16.8	--
10,000-49,000	24.2	16.8	--
less than 10,000	45.2	58.4	99.3

Table 6: Distribution of school types by area population and state

area population	school type	N	state			
			Colo. (N=133)	Iowa (N=169)	Ks. (N=259)	Mo. (N=146)
500,000 or more	elem.	38	17.3	1.2	0.8	7.5
	sec.	9	3.8	1.2	--	1.4
50,000-499,999	elem.	100	21.0	11.2	11.1	16.4
	sec.	19	6.0	0.6	1.9	3.4
10,000-49,000	elem.	109	12.8	14.2	19.2	12.3
	sec.	19	3.0	1.2	3.1	3.4
less than 10,000	elem.	204	10.5	28.4	41.9	22.6
	sec.	66	6.8	15.4	8.5	6.2
	combined	143	18.8	26.6	13.1	26.7

Table 7: Analysis of variance of selected school characteristics

dependent variable	overall F ratio	df error	mean square error	F ratios for independent variables ¹	
				state df=3	school type by area population df=8
no. of students enrolled	56.79	678	6544.31	12.71	63.05
average daily attendance	52.44	659	65049.80	11.44	58.54
percentage of students bussed	19.89	613	673.76	13.40	24.28

¹All values significant, $P \leq .05$.

Mean school size among the four states varied from 587 in Kansas to 754 in Missouri. Average daily attendance followed a similar pattern (Table 8). As expected, the larger schools were found in the larger metropolitan areas. Elementary schools ranged from 421 students in the 500,000+ areas to 281 in the small rural areas (<10,000). Secondary schools were considerably larger than elementary schools except in the small rural areas where the differential was much less. Secondary enrollments ranged from 384 to 1651. Mean school size for combined schools was 506 students.

Missouri schools had the highest percentage of students bussed (53 per cent) and Kansas the lowest (35.1 per cent) (Table 8) among the four states. The percentage of students bussed to school was greatest in the smaller communities. Over 70 per cent of the elementary students were bussed in the small rural communities and almost two-thirds were bussed students in the combined schools in the communities with less than 10,000 population. Percentages of students bussed, walking, and riding bicycles or in cars to school are summarized in Table 9.

Child Nutrition Program Operating Characteristics

A high percentage (98 per cent or more) of schools surveyed participate in the NSLP as indicated in Table 10. Breakfast participation is low, with 14.1 per cent (N = 64) of the elementary schools, 9.7 per cent (N = 11) of the secondary schools, and 9.5 per cent (N = 14) of the combined schools participating in the program. A sizeable percentage of schools of all three types participate in the SMP (86.8 per cent or more).

Table 8: Least squares means for selected school characteristics data

independent variables	no. students enrolled	average daily attendance	% of students bussed
	————— mean and std. error —————		
state:			
Colorado	691.8 ± 35.5	676.7 ± 35.4	46.8 ± 2.7
Iowa	647.8 ± 35.3	608.9 ± 35.2	40.1 ± 2.6
Kansas	587.0 ± 32.6	545.1 ± 32.5	35.1 ± 2.4
Missouri	753.7 ± 35.2	692.9 ± 35.1	53.0 ± 2.6
school type by area population:			
<u>population</u>	<u>school type</u>		
500,000 or more	elem.	421.2 ± 42.8	383.3 ± 43.1
	sec.	1650.9 ± 97.1	1417.1 ± 90.8
50,000- 499,999	elem.	388.9 ± 25.6	355.0 ± 25.6
	sec.	1262.8 ± 60.5	1206.6 ± 63.9
10,000- 49,000	elem.	365.8 ± 25.2	384.3 ± 25.6
	sec.	1145.2 ± 58.8	1215.7 ± 60.2
less than 10,000	elem.	280.6 ± 19.3	270.5 ± 19.5
	sec.	384.7 ± 32.9	361.1 ± 32.0
	combined	505.6 ± 21.9	485.5 ± 22.5
overall		420.1 ± 255.8	397.4 ± 255.0
			53.6 ± 25.9

Table 9: Percentages of students bussed, walking, and riding bicycles or in cars to school

	type of school		
	elem. (N=460)	sec. (N=114)	combined (N=148)
	% of schools		
percentage of students bussed more than 30 minutes			
1 to 10%	12.6	16.7	6.8
11 to 25%	12.3	21.5	25.0
26 to 50%	16.3	26.3	23.6
51 to 75%	3.3	2.6	20.9
76 to 100%	6.8	6.6	10.2
percentage of students bussed less than 30 minutes			
1 to 10%	12.6	20.2	6.1
11 to 25%	17.4	23.7	31.1
26 to 50%	25.9	25.4	27.0
51 to 75%	7.8	2.6	4.7
76 to 100%	7.2	1.8	1.0
percentage of students walking, riding bikes or in private cars			
1 to 10%	9.8	1.8	4.1
11 to 25%	9.3	7.0	19.6
26 to 50%	19.3	30.1	43.9
51 to 75%	16.3	22.8	12.8
76 to 100%	28.9	25.4	3.4

Table 10: Percentages of survey schools operating child nutrition programs

type of program	type of school ¹		
	elem. (N=460)	sec. (N=114)	combined (N=148)
	% of schools with program		
lunch	98.0	98.2	99.3
breakfast	14.1	9.7	9.5
special milk	93.9	86.8	91.9

¹Elem. = schools which include grades below grade 9 only.

Sec. = schools which include grade 9 or above.

Combined = schools which include elementary and secondary grades.

Analysis of variance was used to compare various operating characteristics of child nutrition programs based on state and school type by area population (Table 11). Differences were found for all variables except days of operation and the price of breakfast.

Table 12 presents the least squares means for child nutrition program characteristics data. The number of days of program operation during October 1979 varied slightly, with most schools operating twenty-two days. One source of variation was two calendar days of November that were reported on October records in some schools.

A smaller number of elementary children were out of school at lunch than was true in secondary schools. This can be accounted for in part by larger school size, work study programs available to high school students, high school students having driver's licenses, and some half day sessions in the larger secondary schools in Colorado. These data on students out

Table 11: Analysis of variance of data on child nutrition program operating characteristics

dependent variable ¹	overall F ratio	df error	mean square error	F ratios for independent variables	
				state df=3	school type by area population df=8
days of operation, Oct. 1979 (DAYS)	1.91n.s. ²	680	1.25	3.37	1.31n.s.
no. students out of school at lunch (OUT-STU)	30.06	644	5260.05	3.70	36.50
% of students enrolled qualifying for free lunch (STU-QF)	11.63	657	.02	11.24	10.96
% of students enrolled qualifying for reduced price lunch (STU-QR)	4.95	651	.00	5.13	4.57
lunch price (LUN-PRICE)	23.73	659	82.40	64.75	9.62
breakfast price (BRFT-PRICE)	0.95n.s.	74	90.83	1.11n.s.	0.73n.s.

¹Refer to Table 2 for explanation of variables.

²n.s. = nonsignificant. All other ratios significant, $P \leq .05$.

Table 12: Least squares means for child nutrition program characteristics data

independent variables		DAYS	OUT STU	STU QF	STU QR	LUN PRICE	BRFT PRICE
state:		— mean and std. error —					
Colorado		22.0 ± 0.1	105.5 ± 10.4	14.3 ± 2.1	5.8 ± 0.7	.59 ± .01	.31 ± .03
Iowa		22.1 ± 0.1	83.4 ± 10.0	13.6 ± 0.9	5.0 ± 0.6	.53 ± .01	.25 ± .03
Kansas		22.3 ± 0.1	90.4 ± 9.2	18.1 ± 2.0	6.5 ± 0.6	.64 ± .01	.29 ± .02
Missouri		22.0 ± 0.1	74.9 ± 10.0	22.8 ± 0.9	4.9 ± 0.6	.54 ± .01	.28 ± .03
school type by area population:							
<u>population</u>	<u>school type</u>						
500,000 or more	elem. sec.	22.1 ± 0.2 21.4 ± 0.4	17.5 ± 12.8 402.8 ± 25.8	39.7 ± 2.5 15.6 ± 5.7	8.4 ± 0.8 2.1 ± 1.8	.55 ± .01 .68 ± .03	.28 ± .02 .31 ± .06
50,000-499,999	elem. sec.	21.9 ± 0.1 22.2 ± 0.2	36.9 ± 7.5 203.9 ± 18.2	20.4 ± 1.5 15.1 ± 3.7	6.0 ± 0.5 2.7 ± 1.1	.60 ± .01 .67 ± .02	.31 ± .02 .36 ± .07
10,000-49,000	elem. sec.	21.9 ± 0.1 22.4 ± 0.2	31.6 ± 7.4 124.9 ± 17.1	14.0 ± 1.5 8.7 ± 3.5	5.4 ± 0.5 2.4 ± 1.1	.55 ± .01 .63 ± .02	.30 ± .03 .32 ± .06
less than 10,000	elem. sec. combined	22.0 ± 0.8 22.1 ± 0.1 22.2 ± 0.9	17.4 ± 5.6 30.4 ± 9.4 22.0 ± 6.3	15.8 ± 1.2 13.4 ± 2.0 14.6 ± 1.3	6.6 ± 0.4 5.5 ± 0.6 5.5 ± 0.4	.54 ± .01 .58 ± .01 .54 ± .01	.24 ± .03 .24 ± .10 .27 ± .03
overall		22.1 ± 1.1	35.9 ± 72.5	17.0 ± 15.1	5.6 ± 0.5	.57 ± .09	.29 ± .09

at lunch were used to adjust average daily attendance data in computing lunch participation statistics.

Missouri schools reported the largest mean percentage of students in relation to school enrollment qualifying for free lunches (22.8 per cent) and Iowa schools reported the least (13.6 per cent). A smaller percentage of students qualified for reduced price meals in schools in all four states, with Kansas reporting the highest ratio (6.5 per cent) of students eligible in relation to enrollment. The percentage of students qualifying for free and reduced price meals was higher in the elementary than in the secondary schools in all four population size areas. The differential, however, was greatest in the large cities (500,000 or more population). In the elementary schools in the largest cities almost 40 per cent of the students enrolled had applications on file for free meals.

The mean price for lunches ranged from 53 cents in Iowa schools to 64 cents in Kansas schools. Kansas schools receive cash in lieu of commodities, while the other three states participate in the USDA commodity distribution program. According to the U.S. Comptroller General's Report to Congress in 1977 (3) school administrators believe that price is an important influence on participation rates. Other studies (17, 80, 81) also indicated that price affected participation.

Mean lunch prices in the secondary schools ranged from 4 cents to 13 cents higher than elementary lunch prices. The difference was greatest in schools in the large cities. The overall mean lunch price was 57 cents.

Mean breakfast prices varied from 25 cents in Iowa to 31 cents in Colorado. Breakfast prices were slightly higher in secondary schools compared to elementary schools in the three largest geographic areas.

Breakfast prices were lowest in the small rural areas (mean equals 24 cents).

Alternatives to Lunch

Extent of availability of alternatives to the USDA school lunch program were analyzed by school type (Table 13). Data collected included information on snack bars, vending machines, fast food outlets, and closed campus policies.

The school foodservices in secondary schools were more likely to offer a la carte items to students than those in elementary or combined schools; vending machines also were more often available in secondary schools. Results indicated vending machines were located in the lunchroom in over 15 per cent of the secondary schools. A final rule (30) that went into effect July 1, 1980, restricted the sale of foods of minimum nutritional value from the beginning of the school day to the end of the last lunch period. This rule will affect the choice of foods for sale in the vending machines located in the schools.

Although reports from a large percentage of the schools surveyed indicated students brought sack lunches, the percentage of students was generally below 25 per cent for all three types of schools. Closed campus policy varied by type of school. Relatively fewer elementary schools had closed campus policies compared to secondary and combined schools. West and Hoppe (77) found that permission to leave the school premises at noon was an influential factor on participation. Printiss (82) contended that a school with a closed lunch period had a higher rate of participation; whereas, Hundrup (86) stated that whether a school had an open or closed campus had little importance with respect to percentage

Table 13: Extent of availability of alternatives to USDA lunch program by type of school

alternatives to USDA lunch	type of school		
	elem. (N=451)	sec. (N=113)	combined (N=148)
	% of schools		
a la carte items offered to students	3.3	47.4	10.1
snack bar available at noon	1.0	26.3	4.1
snack bar located in lunchroom	<1.0	24.6	4.0
vending machines available during meal time	<1.0	11.4	2.0
vending machines located in lunchroom	<1.0	15.8	2.0
students bring sack lunches	91.3	78.0	83.8
percentage of students usually bringing sack lunch			
less than 25%	90.2	95.6	98.7
more than 25%	9.8	4.4	1.3
students allowed to leave campus for lunch	61.7	52.6	47.3
percentage of students leaving campus for lunch			
less than 25%	97.8	77.2	95.9
more than 25%	2.2	22.8	4.1
fast food outlets available	10.0	34.2	12.8
proximity of fast food outlets			
1 block	16.1	23.7	12.8
2-3 blocks	13.0	23.7	15.5
6 blocks	70.9	52.6	71.7

of participation. A larger percentage of secondary than elementary schools indicated that more than 25 per cent of the students left campus for lunch.

Fast food outlets were more often available to secondary students and were in a closer proximity. West and Hoppe (77) found that the distance of schools from commercial eating establishments was an influential factor on participation.

School Meal Facilities and Promotion

Facilities and Operations

Operational characteristics of school foodservice programs were studied from a variety of perspectives. Place of food preparation was analyzed by type of school. Of those schools serving the breakfast program, the percentage of secondary schools with on site preparation was greater than that in elementary schools (Table 14). A larger percentage of secondary schools also reported that lunches were prepared on site. Almost 40 per cent of elementary schools had lunches prepared at

Table 14: Place of food preparation by type of school

type of school	breakfast		lunch	
	no. of schools serving breakfast	% of schools with on site preparation	no. of schools serving lunch	% of schools with on site preparation
elementary	65	67.7	451	59.3
secondary	11	90.9	113	80.7
combined	15	60.0	148	74.3

another site and transported to the school; whereas this was true for less than 20 per cent of the secondary schools. About one-fourth of the combined schools had off site preparation of lunches.

The length of the lunch period varied greatly from less than twenty minutes to fifty minutes or longer (Table 15). Most of the schools, however, had lunch periods of twenty minutes or less to thirty minutes in length. Howe (80) reported in her study that sophomore and junior high school students did not participate in school lunch in some instances because there was not enough time.

Table 15: Length of lunch period by type of school

length of lunch period	type of school		
	elem. (N=460)	sec. (N=114)	combined (N=148)
	% of schools		
20 minutes or less	28.8	17.4	26.4
21 to 25 minutes	23.8	26.6	30.5
26 to 30 minutes	32.5	33.0	34.7
31 to 35 minutes	1.8	3.7	2.1
36 to 45 minutes	11.4	13.8	4.2
50 minutes or longer	1.7	5.5	2.1

Most elementary and combined schools had one cafeteria line for service of lunch (Table 16). Nearly one-third of the secondary schools had two lunch lines, while slightly over 20 per cent of secondary schools utilized three or more serving lines. Law et al. (84) found that fast service and not waiting in line were especially important to secondary students.

Table 16: Number of serving lines used for lunch by type of school

number of serving lines	type of school		
	elem. (N=451)	sec. (N=113)	combined (N=148)
	% of schools		
one	89.1	48.6	84.9
two	5.8	30.6	10.3
three or more	5.1	20.7	4.8

Teachers and other school officials were involved in collecting meal receipts more frequently in elementary than in secondary schools (Table 17). Other methods of collection included monthly billing and collection by volunteers.

Table 17: Method of collecting meal receipts by type of school

method of collecting meal receipts	type of school		
	elem. (N=451)	sec. (N=113)	combined (N=148)
	% of schools		
school foodservice cashier	32.7	63.2	32.3
teacher or other school official	51.7	27.4	55.9
other	15.6	9.4	11.8

Student Involvement and Acceptance

Several variables were included in practices related to student involvement and acceptance of the school lunch program (Table 18). The

Table 18: Practices related to student involvement and acceptance of school lunch program

practices	type of school		
	elem. (N=451)	sec. (N=113)	combined (N=148)
	———— % of schools ————		
use of room where meals are served:			
dual purpose	66.3	61.4	49.3
only a lunchroom	33.7	38.6	50.7
adequacy of lunchroom size:			
crowded/too large	20.2	21.9	13.5
about right size	79.8	78.1	86.5
type of lunch period:			
single shift	15.9	18.4	10.8
split shift	84.1	81.6	89.2
taste panels used in menu development	17.0	20.2	9.5
students involved in menu planning			
rarely	58.0	49.1	58.8
occasionally	37.2	44.8	35.1
regularly	4.8	6.1	6.1
student evaluations obtained			
rarely	44.6	28.1	41.9
occasionally	42.4	51.7	45.9
regularly	13.0	20.2	12.2
students involved in testing new foods			
rarely	69.2	61.4	66.9
occasionally	25.6	33.3	28.4
regularly	5.2	5.3	4.7

Table 18: (cont.)

practices	type of school		
	elem. (N=451)	sec. (N=113)	combined (N=148)
	% of schools		
sponsor special events or feature days at lunch			
rarely	30.2	35.1	41.2
occasionally	46.5	45.6	39.2
regularly	23.3	19.3	19.6
conduct class tours of foodservice facilities			
rarely	64.6	72.8	75.7
occasionally	30.6	23.7	20.3
regularly	4.8	3.5	4.0
have student advisory council	10.9	23.7	10.1

room where meals are served was used only as a lunchroom more frequently in combined than in elementary or secondary schools and in most of the schools the size of the lunchroom was considered to be adequate. Split shift scheduling of the lunch period was the predominate practice in all schools surveyed, although a slightly higher percentage of secondary schools had a single shift.

Use of taste panels in menu planning was limited in most schools (Table 18). Student involvement in menu planning was a regular practice in only 6.1 per cent of the secondary and combined schools. Occasional involvement of students in menu planning was reported in slightly more secondary than in the other two types of schools. Somewhat higher percentages of the schools reported that they regularly obtained student evaluations of the foodservice, ranging from 12.2 per cent of the combined schools to 20.2 per cent of the secondary schools. Involvement of students in testing new foods was an infrequent practice in over 60 per cent of the schools in all categories. Sponsoring special events or feature days at lunch was the most frequently reported student involvement activity. Occasional or regular scheduling of special events was reported by almost 70 per cent of the elementary schools. Between 24.3 per cent and 35.4 per cent of the schools conducted class tours of foodservice facilities either occasionally or regularly.

In Hallett's study (87) about 50 per cent of the school foodservice directors surveyed reported occasionally involving students in menu planning, obtaining student evaluations, using taste panels, sponsoring special events or feature days, and arranging class tours of foodservice facilities. About one-third of the respondents in Hopkin's et al. study

involving school foodservice employees (88) rated student involvement in school foodservice as only moderately important.

Student advisory councils were reported in about one-fourth of the secondary schools, whereas only 10.9 per cent of the elementary and 10.1 per cent of the combined schools had student advisory councils for foodservice. Howe found (80) that 69.2 per cent of the regular school lunch participants in her study expressed an interest in joining a student advisory council, and 65 per cent of the students who infrequently ate school lunch were interested in joining such a group. Evans and Vaden (89) reported that assessment of interest in becoming involved in foodservice-related activities did suggest a somewhat heightened interest at schools where advisory councils were implemented for purposes of their study. Also, evaluation responses from members of the councils in the study did indicate a positive attitude toward activities in which they were involved. Findings on the limited extent of student involvement in the schools surveyed in this study give some cause for concern in view of the recent passage of regulations (41) that required school food authorities to devise a program of student involvement.

Menu Alternatives

About one-fourth of the schools used a menu cycle. A four to six week cycle was most common among those schools in which a cycle was used.

Only 8.3 per cent of the elementary schools offered alternate meal approaches to students, whereas 68.4 per cent of the secondary schools and 39.9 per cent of the combined schools reported lunch alternatives were provided (Table 19). Over half of the secondary schools served an additional regular lunch or a salad lunch.

Table 19: Practices related to food quality and service in school lunch program

practice	type of school		
	elem. (N=451)	sec. (N=113)	combined (N=148)
	% of schools		
provide alternate meal approaches	8.3	68.4	39.9
types of alternatives available:			
regular lunch	7.0	54.4	22.3
salad lunch	7.4	57.9	35.1
"snack" lunch	>1.0	16.7	4.0
soup and sandwich	>1.0	11.4	3.4
provide choice of items on regular lunch menu	14.1	64.0	46.0
type of choices:			
main entree	8.9	54.4	14.9
vegetable, fruit or dessert	12.6	57.9	39.9
check plate waste			
rarely	15.2	14.0	10.1
occasionally	30.4	28.1	28.4
regularly	54.4	57.9	61.5
use standardized recipes			
rarely	8.3	2.6	11.5
occasionally	7.7	9.7	14.2
regularly	84.0	87.7	74.3
check serving temperatures			
rarely	10.6	7.0	12.2
occasionally	17.6	16.7	22.3
regularly	71.8	76.3	65.5

Snack-type lunches were offered in 16.7 per cent and soup and sandwich lunches were available in 11.4 per cent of the secondary schools. Small percentages of either the elementary or combined schools provided these two types of alternative school lunches to students. Only about 7 per cent of the elementary schools provided any type of lunch alternative; whereas 35.1 per cent of the combined schools offered a salad lunch and 22.3 per cent offered an alternative regular lunch menu.

Choices within the regular lunch menu pattern were served in almost two-thirds of the secondary schools, in almost 40 per cent of the combined schools, and in only 12.6 per cent of the elementary schools. Results in Table 19 indicate that over half of the secondary schools offer main entree, vegetable, fruit, or dessert choices. Few elementary or combined schools had choices of either entree or other menu items. Some of the other choices offered to students were a sandwich lunch, fruit plate, buffet, bread, and different types of milk. In Evans and Vaden's study (89) students were asked to indicate the types of choices in the school lunch menu they desired. In the four schools they surveyed, students showed the strongest desire for a choice of main dishes, compared to desire for choices of other menu items. Students were least concerned about vegetable and salad choices. Gutsch (90), however, contended that consumption of vegetables tended to be greater when choices were offered.

Food Production Controls

Reports from over half of the schools in all categories indicated plate waste was checked regularly (Table 19). This practice was rare in only a small percentage of schools. Use of standardized recipes was reported in about three-fourths or more of the schools in the elementary,

secondary, and combined classifications. Use of the USDA standardized recipe file probably accounted for these high percentages. It would be interesting to know the extent to which schools have standardized recipes for their own operations.

Checking of serving temperatures was another common practice among the schools surveyed. This practice was somewhat more common in elementary and secondary schools than in combined schools. Over half of the school foodservice directors surveyed in Hallett's study (87) reported regularly checking plate waste and serving temperatures and using standardized recipes.

Analysis of Lunch Quality Variables

Three scores were computed as described in the methodology section to study lunch alternatives, student acceptance, and food quality data. Scores were analyzed by analysis of variance to determine differences among states and school types (Tables 20-21). The lunch alternatives and food quality scores differed significantly in relation to both variables, whereas results from analysis of the student acceptance score were non-significant.

The lunch alternatives score was highest in Colorado schools and lowest in Missouri schools (Table 21). A higher score indicates a greater extent of availability of alternatives to the school lunch. In the three largest population areas, the lunch alternatives score was higher in the secondary schools than in the elementary schools. The differential was small in schools in the small rural communities. Missouri schools had the highest food quality score indicating that menu choices were available more frequently in these schools than in those in

Table 20: Analysis of variance of lunch alternatives, student acceptance, and food quality scores

score ¹	overall F ratio	df error	mean square error	F ratios for independent variables	
				state df=3	school type by area population df=8
lunch alternatives (ALT-LUN)	26.44	695	6.65	14.36	28.71
student acceptance (STU-ACCP)	2.80n.s. ²	695	10.05	0.60n.s.	2.83n.s.
food quality (FOOD)	20.76	695	10.27	3.55	26.10

¹Refer to Table 3 for computation of scores.

²n.s. = nonsignificant. All other ratios significant, $P \leq .05$.

Table 21: Least squares means for lunch alternatives, student acceptance, and food quality scores

independent variables	ALT-LUN	STU-ACCP	FOOD	
	————— mean and std. error —————			
state:				
Colorado	17.6 ± 0.3	18.4 ± 0.4	15.9 ± 0.4	
Iowa	16.7 ± 0.3	18.1 ± 0.4	16.2 ± 0.4	
Kansas	17.1 ± 0.3	18.0 ± 0.4	16.2 ± 0.4	
Missouri	15.7 ± 0.3	17.9 ± 0.4	17.1 ± 0.4	
school type by area population:				
<u>population</u>	<u>school type</u>			
500,000 or more	elem.	15.2 ± 0.4	18.9 ± 0.5	14.0 ± 0.5
	sec.	22.9 ± 0.9	18.6 ± 1.1	19.8 ± 1.1
50,000-499,999	elem.	15.8 ± 0.2	17.7 ± 0.3	13.5 ± 0.3
	sec.	20.8 ± 0.6	18.6 ± 0.7	20.3 ± 0.7
10,000-49,000	elem.	15.3 ± 0.2	17.6 ± 0.3	13.1 ± 0.3
	sec.	21.0 ± 0.6	19.8 ± 0.7	20.5 ± 0.7
less than 10,000	elem.	14.8 ± 0.2	17.0 ± 0.2	14.5 ± 0.2
	sec.	16.1 ± 0.3	17.2 ± 0.4	17.0 ± 0.4
	combined	15.2 ± 0.2	17.6 ± 0.3	15.9 ± 0.3
overall		15.7 ± 2.6	17.6 ± 3.2	15.0 ± 3.2

the other three states. Colorado schools had the lowest food quality score. The secondary schools in all area population levels provided more choices to students, as indicated by the higher scores on the food quality index.

Participation in NSLP

General linear model analysis of covariance was used to analyze school lunch participation statistics (Tables 22-24). The two discrete variables in the analysis were state and school type by area population. School size, percentage of students bussed, percentages of students qualifying for free and reduced price meals, price, and three indexes computed to assess effects of availability of lunch alternatives and student involvement and food quality practices were continuous variables in the model. Average daily participation in the NSLP was computed as a percentage of school enrollment (ADP-EN) and as a percentage of average daily attendance (ADP). In the latter variable (ADP), average attendance was adjusted for number of students out of school at lunch. Participation data were from October 1979 records in each school surveyed. Participation rates within free, reduced price, and paid meal categories also were analyzed. Separate analyses were run for each of the three types of schools studied, elementary, secondary, and combined (i.e., those serving both levels of students) using the same model (Appendix I, Tables 30-38).

F ratios were significant for all variables analyzed in relation to state with one exception, % ADP, free (Table 22). School type by area population had a significant effect on all variables except ADP. The F ratio for the percentage of students bussed was significant for only one

Table 22: General linear model analysis of covariance for effects of selected variables on school lunch participation											
source of variation	df	F ratios								paid	paid
		ADP-EN lunch	ADP lunch	% ADP				% meals served			
				free	reduced	paid	free	reduced	paid		
state	3	6.56*	5.73*	.20	3.83*	9.75*	6.19*	8.10*	12.01*		
school type by area population	8	3.95*	1.41	2.36*	8.41*	2.87*	5.00*	8.44*	9.31*		
school size	1	.23	.07	.13	.03	.08	.58	.22	.63		
% of students bussed	1	.15	.06	.36	2.04	.08	1.37	1.90	3.97*		
% students qualifying, free	1	54.00*	25.83*	483.60*	46.65*	1.69	490.11*	3.63	417.42*		
% students qualifying, reduced price	1	8.33*	2.47	1.18	17.73*	1.10	7.79*	104.83*	7.95*		
lunch price	1	.25	.26	1.06	.53	.06	.40	.15	.09		
lunch alternatives score	1	14.89*	1.99	.54	1.19	1.74	3.28	.43	2.08		
student acceptance score	1	2.21	.12	.62	2.50	.42	1.38	1.25	.02		
food quality score	1	5.69*	4.55*	.08	1.67	7.45*	4.17*	12.73*	9.08*		
df error		535	489	486	476	475	530	519	518		
mean square error		983.6	2441.2	150.0	62.9	1505.2	107.6	24.9	122.9		
R ²		.295	.153	.640	.383	.196	.648	.422	.697		

* P < .05

Table 23: Partial regression coefficients and standard error from analysis of effects of selected variables on school lunch participation

variables	ADP-EN lunch	ADP lunch	% ADP			% meals served		
			free	reduced	paid	free	reduced	paid
			$\hat{\beta}_j$ and std. error					
school size	-.002 ±.005	.002 ±.009	-.000 ±.002	.000 ±.001	.002 ±.007	-.001 ±.001	.000	.001 ±.001
% students bussed	-.020 ±.053	-.022 ±.087	-.013 ±.022	-.020 ±.014	.020 ±.070	-.021 ±.018	-.012 ±.009	.038* ±.020
% students qualifying, free	.738* ±.100	.826* ±.162	.891* ±.041	.184* ±.027	-.172 ±.132	.740* ±.034	.031 ±.016	-.753* ±.037
% students qualifying, reduced price	.936* ±.324	.821 ±.523	-.141 ±.130	.368* ±.087	.449 ±.427	-.301* ±.108	.551* ±.053	-.338* ±.120
lunch price	-.077 ±.153	-.130 ±.254	-.065 ±.063	-.030 ±.041	.050 ±.202	.032 ±.051	-.009 ±.024	.016 ±.055
lunch alternatives score	-2.150* ±.557	-1.311 ±.929	-.169 ±.231	-.165 ±.151	-.981 ±.743	.337 ±.186	-.059 ±.091	-.292 ±.202
student acceptance score	.671 ±.452	.265 ±.754	.148 ±.188	-.196 ±.124	.394 ±.607	.176 ±.149	-.081 ±.073	.023 ±.162
food quality score	1.070* ±.448	1.593* ±.746	.051 ±.185	-.156 ±.121	1.617* ±.592	-.302* ±.148	-.256* ±.071	.482* ±.159

* P < .05

Table 24: Least squares means and standard error for lunch participation variables

independent variable	ADP-EN lunch	ADP lunch	% ADP			% meals served		
			free	reduced	paid	free	reduced	paid
state: mean % and std. error								
Colorado	59.40± 4.25	69.82± 7.36	17.59± 1.82	4.70± 1.19	47.19± 5.82	22.36± 1.41	6.79± .68	70.91± 1.52
Iowa	75.07± 3.78	88.07± 6.23	17.47± 1.54	7.51± .99	64.25± 4.90	18.52± 1.26	7.17± .60	74.61± 1.34
Kansas	70.29± 3.85	85.71± 6.43	18.50± 1.59	8.35± 1.04	58.73± 5.10	20.80± 1.29	7.99± .63	71.51± 1.39
Missouri	59.22± 4.18	63.26± 6.98	18.36± 1.73	8.95± 1.27	36.57± 5.51	24.37± 1.40	10.07± .68	65.64± 1.50
school type by area population:								
population	school type							
500,000 or more	57.98± 6.21 56.11±16.30	86.09±10.60 54.26±26.41	28.06± 2.62 17.59± 6.54	19.69± 1.72 8.55± 4.23	38.72± 8.43 29.39±20.75	28.15± 2.08 17.54± 5.43	15.37± 1.02 8.05± 2.61	56.95± 2.26 74.73± 5.81
50,000-499,999	58.50± 4.05 50.08± 9.95	70.01± 6.48 52.03±17.63	16.56± 1.61 18.30± 4.36	4.59± 1.05 3.47± 2.82	47.86± 5.14 29.82±13.84	22.70± 1.34 33.08± 3.40	6.84± .65 7.64± 1.63	70.09± 1.45 59.32± 3.63
10,000-49,000	66.33± 3.78 68.86± 9.43	82.34± 6.28 78.48±16.38	16.85± 1.56 17.29± 4.06	5.39± 1.01 6.66± 2.62	60.12± 4.94 55.23±12.86	19.19± 1.24 17.83± 3.15	7.51± .60 7.17± 1.51	73.25± 1.33 75.12± 3.37
less than 10,000	81.53± 2.87 79.43± 4.61 75.14± 3.02	92.65± 4.70 89.72± 7.86 84.88± 5.10	16.07± 1.17 15.21± 1.94 15.89± 1.27	5.75± .77 6.43± 1.26 5.89± .81	71.56± 3.81 68.27± 6.17 64.20± 4.02	18.50± .95 16.85± 1.57 19.78± 1.00	6.32± .47 6.31± .76 6.84± .48	75.75± 1.05 77.09± 1.68 73.70± 1.07
overall	73.73±31.36	86.82±49.41	16.93±12.25	6.73± 7.93	63.49±38.80	19.78±10.37	7.27± 4.99	73.23±11.09

variable, the percentage of meals served in the paid meals category. Percentage of students qualifying free had a significant effect on most of the lunch participation variables analyzed and percentage of students qualifying for reduced price meals was a significant predictor of five of the eight lunch participation variables. The F ratio for the lunch alternatives score was significant for only one variable, ADP in relation to school enrollment (ADP-EN); whereas the food quality score had a significant effect on six of the eight lunch participation variables.

The percentage of variance accounted for by the model ranged from 15.3 per cent to 69.7 per cent. As shown in Table 22, the model accounted for over 60 per cent of the variance in three variables, % ADP free, % meals served-free, and % meals served-paid.

Beta estimates are shown in Table 23. Three variables were significant positive predictors of ADP in relation to school enrollment, percentages of students qualifying for free and reduced price meals and the food quality score. These data indicate that as the percentage of students in a school with approved applications on file for free or reduced price meals increased, the average daily participation in the school lunch program, as a percentage of school enrollment, also increased. Also, higher food quality scores are related to higher participation rates. The food quality score is an index measuring practices related to food production and service. A higher score indicates that alternative lunches and choices are offered to students and that quality control practices are followed regularly.

The lunch alternatives score had a significant negative beta weight in the analysis of ADP in relation to school enrollment. These results indicate that lower participation rates were associated with a greater

availability of alternatives to the lunch program; e.g., fast food outlets in close proximity, extensive a la carte offerings, and policies at lunch permitting students to leave campus.

Beta weights were significant for only two of the variables in relation to average daily participation in the school lunch program as a percentage of average daily attendance. These variables were percentage of students with approved applications for free meals and the food quality score.

As expected, the percentage of students qualifying for free meals was a significant positive predictor of both % ADP free and the percentage of total meals served in the free meals category. Conversely, as the percentage of students qualifying for free meals increased, the percentage of meals served in the paid category decreased significantly. Also as expected, the percentage of students with approved applications for reduced price meals was a significant predictor of the two variables related to the percentage of reduced price meals served (% ADP reduced and % meals served-reduced).

The food quality score was a significant positive predictor of the two paid meal participation variables, whereas beta weights were significant but negative for the two other participation variables, % meals served free and reduced. These data indicate that as more menu choices are offered and as food production controls are utilized more frequently paid meal participation increases. One other variable was a significant positive predictor of percentage of meals served in the paid category. Higher percentages of bussed students were related to increased percentages of paid meals. Other researchers have found that price, menu variety and choices in the menu pattern, closed or open campus policies,

transportation arrangements, and availability of alternatives to the school lunch were among factors affecting participation rates (3, 77-83, 85, 86).

Several key differences were noted in reviewing the separate analyses for each of the three types of schools (elementary, secondary, and combined) (Appendix I, Tables 30-38). The percentage of bussed students was a significant predictor in the analysis of the percentage of meals served in the paid category for elementary and combined schools only. The lunch alternatives variable had a significant negative effect on three of the participation variables in the secondary but not in the elementary or combined schools. Also, the student acceptance score was a significant predictor of several participation variables in only the secondary schools. Data indicated that higher student acceptance scores were related to higher average daily participation in the lunch program as a percentage of school enrollment and as a percentage of average daily attendance and also, percentage of ADP in the paid meal category in secondary schools. The student acceptance index is a measure of the extent to which student involvement and related activities are practiced regularly.

In Table 24, least squares means and standard errors are shown for lunch participation variables for each of the four states and the nine school type by area population categories. Overall average daily participation as a percentage of number of students enrolled in a school (ADP-EN) was 73.7 per cent, ranging from 59.2 per cent in Missouri to 75.1 per cent in Iowa. Data among the school types by area population were very revealing. The ADP in relation to enrollment ranged from 50.1 per cent in urban secondary schools to 81.5 per cent in rural elementary

schools. ADP-EN rates were lowest in both elementary and secondary schools in the two largest population areas and highest in the three types of schools in the small communities with population of less than 10,000.

Hiemstra (32) reported that participation as a percentage of enrollment in NSLP schools was 57 per cent in 1976. Data from this research indicate a higher overall participation rate in schools in the four state midwestern region studied than that reflected by the national statistics; however, statistics from among the school types by area population revealed a large variation between rural and urban areas. The participation rates in the large urban areas in this study were similar to those reported by Hiemstra.

The average daily participation as a function of average daily attendance (ADP) followed a pattern among the states similar to that for ADP-EN. Analysis of the breakdown of types of meals served among the three categories (free, reduced, paid) revealed differences among schools in the four states. The percentage of meals served free and reduced was highest in Missouri schools. The lowest percentage of meals served free was in Iowa, although the lowest percentage of reduced price meals was in Colorado. Conversely, the percentage of meals served in the paid category was lowest in Missouri and highest in Iowa schools.

Data reported by Hiemstra (32) indicated that nationally, 39.2 per cent of total meals served in 1976 were in the free category, 3 per cent were in the reduced category, and 57.6 per cent in the paid category. A somewhat different pattern was found in this study. For the overall sample of schools, only about 20 per cent of the total meals served were in the free category, 7.3 per cent in the reduced price category and 73.2

per cent in the paid meal category. The highest percentage of free meals was reported by elementary schools in the largest cities (>500,000 population) and secondary schools in the 50,000 to 499,999 population areas, 28.2 and 33.1 per cent respectively. The highest percentage of reduced price meals was in the elementary schools in the large metropolitan areas.

Participation in the School Breakfast Program (SBP)

General linear model analysis of covariance also was used to analyze school breakfast participation statistics (Tables 25-27). As in the analysis of lunch participation data, state and school type by area population were the two discrete variables in the model. Five continuous variables were included in the analysis of breakfast participation rates: school size, percentage of students bussed, percentages of students qualifying for free and reduced price meals, and price. The three indexes related to lunch alternatives and food quality were excluded from the model for examining breakfast data because these variables were relevant to lunch production and service, but not to breakfast. The model accounted for 62.5 per cent of the variance for ADP breakfast; R^2 ranged from 39.6 for % ADP, reduced to 82.7 for % ADP, free (Table 25).

As shown in Table 25 there were two significant F ratios in the analysis of average daily participation in the school breakfast program in relation to average daily attendance. Percentage ADP varied among schools in the four states. Also percentage of students with approved applications on file for free meals had a significant effect on ADP breakfast.

Table 25: General linear model analysis of covariance for effects of selected variables on school breakfast participation

source of variation	df	F ratios					
		ADP breakfast	% ADP		% meals served		
			free	reduced	paid	free	reduced
state	3	3.41*	5.61*	3.50*	.41	.50	1.54
school type by area population	7	.85	1.27	.77	1.01	1.40	.52
school size	1	2.80	.61	7.91*	.57	1.72	2.24
% students bussed	1	.00	.28	.36	.28	.49	.49
% students qualifying, free	1	4.48*	29.21*	3.27	1.72	27.88*	13.84*
% students qualifying, reduced price	1	.11	.20	.19	.23	.51	.50
breakfast price	1	3.49	1.32	.09	2.54	1.38	1.18
df error	39	39	39	30	30	44	35
mean square error	249.9	249.9	96.7	6.6	100.3	248.2	38.6
R ²	.625	.625	.827	.396	.414	.689	.437
							.677

Table 26: Partial regression coefficients and standard error from analysis of effects of selected variables on school breakfast participation

variables	ADP breakfast	% ADP			% meals served		
		free	reduced	paid	free	reduced	paid
		$\hat{\beta}_j$ and std. error					
school size	-.017 ±.010	-.005 ±.006	-.010* ±.003	-.010 ±.014	.010 ±.007	-.006 ±.004	-.005 ±.008
% students bussed	-.007 ±.111	.036 ±.070	.012 ±.020	-.041 ±.076	.070 ±.100	-.030 ±.043	.001 ±.095
% students qualifying, free	.266* ±.126	.423* ±.078	-.045 ±.025	-.128 ±.098	.643* ±.122	-.214* ±.058	-.575* ±.126
% students qualifying, reduced price	-.122 ±.370	-.102 ±.230	.028 ±.064	-.118 ±.248	.259 ±.362	.107 ±.151	-.245 ±.331
breakfast price	-.723 ±.387	-.277 ±.241	.019 ±.067	-.417 ±.261	.435 ±.371	.167 ±.154	-.574 ±.338

* $P \leq .05$

Table 27: Least squares means and standard error for breakfast participation variables

independent variable	ADP breakfast	% ADP			% meals served		
		free	reduced	paid	free	reduced	paid
		mean % and std. error					
state:							
Colorado	26.78± 8.04	16.45± 4.90	4.34± 1.81	6.33± 7.08	68.95± 7.22	6.48± 3.36	20.75± 7.35
Iowa	22.37± 8.15	15.23± 4.89	5.89± 2.15	2.06± 8.38	58.29± 7.60	11.62± 3.91	26.58± 8.56
Kansas	31.04± 5.23	19.67± 3.47	3.24± .98	10.30± 3.85	59.56± 4.80	6.25± 1.76	30.63± 3.84
Missouri	50.85± 7.92	36.49± 4.92	8.11± 1.73	7.34± 6.77	63.51± 6.96	12.08± 3.11	21.70± 6.81
school type by area population:							
population	school type						
500,000 or more	elem. sec.	35.59± 5.31 42.22± 20.94	28.62± 3.29 27.48± 13.02	3.00± .91 --	4.82± 3.55 --	69.06± 5.21 25.88± 18.83	9.61± 2.16 --
50,000- 499,999	elem. sec.	25.43± 6.90 47.18± 14.40	19.35± 4.29 27.05± 8.94	2.38± 1.31 14.98± 6.09	3.69± 5.11 16.29± 23.74	68.62± 6.83 58.58± 13.59	12.87± 3.04 3.99± 9.40
10,000- 49,000	elem. sec.	20.74± 8.61 36.22± 14.99	19.14± 5.37 23.10± 9.32	2.43± 1.44 9.52± 3.81	2.84± 5.64 8.14± 14.86	81.16± 8.18 72.87± 11.39	10.25± 3.34 6.67± 5.16
less than 10,000	elem. sec. combined	29.25± 6.90 36.83± 17.85 21.40± 6.97	16.82± 4.30 14.12± 4.34 21.19± 9.83	1.77± 1.20 -- 3.71± 1.43	11.64± 4.69 -- 3.83± 5.59	64.15± 6.73 -- 60.31± 6.10	8.40± 2.79 -- 11.97± 2.84
overall		29.52± 15.81	21.19± 9.83	2.47± 2.56	6.06± 10.01	67.74± 15.75	8.80± 6.20 22.89± 13.60

¹ Insufficient data for analysis.

F ratios for state were significant for two other breakfast participation variables, % ADP, free and % ADP, reduced. As expected, the percentage of students qualifying for free meals had a significant F in the analysis of the two variables related to the ratio of free meals served. Also, the F ratios for percentage of students qualifying free were significant in the analysis of per cent of meals served in the reduced price and paid categories.

As shown in Table 26, the percentage of students qualifying for free meals had significant positive beta weights in analysis of three breakfast participation variables: ADP breakfast, % ADP, free, and % meals served, free. Significant negative beta weights resulted in the analyses of the percentage of meals served as reduced price and paid meals. These data indicate that as the percentage of students with approved applications on file for free meals increases, the average daily participation in the school breakfast program as a function of school enrollment also increases. As expected, the proportion of ADP and the percentage of meals in the free category were higher when the ratio of students qualifying for free meals in relation to student enrollment was higher. Although, the percentage of meals served in the reduced price and paid categories was related negatively to the percentage of students qualifying for free meals.

Least squares means and standard errors for breakfast participation data for schools in each of the four states and for school types by area population are enumerated in Table 27. Overall participation rate in the breakfast program in relation to average daily attendance was 29.5 per cent. The breakfast program, however, was available in only 13 per cent of the schools surveyed. About half of the breakfast programs (44

of 89) were in elementary schools in the two largest urban areas (population 50,000-499,999 and $\geq 500,000$) and twenty-one were in elementary schools in the two smallest population areas.

Over two-thirds of the school breakfasts served were in the free category, 8.8 per cent in the reduced price and 22.9 per cent in the paid category. Breakfast participation as a ratio of average daily attendance varied from 22.4 per cent in the Iowa schools to over 50 per cent in the Missouri schools with breakfast programs. Data from a USDA/FNS study (11) indicated that 25 per cent of the students in the midwest region took advantage of the school breakfast program.

In the small number of secondary schools that provided the SBP, participation rates were higher than in the elementary schools in all four population areas. The elementary participation rate in the breakfast program was highest in the large urban areas (35.6 per cent ADP breakfast). Data from separate analysis of school breakfast participation rates in elementary schools is shown in Tables 39 to 41 (Appendix I). Separate analyses are not reported for secondary or combined schools because the small number of breakfast programs in those schools provided insufficient data.

Participation in the Special Milk Program (SMP)

General linear model analysis of variance was used to analyze data on participation rates in the SMP (Tables 28 and 29). The two independent variables in the models were state and school type by area population.

Significant differences were found among schools in the four states for three of the four variables computed for examining SMP participation

Table 28: Analysis of variance of special milk program participation variables

dependent variable ¹	overall F ratio	df error	mean square error	F ratios for independent variables	
				state df=3	school type by area population df=8
average daily participation in special milk program (ADP-MK)	4.8	473	1134.4	4.32	3.22
% of milk served					
free (MK-F)	2.1	318	417.5	5.70	0.70n.s. ²
reduced (MK-R)	10.0	53	144.8	0.16n.s.	11.52
paid (MK-PD)	4.6	493	226.8	5.19	3.76

¹Refer to Table 2 for explanation of variables.

²n.s. = nonsignificant. All other ratios significant, $P \leq .05$.

Table 29: Least squares means for special milk program participation variables

independent variables		ADP-MK	MK-F	MK-R	MK-PD
————— mean % and std. error —————					
state:					
Colorado		21.3 ± 4.2	12.6 ± 3.7	12.5 ± 4.2	93.7 ± 1.8
Iowa		27.6 ± 3.8	10.4 ± 2.9	12.4 ± 4.4	94.4 ± 1.6
Kansas		38.0 ± 3.5	20.1 ± 2.8	13.3 ± 3.7	89.5 ± 1.5
Missouri		32.4 ± 4.1	21.3 ± 3.1	15.1 ± 3.2	87.4 ± 1.9
school type by area population:					
	<u>population</u>	<u>school type</u>			
500,000 or more	elem.	20.4 ± 7.5	14.0 ± 6.2	--	95.7 ± 3.7
	sec.	21.7 ± 15.3	17.5 ± 11.9	9.5 ± 12.6	89.2 ± 6.2
50,000-499,999	elem.	26.6 ± 4.0	14.7 ± 3.5	6.7 ± 4.5	92.5 ± 1.8
	sec.	31.2 ± 9.8	14.3 ± 10.2	4.0 ± 8.7	96.1 ± 4.2
10,000-49,000	elem.	31.8 ± 4.0	19.3 ± 3.1	6.4 ± 4.6	91.1 ± 1.7
	sec.	14.7 ± 9.4	6.9 ± 7.3	4.7 ± 8.7	93.9 ± 4.0
less than 10,000	elem.	44.7 ± 3.0	20.3 ± 2.1	6.9 ± 3.2	85.6 ± 1.3
	sec.	41.0 ± 5.4	18.1 ± 5.3	4.1 ± 6.1	92.2 ± 2.4
	combined	36.3 ± 3.4	19.5 ± 2.2	7.5 ± 2.8	84.7 ± 1.5
overall		37.1	19.2	10.9	88.6

statistics. Differences were not significant for the percentage of milk served to students in the reduced price category. The average daily participation in the SMP in relation to average daily attendance (ADP-MK) was highest in Kansas and lowest in Colorado; percentages were 38.0 and 21.3 per cent, respectively. A large percentage of the milk served in the SMP was in the paid category. Missouri schools served the highest ratio of free milk in relation to total numbers of students served in the SMP.

Participation rates in the SMP were highest in all three types of schools (elementary, secondary, and combined) in the small rural areas (<10,000). The percentage varied from 36.3 per cent in the rural combined schools to 44.7 per cent in rural elementaries. Slightly over 20 per cent of the average daily attendance in the schools in the large metropolitan areas (\geq 500,000 population) participated in the SMP.

SUMMARY AND CONCLUSIONS

The expanded use of the term "accountability" and the recent emphasis on nutrition education have made participation statistics in child nutrition programs more important now than ever before. The objective of this study was to assess factors affecting student participation in these programs. Specific objectives of the study were to compare participation rates in the school lunch and breakfast programs in relation to a number of selected variables, to determine the alternatives to the NSLP that are available to students, to assess data on school facilities being used in school foodservice programs, and to study activities and functions identified as components of school foodservice program quality.

The instrument used for the study was adapted from a questionnaire provided by the staff of the United States Department of Agriculture, Food and Nutrition Service (USDA/FNS), which was developed for a proposed national study of factors affecting participation in child nutrition programs. This study was designed to modify and pretest the questionnaire and utilize the revised instrument to collect data from a selected sample of schools in four states in the USDA/FNS Mountain Plains Region. Initial approval for the project was obtained from various USDA officials and each state school foodservice director in the four states involved in the study. Questionnaires were mailed to randomly selected schools in Colorado, Iowa, Kansas, and Missouri; school officials were asked to complete the survey form using October, 1979 school foodservice

records. After telephone and letter follow-up, an 85.3 per cent overall return resulted (N = 722).

Data from the instruments were analyzed using cross tabulations and general linear model analysis of variance and analysis of covariance. Schools were divided into three categories, elementary, secondary, and combined (i.e., those serving both levels of students), for analysis of questionnaire items. State and school type by area population were variables used to analyze school and child nutrition program operational characteristics. These two variables and selected other variables including price, school size, percentage of students qualifying for free or reduced price meals, percentage of bussed students, and lunch quality scores, were used to analyze factors affecting program participation data.

A high percentage of the schools surveyed participated in the National School Lunch Program (NSLP) and the Special Milk Program (SMP). Participation in the School Breakfast Program (SBP) was limited; only eighty-nine schools of 722 surveyed provided breakfast.

The mean percentage of students qualifying for free lunches ranged from 13.6 per cent in Iowa to 22.8 per cent in Missouri. In the elementary schools in large cities almost 40 per cent of the students enrolled had approved applications on file for free meals.

The mean price for lunches ranged from 53 cents in Iowa schools to 64 cents in Kansas schools. Mean lunch prices in the secondary schools were from 4 to 13 cents higher than elementary lunch prices. The overall mean lunch price was 57 cents. Mean breakfast prices varied from 25 cents in Iowa to 31 cents in Colorado schools. Breakfast prices were lowest in the small rural areas (mean, 24 cents).

Extent of availability of alternatives to the USDA school lunch was greater and on site preparation of meals was more frequent in secondary than in elementary or combined schools. Including students in the menu planning process, obtaining student evaluations, using taste panels, and arranging class tours of foodservice facilities generally were infrequent practices. Student advisory councils were reported in 25 per cent or less of the schools.

Alternate meal approaches were offered by 68.4 per cent of the secondary schools, whereas only about 7 per cent of the elementary schools provided any type of meal alternatives. Choices within the regular lunch menu pattern were served in two-thirds of the secondary, 40 per cent of the combined schools, and 12.6 per cent of the elementary schools. Plate waste and serving temperature checks were common practices in most schools.

General linear model analysis of covariance was used to analyze school lunch and breakfast participation variables. The two discrete variables in both analyses were state and school type by area population. Eight continuous variables were used in the lunch participation data analysis and five in the breakfast participation analysis.

Average daily participation (ADP) in the NSLP varied significantly among schools in the four states surveyed, with Missouri schools reporting the lowest and Iowa schools the highest ADP. Participation rates were lowest in secondary schools in the two largest population areas (50,000 to 499,999 and >500,000 populations). Overall ADP in relation to school enrollment was 73.7 per cent, varying from 50.1 per cent in urban secondary schools to 81.5 per cent in rural elementary schools. Percentage of students qualifying for free meals and a food quality index were factors

with significant effects on ADP in the lunch program. Results indicated that lower participation rates were associated with a greater availability of alternatives to the lunch program; e.g., fast food outlets in close proximity, extensive a la carte offerings, and policies at lunch permitting students to leave campus.

The percentage of students qualifying for free meals was a significant positive predictor of both % ADP free and the percentage of total meals served in the free meals category. Higher percentages of bussed students were related to increased percentages of meals served in the paid category. For the overall sample of schools, about 20 per cent of the total meals served were in the free category, 7.3 per cent in the reduced price category, and 73.2 per cent in the paid meal category.

In the small number of schools providing the breakfast program, the ADP in relation to average daily attendance was 29.5 per cent. Over two-thirds of the breakfasts served were to students qualifying for free meals. As the percentage of students with approved applications on file for free meals increased, the average daily participation in the school breakfast program as a function of school enrollment also increased. About half of the programs were found in elementary schools in the two largest urban areas.

Breakfast participation as a ratio of average daily attendance varied from 22.4 per cent in the Iowa schools to over 50 per cent in the Missouri schools with breakfast programs. In the small number of secondary schools which provided the SBP, participation rates were higher than in the elementary schools in all four sizes of population areas.

General linear model analysis of variance was used to analyze data on participation rates in the SMP. The average daily participation in the

SMP in relation to average daily attendance was highest in Kansas and lowest in Colorado. A large percentage of the milk served in the SMP was in the paid category. School milk participation rates were highest in all three types of schools in the small rural areas. About 20 per cent of the average daily attendance in the schools in the large metropolitan areas participated in the SMP.

In conclusion, meal price was not a significant predictor of participation in this study. Longitudinal studies, however, might reflect a significant negative impact of price increase as shown in other child nutrition program studies.

The positive student acceptance score in secondary schools supports the philosophy of recent federal regulations that specify student involvement. Relatively limited student involvement activities in schools surveyed would indicate this is an area that needs to be emphasized by state and federal child nutrition program agencies. The limited number of schools offering choices in menus contributes also to this concern.

Because various studies have indicated that a sizeable number of children arrive at school without breakfast, and because of relatively high percentages of students bussed in many areas, particularly in states with rural economies, greater emphasis on expansion of the breakfast program appears warranted. Secondary and combined schools especially need to be targets of this program expansion.

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APPENDIXES

APPENDIX A
Initial Correspondence

**THIS BOOK
CONTAINS
NUMEROUS PAGES
WITH THE ORIGINAL
PRINTING BEING
SKEWED
DIFFERENTLY FROM
THE TOP OF THE
PAGE TO THE
BOTTOM.**

**THIS IS AS RECEIVED
FROM THE
CUSTOMER.**

(Kansas State University Letterhead)

Letter to USDA/FNS Regional Administrator

February 5, 1979

Mr. Billie Wood
Regional Administrator
Mountain Plains Regional Office
USDA
2420 W. 26th Ave.
Suite 430 D
Denver, Colorado 80211

Dear Mr. Wood:

I am writing to you as a follow-up to our telephone conversation on 1/29/79. The thesis project I am undertaking is designed to look at factors affecting participation in child nutrition programs. The survey instrument to be used was designed by the Economic Evaluation Staff at USDA/FNS. Dr. Stephen Heimstra shared the instrument with the Department of Dietetics, Restaurant, and Institutional Management at Kansas State with the agreement that a pilot study would be conducted. The instrument itself has been reviewed by a USDA advisory council. Dr. J. C. Chai of USDA has consented to assist during the course of the study.

The pilot study will be funded by the Department of Dietetics, Restaurant, and Institutional Management at Kansas State University. The intent is to select a sample of schools in part, or all of the states in the USDA/FNS Mountain Plains Region. We will consult with State Directors involved and keep them informed throughout the study. Schools may be contacted by mail, or as funds permit, by telephone to complete the survey.

Any further comments or suggestions you might have concerning the study would be appreciated at any time.

Sincerely,

Donna Keyser
Graduate Student
Department of Dietetics, Restaurant,
and Institutional Management

Allene G. Vaden, Ph.D., R.D.
Associate Professor
Department of Dietetics, Restaurant,
and Institutional Management

(Kansas State University Letterhead)

Sample of Letter to State Directors

May 14, 1979

Mr. Vern Carpenter
Child Nutrition Programs Div.
Dept. of Public Instruction
Grimes State Office Building
Des Moines, Iowa 50319

Dear Mr. Carpenter:

This correspondence is to follow up our phone conversation last week concerning participation of selected schools in Iowa in the school foodservice study being conducted here at Kansas State University. As indicated, the project is designed to study factors affecting participation in child nutrition programs. I am enclosing a copy of the project proposal and the survey questionnaire for your review.

The survey instrument was designed by the Economic Evaluation Staff at USDA/FNS and has been reviewed by an advisory council. After pretesting, we may make minor revisions in the questionnaire.

Approximately 100 to 150 schools in your state will be selected. The states involved will be Kansas, Iowa, Colorado, and Missouri. As the random sample of schools is drawn, you will be informed as to which schools in your state have been selected. Private as well as public schools will be surveyed. October 1979 data will be used, so the survey will be mailed early in November 1979.

As further plans for the study develop, we will be in contact with you by phone or letter. Also, we may need some specific information from you on your state reporting procedures.

We are pleased you are interested in the study and are willing to work with us. If you have questions after reviewing the proposal, please let us know. We will share a copy of the final study with you, which will be available early next year.

Sincerely,

Donna Keyser
Graduate Student

Allene G. Vaden, Ph.D., R.D.
Assoc. Professor and Project Director

APPENDIX B
Pretest Correspondence

(Kansas State University Letterhead)

February 20, 1979

TO: School Foodservice Directors

FROM: Donna Keyser
Graduate Student

Allene G. Vaden, Ph.D., R.D.
Associate Professor of
Dietetics, Restaurant, and
Institutional Management

We appreciate your willingness to help in the pilot study as a part of a research project here at K-State on factors affecting participation in child nutrition programs.

Please select an elementary and a secondary school on which to gather the data. Refer to October, 1978 records.

You will also find enclosed a survey evaluation form. Please complete the evaluation and include any comments or suggestions.

Please return the evaluation form and questionnaires by March 5th.
Thank you.

KANSAS STATE UNIVERSITY

Department of Dietetics, Restaurant
and Institutional Management

EVALUATION OF THE QUESTIONNAIRE

1. Was the questionnaire difficult to answer?
☐ Yes
☐ No
2. Indicate the number of the questions you found difficult to answer.

<u>NUMBER</u>	<u>COMMENTS</u>
---------------	-----------------
3. What suggestions do you have for revising the questionnaire?
☐ None, leave questionnaire as it is
☐ Suggestions, please specify
4. What additions would you suggest?
☐ None
☐ Additions, please list below
5. What would you omit on the questionnaire?
☐ Nothing
☐ Omit, please list below
6. How long did it take to fill out the questionnaire?

7. Was it difficult to refer back to October records?

APPENDIX C
Final Instrument

(Kansas State University Letterhead)

SURVEY OF SCHOOL FOOD PROGRAMS

SCHOOL NAME _____

ADDRESS _____

CITY, STATE _____

PHONE NUMBER _____

SCHOOL DISTRICT _____

ADDRESS _____

CITY, STATE _____

PHONE NUMBER _____

Please complete all questions and return in the envelope provided
to:

Department of Dietetics, Restaurant,
and Institutional Management
Kansas State University
Manhattan, Kansas 66506

STUDY OF SCHOOL FOODSERVICE PROGRAMS

Directions: Please complete all items as completely as possible.

SECTION I: SCHOOL CHARACTERISTICS AND PROGRAM INFORMATION

1. Is this school . . .

- ☐ (1) Public
☐ (2) Private

2. Please check all grades taught at this school:

- ☐ (1) Pre-K
☐ (2) K
☐ (3) 1
☐ (4) 2
☐ (5) 3
☐ (6) 4
☐ (7) 5
☐ (8) 6
☐ (9) 7
☐ (10) 8
☐ (11) 9
☐ (12) 10
☐ (13) 11
☐ (14) 12

3. Please indicate enrollment at each grade level on October 1, 1979 (or the closest official reporting date; if different than Oct. 1, please specify date: _____):

date

no. students

- ☐ (1) Pre-K
☐ (2) K
☐ (3) 1
☐ (4) 2
☐ (5) 3
☐ (6) 4
☐ (7) 5
☐ (8) 6
☐ (9) 7
☐ (10) 8
☐ (11) 9
☐ (12) 10
☐ (13) 11
☐ (14) 12

4. What was the average daily attendance during October? (Estimate if necessary).

5. Does this school provide:

a. Lunches under the USDA National School Lunch Program?

- ☐ (1) Yes
☐ (2) No

b. Breakfasts under the USDA School Breakfast Program?

- ☐ (1) Yes
☐ (2) No

c. Milk under the USDA Special Milk Program?

- ☐ (1) Yes
☐ (2) No

If the answer to any part of Question 5 is Yes, please continue with Question 7 on page 2. If the answer to all three parts of Question 5 is No, please respond to Question 6 and return the questionnaire in the enclosed envelope. Thank you.

6. If this school is not currently providing these USDA Programs but has participated previously, please indicate when Programs were discontinued:

date of discontinuation
of Program

_____ Lunch

_____ Breakfast

_____ Special Milk

For Questions 7 and 8, elementary and secondary grades are defined as:

Elementary Grades: Grades K-8 in K-12 schools or any school which includes grades below grade 9 (for example, schools with grades K-6, K-8, 4-6, 6-8, 7-8, etc.).

Secondary Grades: Grades 9-12 in K-12 schools or any school which includes grades 9 or above (that is, schools with grades 7-9, 8-9, 9-12, 10-12, etc.).

7. During October, 1979, how many USDA lunches, breakfasts, a la carte items and half-pints of special milk were served in this school to the categories of participants identified below? (Please fill in those blocks that pertain to this school.)

Category	Elementary Grades			
	Breakfast (Number)	Lunch (Number)	A la Carte (No. of Items)	Special Milk (No. of H-Pints)
Full price-student				
Reduced price-student				
Free-student				
Other (teachers, other school staff and other adults)				
TOTAL				

Category	Secondary Grades			
	Breakfast (Number)	Lunch (Number)	A la Carte (No. of Items)	Special Milk (No. of H-Pints)
Full price-student				
Reduced price-student				
Free-student				
Other (teachers, other school staff and other adults)				
TOTAL				

8. What were the full and reduced prices charged for the USDA meals and special milk during October 1979? (Fill in the blocks that pertain to this school.)

Category	Elementary Grades			Secondary Grades		
	Breakfast	Lunch (Type A)	Special Milk	Breakfast	Lunch (Type A)	Special Milk
Full price						
Reduced price						

9. How many days were USDA meals served during October 1979?
 _____ days served in Oct. 1979.
10. How many students had approved applications for free meals on file, October 15, 1979 (or closest official reporting date; if different than Oct. 15, please specify date _____)?
 _____ no. free meal applications, Oct. 15, 1979.
11. How many students had approved applications for reduced price meals on file, October 15, 1979 (or closest official reporting date; if different than Oct. 15, please specify date: _____)?
 _____ no. reduced price meal applications, Oct. 15, 1979.
12. Approximately how many students are not in school when lunch is served?
 _____ (enter number)
13. Are a la carte items offered to students? (If No, skip to Section II.)
 _____ (1) Yes
 _____ (2) No
14. What are the five most common a la carte items offered and what are their prices?

ITEM	PRICE
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

SECTION II: ALTERNATIVES TO THE USDA LUNCH

1. Is a snack bar available for students to use at noon? (If No, skip to question 4.)
 _____ (1) Yes
 _____ (2) No
2. Is the snack bar located in the lunchroom?
 _____ (1) Yes
 _____ (2) No
3. Who operates the snack bar?
 _____ (1) School Foodservice
 _____ (2) Student groups
 _____ (3) Outside vendors
 _____ (4) Other, please specify: _____
4. Are food vending machines available to students during mealtimes? (If No, skip to question 6.)
 _____ (1) Yes
 _____ (2) No

5. Are the vending machines located in the lunchroom?
 ___ (1) Yes
 ___ (2) No
6. Do any students bring sack lunches at noon? (If No, skip to question 8.)
 ___ (1) Yes
 ___ (2) No
7. What percentage do you estimate usually bring sack lunches?
 ___ (1) Less than 25%
 ___ (2) More than 25%
8. Are students allowed to leave the campus at noon for lunch? (If No, skip to Section III.)
 ___ (1) Yes
 ___ (2) No
9. What percent do you estimate usually leave the campus for lunch?
 ___ (1) Less than 25%
 ___ (2) More than 25%
10. Are off-campus fast food outlets readily available to students at noon? (If No, skip to Section III.)
 ___ (1) Yes
 ___ (2) No
11. What types of outlets are available?
 ___ (1) Restaurants (McDonalds, A&W, . . .)
 ___ (2) Mobile units
 ___ (3) Other (please specify) _____
12. How close are the nearest fast food outlets located to school?
 ___ (1) One block or less
 ___ (2) 2-3 blocks
 ___ (3) 3-6 blocks
 ___ (4) Over 6 blocks

SECTION III: SCHOOL MEAL FACILITIES AND PROMOTION

1. Where is the food served at this school prepared? (Check all appropriate boxes.)

Place Prepared	Breakfast	Lunch	A la Carte
On Site			
Base or Central Kitchen			
Commercial Firm			
Other _____ (specify)			

2. Is the room where the meals are served:
- ____ (1) Used only as a lunch-room?
- ____ (2) Dual-purpose, such as a gym?
3. At meal time, is the lunchroom:
- ____ (1) Crowded?
- ____ (2) About the right size?
- ____ (3) Too big?
4. Is the lunch period:
- ____ (1) A single shift?
- ____ (2) Split and/or staggered?
5. How much time is allowed for each group of students to be served and to eat their lunch?
- _____ length of lunch period (in minutes)
6. How many serving lines are used for the lunch?
- _____ no. serving lines
7. How is the money for the meals collected?
- ____ (1) School foodservice cashier
- ____ (2) Teacher or school official
- ____ (3) Other (please specify)
- _____
8. Do you use a menu cycle for Type A lunches? (If No, skip to question 10.)
- ____ (1) Yes
- ____ (2) No
9. What is the length of the cycle? (Enter number of days.)
- _____ length of cycle (in days)
10. a. Are alternate Type A meal approaches available (e.g., Type A salad bar, etc.)?
- ____ (1) Yes
- ____ (2) No
- b. If Yes, what Type A alternatives are regularly available? (Check all that apply.)
- ____ (1) Regular Type A
- ____ (2) Type A salad lunch
- ____ (3) Type A "snack" lunch
- ____ (4) Type A soup and sandwich
- ____ (5) Other, please specify
- _____
11. Do students have a choice of items with the regular Type A lunch?
- ____ (1) Yes
- ____ (2) No
12. If Yes, does the choice of items include:
- a. Main entree?
- ____ (1) Yes
- ____ (2) No
- b. Vegetable, fruit or dessert?
- ____ (1) Yes
- ____ (2) No
- c. Other?
- ____ (1) Yes
- ____ (2) No
- If yes, please specify.
- _____
13. Are student taste panels used in your menu development?
- ____ (1) Yes
- ____ (2) No

14. Are students involved in menu planning?
 ___ (1) Rarely
 ___ (2) Occasionally
 ___ (3) Regularly
15. Are student evaluations or reactions to foodservice obtained?
 ___ (1) Rarely
 ___ (2) Occasionally
 ___ (3) Regularly
16. Are students involved in testing new food products and/or recipes?
 ___ (1) Rarely
 ___ (2) Occasionally
 ___ (3) Regularly
17. Are special events or feature days sponsored for students?
 ___ (1) Rarely
 ___ (2) Occasionally
 ___ (3) Regularly
18. Are class tours of foodservice facilities arranged?
 ___ (1) Rarely
 ___ (2) Occasionally
 ___ (3) Regularly
19. Is plate waste checked?
 ___ (1) Rarely
 ___ (2) Occasionally
 ___ (3) Regularly
20. Are standardized recipes used?
 ___ (1) Rarely
 ___ (2) Occasionally
 ___ (3) Regularly
21. Are serving temperatures of foods checked?
 ___ (1) Rarely
 ___ (2) Occasionally
 ___ (3) Regularly
22. Do you have a student food-service advisory council?
 ___ (1) Yes
 ___ (2) No

SECTION IV: CHARACTERISTICS OF GEOGRAPHIC AREA

1. What is the population of the city, town or area where the school is located?
 ___ (1) 500,000 or more
 ___ (2) 50,000-499,999
 ___ (3) 10,000-49,000
 ___ (4) Less than 10,000
2. Approximately what percentage of the students come to school by:
 (It may be helpful to contact other school officials e.g., bus company, transportation supervisor, etc.)
- _____ a. School bus, bused more than 30 minutes?
 _____ b. School bus, bused less than 30 minutes?
 _____ c. Walking, bikes, or private car?
 _____ d. Other, please specify

Thank you for completing this questionnaire. Please return it in the enclosed, postage paid envelope.

APPENDIX D

Correspondence to Accompany Research Instrument

(Kansas State University Letterhead)

Cover Letter to Principals of Colorado Schools

November 30, 1979

Dear School Administrator,

The Department of Dietetics, Restaurant and Institutional Management at Kansas State University is conducting a study investigating factors affecting participation in school foodservice programs. Schools in Kansas, Missouri, Iowa, and Colorado will participate in the study. Approximately two hundred schools were randomly selected from each state to take part in the project.

The study has been reviewed and approved by Colorado's DARU Committee. Also, the state directors of school foodservice in Colorado and the other participating states have approved the project. The School Food Supporting Services of the Colorado State Department of Education is quite interested in the results of the study and will be receiving a copy of the final report and a summary will be sent to each participating district. A letter with the approval from the DARU Committee indicated is enclosed from Mr. Daniel Wisotzkey, Colorado Executive Director of Child Nutrition/Traffic Safety, encouraging participation of your district in the project.

Enclosed is a questionnaire for the school in your district which was chosen in the random selection. The name of the school selected is indicated on the cover page. Please request that the school foodservice director in your school district and/or the manager of the school selected for study complete the questionnaire as soon as possible. When completed, please ask that it be returned to us in the enclosed stamped envelope.

If you have any questions concerning this research, please contact by phone or mail either member of the research team. Thank you for your cooperation and time.

Sincerely,

Allene G. Vaden, Ph.D., R.D.
Associate Professor

Donna Keyser
Graduate Research Assistant

ns

Enclosures

(Kansas State University Letterhead)

Cover Letter to Superintendents of Iowa Schools

November 15, 1979

Dear School Administrator,

The Department of Dietetics, Restaurant and Institutional Management at Kansas State University is conducting a study investigating factors affecting participation in school foodservice programs. Schools in Kansas, Missouri, Iowa, and Colorado will participate in the study. Approximately two hundred schools were randomly selected from each state to take part in the project.

The study has been reviewed and approved by the Iowa State director and the state directors of School Foodservice in the other participating states. The Iowa Department of Public Instruction is quite interested in the results of the study and will be receiving a copy of the final report. Also, a summary will be sent to each participating district. A letter of endorsement is enclosed from Mr. Vern Carpenter, Director of Child Nutrition Programs in Iowa, encouraging participation of your district in the project.

Enclosed is a questionnaire for the school in your district which was chosen in the random selection. The name of school selected is indicated on the cover page. Multiple questionnaires are included if more than one school were selected in your district. Please request that the school foodservice director in your school district and/or the manager of the school selected for study complete the questionnaire as soon as possible. When completed, please ask that it be returned to us in the enclosed stamped envelope.

If you have any questions concerning this research, please contact by phone or mail either member of the research team. Thank you for your cooperation and time.

Sincerely,

Allene G. Vaden, Ph.D., R.D.
Associate Professor

Donna Keyser
Graduate Research Assistant

ns

Enclosures

(Kansas State University Letterhead)

Cover Letter to Superintendents of Kansas Schools on USDA Listing

Dear School Administrator,

The Department of Dietetics, Restaurant and Institutional Management at Kansas State University is conducting a study investigating factors affecting participation in school foodservice programs. Schools in Kansas, Missouri, Iowa, and Nebraska will participate in the study. Approximately two hundred schools were randomly selected from each state to take part in the project.

The study has been reviewed and approved by State Directors of School Foodservice in the four participating states. The Kansas State Department of Education is quite interested in the results of the study and will be receiving a copy of the final report. Also, a summary will be sent to each participating district.

Enclosed is a questionnaire for the school in your district which was chosen in the random selection. The name of school selected is indicated on the cover page. Multiple questionnaires are included if more than one school were selected in your district. Please request that the school foodservice director in your school district and/or the manager of the school selected for study complete the questionnaire as soon as possible. When completed, please ask that it be returned to us in the enclosed stamped envelope.

If you have any questions concerning this research, please contact by phone or mail either member of the research team. Thank you for your cooperation and time.

Sincerely,

Allene G. Vaden, Ph.D., R.D.
Associate Professor

Donna Keyser
Graduate Research Assistant

jj

Enclosures

(Kansas State University Letterhead)

Cover Letter to Superintendents of Missouri Schools

November 23, 1979

Dear School Administrator,

The Department of Dietetics, Restaurant and Institutional Management at Kansas State University is conducting a study investigating factors affecting participation in school foodservice programs. Schools in Kansas, Missouri, Iowa, and Colorado will participate in the study. Approximately two hundred schools were randomly selected from each state to take part in the project.

The study has been reviewed and approved by the Missouri State Director and the state directors of School Foodservice in the other participating states. The Missouri Department of Elementary and Secondary Education is quite interested in the results of the study and will be receiving a copy of the final report. Also, a summary will be sent to each participating district. A letter of endorsement is enclosed from Mr. Wilbert Grannemann, Director of School Food Services in Missouri, encouraging participation of your district in the project.

Enclosed is a questionnaire for the school in your district which was chosen in the random selection. The name of the school selected is indicated on the cover page. Multiple questionnaires are included if more than one school were selected in your district. Please request that the school foodservice director in your school district and/or the manager of the school selected for study complete the questionnaire as soon as possible. When completed, please ask that it be returned to us in the enclosed stamped envelope.

If you have any questions concerning this research, please contact by phone or mail either member of the research team. Thank you for your cooperation and time.

Sincerely,

Allene G. Vaden, Ph.D., R.D.
Associate Professor

Donna Keyser
Graduate Research Assistant

ns

Enclosures

APPENDIX E

Letters of Support from State Directors

ILLEGIBLE DOCUMENT

**THE FOLLOWING
DOCUMENT(S) IS OF
POOR LEGIBILITY IN
THE ORIGINAL**

**THIS IS THE BEST
COPY AVAILABLE**

**COLORADO DEPARTMENT OF EDUCATION**

State Office Building, 201 E. Colfax

Denver, Colorado 80203

Telephone (303) 839-2212

Calvin M. Frazier, Commissioner

The enclosed survey is being conducted by Kansas State University in four states. It has received the approval of Colorado's DARU committee as shown below.

I hope that you will take the time to complete and return the survey. It is being sent to only a select number of schools, so every reply is important.

Please accept my thanks in advance for your cooperation.

Sincerely,

Daniel G. Wisotzkey
Executive Director
Child Nutrition/Traffic Safety
839-2217

DGW:d1m

Encl.

CDE - DARU FORM CLEARANCE		VOLUNTARY
FORM NO. 508		
UNIT Child Nutrition/Traffic Safety		839-2217
APPROVAL 1979-80 School Year		



ROBERT D. BENTON, Ed.D., STATE SUPERINTENDENT
David H. Bechtel, M. S., Administrative Assistant
JAMES E. MITCHELL, Ph.D., DEPUTY SUPERINTENDENT

Dear School Administrator,

One of the schools in your district has been selected to participate in a study concerning factors affecting participation in child nutrition programs. The study is being undertaken and funded by Kansas State University as part of an overall research project on school foodservice programs.

We need the help of your school food service director and/or manager of the school selected for study to complete the questionnaire. All required information can be obtained from October records for that school.

Your cooperation will provide information to assist in the ongoing development of the child nutrition programs in Iowa. Schools in Colorado, Iowa, Kansas and Missouri have been asked to participate.

We encourage you to complete the questionnaire. This study should make a worthwhile contribution to research in the area of child nutrition programs. Thank you for the time involved.

Sincerely,

Vern Carpenter, Director
Child Nutrition Programs Division

VC:nam

State of Missouri
DEPARTMENT OF ELEMENTARY AND SECONDARY EDUCATION
P. O. BOX 1881
JEFFERSON CITY, MISSOURI 65102

Dear Authorized Representative:

The Department of Dietetics, Kansas State University, is conducting a study in Missouri, Kansas, Iowa, and Colorado of factors affecting participation in Child Nutrition Programs.

Your school has been selected as one of approximately 125 randomly selected schools in Missouri to provide the survey data for the study. Although providing the data is voluntary, we encourage the selected schools to cooperate with Kansas State University in this project.

The Department of Elementary and Secondary Education will be provided the results of the study and hopefully will be helpful to us as we work with schools in administering the Child Nutrition Programs.

Sincerely,



Wilbert Grannemann, Director
School Food Services

APPENDIX F

Letter to Principals of Kansas Schools in
Needs Assessment Project

(Kansas State University Letterhead)

Letter to Principals of Kansas Schools in
Needs Assessment Project

To: Principals of Participating Schools

From: Cynthia Foley, Project Coordinator
Allene G. Vaden, Project Co-Director
G. Kathleen Newell, Project Co-Director

As part of the Needs Assessment Project, in addition to the data from teachers, foodservice personnel, and fifth graders, we need some information about the school foodservice programs at each school.

Attached is the form (Survey of School Food Programs) to be completed by you or the school foodservice manager at your school. Also, you may have to get some of the data from the District School Foodservice Director or Central Office in the district. The type of information requested conforms to that required for monthly reports to the Kansas State Department of Education. Data for the month of October are requested because that month is recommended by the United States Department of Agriculture for studies of foodservice programs.

Please mail the completed report to us within one week after the on-site visit. An addressed stamped envelope is provided for returning the form to Cynthia Foley at Kansas State University.

Thank you for your cooperation. We appreciate the opportunity to visit your school and to work with you. Please express our thanks to your staff and students.

APPENDIX G
Follow-up Correspondence

(Kansas State University Letterhead)

TO: School administrators in schools involved in
Kansas State University's School Foodservice
Survey

FROM: Donna Keyser, Graduate Research Assistant

I enjoyed talking with you or a member of your staff on the phone recently. We will look forward to receiving the school foodservice survey very soon.

In the event the questionnaire has been misplaced, please call me at (913) 532-5521 or notify me by return mail at the above address. I will be happy to drop a replacement questionnaire in the mail. Thank you for your cooperation in making this study possible.

cc: Allene G. Vaden, Ph.D., Associate Professor

APPENDIX H
Coding of Questionnaire Data

Card 4:Column

1 Card code
 2-4 School identification number
 5 State identification number
 6-7 Item 8, Record price of paid elem. brft.
 8-9 Record price of reduced price elem. brft.
 10-11 Record price of paid elem. lunch
 12-13 Record price of reduced price elem. lunch
 14-15 Record price of paid elem. milk
 16-17 Record price of reduced price elem. milk
 18-19 Record price of paid sec. brft.
 20-21 Record price of reduced price sec. brft.
 22-23 Record price of paid sec. lunch
 24-25 Record price of reduced price sec. lunch
 26-27 Record price of paid sec. milk
 28-29 Record price of reduced price sec. milk
 30-31 Item 9, Record no. of days meals were served
 32-35 Item 10, Record no. of approved free applications on file
 36-39 Item 11, Record no. of approved reduced price applications on file
 40-43 Item 12, Record no. of students out during lunch
 44 Item 13, Code according to pre-numbered responses indicated

Card 5:Column

1 Card code
 2-4 School identification number
 5 State identification number
 6 Section II. Item 1
 7 Item 2
 8 Item 3
 9 Item 4
 10 Item 5
 11 Item 6
 12 Item 7
 13 Item 8
 14 Item 9
 15 Item 10
 16 Item 11
 17 Item 12
 18-29 Section III. Item 1, ✓ = 1
 blank = 2
 30 Item 2
 31 Item 3
 32 Item 4
 33-34 Item 5, Record length of lunch period in no. of minutes
 35 Item 6, Record no. of serving lines
 36 Item 7, Code as reported (pre-coded)
 37 Item 8
 38-39 Item 9, Record length of menu cycle in no. of days

Card 5 (cont.):Column

40	Item 10a, Code as reported (pre-coded)	
41-45	Item 10b, ✓ = 1	
	blank = 2	
46	Item 11]
47	Item 12a	
48	Item 12b	
49	Item 12c	
50	Item 13	
51	Item 14	Code as reported (pre-coded)
52	Item 15	
53	Item 16	
54	Item 17	
55	Section IV. Item 1, Code as reported (pre-coded)	
56-63	Item 2, Enter percentage of students in appropriate spaces	
64	Section III. Item 18]
65	Item 19	
66	Item 20	
67	Item 21	
68	Item 22	
		Code as reported (pre-coded)

<p>CARD 2 Col.</p> <p>(1) 2 card code (2-4) school ID (5) state</p> <p>Ques. 7--Elementary 4 Col. Field</p> <p>(6-9) Full Brft. (10-13) Reduce Brft. (14-17) Free Brft. (18-21) Other (22-25) Total</p> <p>5 Col. Field</p> <p>(26-30) Full Lunch (31-35) Reduce Lunch (36-40) Free Lunch (41-45) Other (46-50) Total</p> <p>(51-56) A la Carte Total</p> <p>3 Col. Field</p> <p>(57-59) Full Milk (60-62) Reduced Milk (63-65) Free Milk (66-68) Other Milk (69-71) Total Milk</p>	<p>CARD 3 Col.</p> <p>(1) 3 card code (2-4) school ID (5) state</p> <p>Ques. 7--Secondary 4 Col. Field</p> <p>(6-9) Full Brft. (10-13) Reduce Brft. (14-17) Free Brft. (18-21) Other (22-25) Total</p> <p>5 Col. Field</p> <p>(26-30) Full Lunch (31-35) Reduce Lunch (36-40) Free Lunch (41-45) Other (46-50) Total</p> <p>(51-56) A la Carte Total</p> <p>3 Col. Field</p> <p>(57-59) Full Milk (60-62) Reduced Milk (63-65) Free Milk (66-68) Other Milk (69-71) Total Milk</p>	<p>CARD 4 Col.</p> <p>(1) 4 card code (2-4) school ID (5) state</p> <p>Ques. 8--Cost--Elem. 2 Col. Field</p> <p>(6-7) Full Brft. (8-9) Reduce Brft.</p> <p>(10-11) Full Lunch (12-13) Reduce Lunch</p> <p>(14-15) Full Milk (16-17) Reduce Milk</p> <p>Ques. 8--Cost--Elem. 2 Col. Field</p> <p>(18-19) Full Brft. (20-21) Reduce Brft.</p> <p>(22-23) Full Lunch (24-25) Reduce Lunch</p> <p>(26-27) Full Milk (28-29) Reduce Milk</p> <p>(30-31) Days, Q. 9 (32-35) Free Applic, Q. 10 (36-39) Reduce Applic., Q. 11 (40-43) Out Students, Q. 12 (44) A la carte, Yes, No, Q. 13</p>
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APPENDIX I

Supplemental Tables (Tables 30-41)

Table 30: General linear model analysis of covariance for effects of selected variables on elementary school lunch participation

source of variation	df	ADP-EN lunch	ADP lunch	F ratios					
				% ADP			% meals served		
				free	reduced	paid	free	reduced	paid
state	3	1.84	2.51	.22	3.74*	4.09*	2.16	7.81*	6.97*
area population	3	5.57*	1.51	3.88*	15.19*	4.06*	5.59*	15.26*	15.77*
school size	1	1.73	.03	.04	.20	.01	.19	.01	.00
% students bussed	1	.00	.18	.17	.78	1.15	2.00	1.49	5.13*
% students qualifying, free	1	47.14*	22.46*	283.40*	31.86*	.24	295.31*	1.94	253.83*
% students qualifying, reduced price	1	.64	.17	.18	5.58*	.12	1.56	55.60*	12.18*
lunch price	1	.10	.77	1.13	1.34	.07	.52	.40	.11
lunch alternatives score	1	2.63	.04	1.01	.35	.32	.15	1.46	.08
student acceptance score	1	.21	.27	.09	3.14	.04	3.25	1.12	.06
food quality score	1	3.87*	4.38*	.29	1.48	6.90*	3.47	8.90*	7.26*
df error	330	330	310	308	297	297	330	318	318
mean square error	1180.8	3045.4	221.3	221.3	91.4	1762.2	130.6	35.2	143.3
R ²	.260	.135	.622	.381	.184	.642	.403	.709	

Table 31: Partial regression coefficients and standard error from analysis of effects of selected variables on elementary school lunch participation

variables	ADP-EN lunch	ADP lunch	% ADP			% meals served		
			free	reduced	paid	free	reduced	paid
			$\hat{\beta}_i$ and std. error					
school size	-.014 ±.011	.003 ±.019	.000 ±.005	.001 ±.003	-.001 ±.015	-.001 ±.004	.000 ±.002	-.000 ±.004
% students bussed	.003 ±.070	.049 ±.116	-.013 ±.031	-.018 ±.195	.096 ±.090	-.033 ±.023	-.015 ±.012	.056* ±.024
% students qualifying, free	.821* ±.120	.923* ±.195	.886* ±.053	.198* ±.035	-.075 ±.153	.684* ±.040	.030 ±.021	-.690* ±.043
% students qualifying, reduced price	.334 ±.417	.280 ±.681	-.079 ±.184	.295* ±.125	-.187 ±.548	-.174 ±.139	.569* ±.076	-.537* ±.154
lunch price	-.064 ±.205	-.299 ±.342	-.098 ±.092	-.069 ±.060	-.068 ±.263	.049 ±.069	-.023 ±.037	.024 ±.073
lunch alternatives score	-1.478 ±.911	-.288 ±1.538	-.418 ±.416	-.165 ±.277	.684 ±1.218	.118 ±.308	-.201 ±.167	.098 ±.336
student acceptance score	.291 ±.641	-.564 ±1.081	.089 ±.294	-.346 ±.195	-.177 ±.858	.380 ±.210	-.119 ±.112	-.053 ±.227
food quality score	1.351* ±.686	2.376* ±1.134	.164 ±.307	-.243 ±.199	2.305* ±.877	-.423 ±.227	-.356* ±.119	.650* ±.241

Table 32: Least squares means and standard error for elementary school lunch participation variables

independent variable	ADP-EN lunch	ADP lunch	% ADP			% meals served		
			free	reduced	paid	free	reduced	paid
mean % std. error								
state:								
Colorado	63.06 ±4.99	81.16 ±8.63	20.59 ±2.32	5.88 ±1.53	54.98 ±6.73	23.40 ±1.67	7.53 ±.88	69.40 ±1.78
Iowa	76.26 ±4.56	93.20 ±7.53	21.02 ±2.03	9.61 ±1.31	62.52 ±5.77	21.58 ±1.51	8.77 ±.79	69.78 ±1.59
Kansas	71.93 ±3.95	93.66 ±6.57	22.58 ±1.78	11.00 ±1.16	59.69 ±5.09	23.63 ±1.32	9.89 ±.70	66.84 ±1.40
Missouri	63.83 ±4.72	68.63 ±7.70	21.41 ±2.08	12.40 ±1.37	36.31 ±6.01	26.84 ±1.57	12.94 ±.84	60.52 ±1.69
area population:								
500,000 or more	61.60 ±7.04	87.72 ±12.10	30.25 ±3.26	21.03 ±2.12	37.03 ±9.33	30.73 ±2.36	16.43 ±1.24	53.45 ±2.51
50,000- 499,999	60.90 ±4.48	72.25 ±7.34	18.83 ±1.98	5.48 ±1.28	47.03 ±5.62	24.36 ±1.50	7.62 ±.79	67.67 ±1.59
10,000- 49,000	69.17 ±4.14	84.28 ±7.05	18.81 ±1.90	5.94 ±1.22	59.68 ±5.36	20.36 ±1.36	8.07 ±.71	71.61 ±1.43
less than 10,000	83.42 ±3.33	92.40 ±5.55	17.72 ±1.50	6.44 ±1.00	69.77 ±4.39	19.99 ±1.11	7.01 ±.60	73.81 ±1.21
overall	74.77 ±34.36	88.20 ±55.18	19.52 ±14.87	7.87 ±9.56	61.18 ±41.98	21.83 ±11.43	8.33 ±5.94	70.22 ±11.97

Table 33: General linear model analysis of covariance for effects of selected variables on secondary school lunch participation

source of variation	df	F ratios					
		ADP-EN lunch		ADP lunch		% ADP	
		free	paid	free	paid	free	paid
state	3	1.70	2.06	.45	.48	1.45	.97
area population	3	1.61	1.39	.14	.28	3.79*	1.39
school size	1	1.12	.56	1.70	.04	2.43	.47
% students bussed	1	.12	.45	.05	.02	.02	1.20
% students qualifying, free	1	.61	2.48	82.41*	.29	.03	1.83
% students qualifying, reduced price	1	18.33*	4.64*	4.99*	39.58*	25.39*	32.38*
lunch price	1	.02	.26	.00	1.20	.32	.31
lunch alternatives score	1	8.48*	.75	.85	.01	5.52*	3.04
student acceptance score	1	6.76*	8.64*	2.41	4.36*	1.29	1.06
food quality score	1	1.25	.03	.36	.02	.09	8.78*
df error	71	59	59	59	59	67	67
mean square error	936.1	1838.3	42.2	1268.6	69.1	5.1	83.6
R ²	.602	.505	.727	.667	.513	.756	.585
							.728

Table 34: Partial regression coefficients and standard error from analysis of effects of selected variables on secondary school lunch participation

variables	ADP-EN lunch	ADP lunch	% ADP			% meals served		
			free	reduced	paid	free	reduced	paid
			$\hat{\beta}_i$ and std. error					
school size	.012 ±.011	.013 ±.018	-.003 ±.002	.000 ±.001	.017 ±.015	-.005 ±.003	-.000 ±.001	.005 ±.003
% students bussed	-.044 ±.131	-.137 ±.203	-.007 ±.031	.002 ±.017	-.133 ±.168	.005 ±.037	.010 ±.010	-.016 ±.040
% students qualifying, free	.365 ±.467	1.140 ±.724	.996* ±.110	.032 ±.060	.112 ±.601	1.250* ±.130	-.048 ±.035	-1.202 ±.143
% students qualifying, reduced price	4.130* ±.965	3.157* ±1.466	-.496* ±.222	.762* ±.121	2.891* ±1.218	-1.370* ±.272	.419* ±.073	.951* ±.299
lunch price	-.067 ±.444	.340 ±.668	-.003 ±.101	.060 ±.055	.283 ±.555	.070 ±.124	.018 ±.034	-.089 ±.136
lunch alternatives score	-2.922 ±1.003	-1.351 ±1.556	.217 ±.235	.012 ±.129	-1.580 ±1.293	.655* ±.278	.132 ±.075	-.787* ±.307
student acceptance score	2.988* ±1.149	5.506* ±1.873	.441 ±.283	.323* ±.154	4.742* ±1.556	-.379 ±.335	.093 ±.090	.286 ±.368
food quality score	1.280 ±1.147	.333 ±1.815	.166 ±.275	-.021 ±.149	.187 ±1.508	.094 ±.317	-.255* ±.086	.161 ±.349

Table 35: Least squares means and standard error for secondary school lunch participation variables

independent variable	ADP-EN lunch	ADP lunch	% ADP			% meals served		
			free	reduced	paid	free	reduced	paid
			mean % std. error					
state:								
Colorado	49.68 ±10.74	45.03 ±19.36	14.23 ±2.93	2.91 ±1.60	27.90 ±16.08	20.01 ±2.95	4.14 ± .80	75.84 ±3.25
Iowa	67.74 ±9.10	88.16 ±13.30	11.64 ±2.02	4.42 ±1.10	72.10 ±11.05	14.94 ±2.50	3.79 ± .68	81.27 ±2.75
Kansas	51.77 ±10.20	64.50 ±15.66	11.08 ±2.37	3.14 ±1.29	50.29 ±13.01	16.30 ±2.82	5.23 ± .76	78.47 ±3.10
Missouri	44.54 ±10.92	53.89 ±15.49	10.33 ±2.35	2.97 ±1.28	40.60 ±12.87	20.21 ±2.98	4.49 ± .81	75.31 ±3.28
area population:								
500,000 or more	37.87 ±19.83	50.53 ±28.80	10.80 ±4.36	2.41 ±2.38	37.32 ±23.92	16.44 ±5.41	3.46 ±1.46	80.10 ±5.95
50,000- 499,999	43.25 ±11.02	42.44 ±18.54	12.96 ±2.81	2.89 ±1.53	26.59 ±15.40	25.42 ±3.03	5.72 ± .82	68.86 ±3.33
10,000- 49,000	59.65 ±9.90	70.53 ±16.01	12.27 ±2.42	3.82 ±1.32	54.43 ±13.30	15.02 ±2.71	4.08 ± .73	80.90 ±2.99
less than 10,000	73.97 ±6.31	88.09 ±9.51	11.24 ±1.44	4.32 ± .79	72.54 ±7.90	14.58 ±1.74	4.39 ± .47	81.03 ±1.92
overall	66.74 ±30.60	81.58 ±42.87	11.36 ±6.49	4.07 ±3.54	66.14 ±35.61	15.65 ±8.31	4.50 ±2.25	79.84 ±9.15

Table 36: General linear model analysis of covariance for effects of selected variables on school lunch participation in combined schools

source of variation	df	F ratios									
		ADP-EN lunch	ADP lunch	% ADP			% meals served				
				free	reduced	paid	free	reduced	paid		
state	3	5.21*	1.72	1.04	.79	2.95*	4.89*	4.47*	5.79*		
school size	1	.46	.01	.69	.60	.00	.15	.17	.09		
% students bussed	1	.83	.48	.39	3.59	.16	2.97	4.41*	4.11*		
% students qualifying, free	1	.03	.78	192.17*	1.26	4.20*	146.30*	.22	103.74*		
% students qualifying, reduced price	1	2.01	.09	.09	160.12*	.85	2.28	252.05*	6.31*		
lunch price	1	1.62	.02	.01	.77	.07	1.20	3.23	1.31		
lunch alternatives score	1	2.29	.78	.57	.40	1.13	.60	.42	.58		
student acceptance score	1	.13	1.43	.20	2.72	1.51	.95	.06	.59		
food quality score	1	.04	.01	1.43	.01	.15	.08	.30	.16		
df error		112	98	97	98	97	111	112	111		
mean square error		326.4	850.2	14.9	4.0	651.1	47.2	3.5	63.9		
R ²		.236	.127	.797	.685	.288	.717	.753	.709		

Table 37: Partial regression coefficients and standard error from analysis of effects of selected variables on combined school lunch participation

variables	ADP-EN lunch	ADP lunch	% ADP			% meals served		
			free	reduced	paid	free	reduced	paid
			$\hat{\beta}_j$ and std. error					
school size	-.003 ±.004	-.001 ±.009	-.001 ±.001	-.001 ±.001	-.000 ±.008	.001 ±.002	-.000 ±.001	-.001 ±.002
% students bussed	.092 ±.101	-.120 ±.174	-.014 ±.023	-.023 ±.012	-.061 ±.153	-.066 ±.039	-.022* ±.011	-.091* ±.045
% students qualifying, free	.038 ±.219	-.374 ±.425	.858* ±.062	-.033 ±.029	-.839* ±.410	1.085* ±.090	.010 ±.022	-1.064* ±.104
% students qualifying, reduced price	.784 ±.553	.289 ±.955	-.038 ±.128	.830* ±.065	-.779 ±.846	-.320 ±.211	.914* ±.058	-.618* ±.246
lunch price	-.263 ±.206	-.053 ±.371	.005 ±.050	.022 ±.025	.086 ±.331	.088 ±.081	.038 ±.021	-.107 ±.094
lunch alternatives score	-1.144 ±.756	-1.171 ±1.328	-.134 ±.176	-.057 ±.091	-1.245 ±1.170	-.223 ±.288	-.050 ±.078	.255 ±.335
student acceptance score	-.209 ±.574	-1.143 ±.956	.056 ±.126	-.108 ±.065	-1.031 ±.838	.213 ±.218	-.014 ±.059	.195 ±.254
food quality score	.100 ±.499	.069 ±.860	-.136 ±.114	-.005 ±.059	.292 ±.754	-.052 ±.190	-.028 ±.052	.089 ±.221

Table 38: Least squares means and standard error for combined school lunch participation variables

independent variable	ADP-EN lunch	ADP lunch	% ADP			% meals served		
			free	reduced	paid	free	reduced	paid
mean % std. error								
state:								
Colorado	66.39 ±4.54	72.69 ±8.04	11.87 ±1.07	5.37 ± .55	54.90 ±7.05	21.57 ±1.72	7.03 ± .47	71.40 ±2.00
Iowa	81.37 ±3.08	91.98 ±5.07	12.71 ± .70	5.06 ± .35	77.30 ±4.64	14.59 ±1.22	5.80 ± .32	79.95 ±1.42
Kansas	83.16 ±4.11	91.49 ±7.02	13.17 ± .95	5.04 ± .48	70.98 ±6.27	14.59 ±1.60	5.41 ± .43	79.75 ±1.85
Missouri	67.55 ±3.38	80.37 ±6.25	14.07 ± .83	5.88 ± .43	60.06 ±5.48	18.77 ±1.29	7.11 ± .35	74.05 ±1.50

Table 39: General linear model analysis of covariance for effects of selected variables on elementary school breakfast participation

source of variation	df	ADP breakfast	F ratios					
			% ADP			% meals served		
			free	reduced	paid	free	reduced	paid
state	3	2.10	4.34*	2.02	.40	.77	1.77	.22
area population	3	.94	1.46	.27	1.47	.68	.30	1.43
school size	1	1.17	.12	6.81*	.96	6.16*	7.07*	2.54
% students bussed	1	.05	.10	.31	.28	.19	.04	.05
% students qualifying, free	1	3.99	21.24*	2.03	.87	19.44*	10.80*	12.09*
% students qualifying, reduced price	1	.10	.19	.22	.17	.32	.37	.80
breakfast price	1	2.46	.49	.01	3.04	3.85	.50	4.32*
df error	31		31	25	25	32	26	26
mean square error	297.9		116.3	7.7	113.4	216.4	38.4	180.6
R ²	.571		.803	.354	.439	.709	.467	.688

Table 40: Partial regression coefficients and standard error from analysis of effects of selected variables on elementary school breakfast participation

variables	ADP breakfast	% ADP			% meals served		
		free	reduced	paid	free	reduced	paid
		$\hat{\beta}_i$ and std. error					
school size	-.026 ±.024	-.005 ±.015	-.011* ±.004	-.015 ±.000	.051* ±.020	-.024* ±.009	-.031 ±.019
% students bussed	-.033 ±.147	.029 ±.092	.014 ±.025	-.051 ±.100	.052 ±.121	-.011 ±.053	-.025 ±.115
% students qualifying, free	.286 ±.143	.413* ±.090	-.040 ±.028	-.010 ±.107	.537* ±.122	-.204* ±.062	-.467* ±.134
% students qualifying, reduced price	-.139 ±.432	-.117 ±.270	.034 ±.072	-.112 ±.275	.207 ±.368	.098 ±.160	-.309 ±.347
breakfast price	-.762 ±.485	-.212 ±.303	-.010 ±.084	-.565 ±.324	.802 ±.409	.131 ±.186	-.836* ±.402

Table 41: Least squares means and standard error for elementary school breakfast participation variables

independent variable	ADP breakfast	% ADP			% meals served		
		free	reduced	paid	free	reduced	paid
		mean % std. error					
state:							
Colorado	25.37 ±7.27	17.81 ±4.54	2.19 ±1.15	5.26 ±4.23	70.84 ±6.13	8.86 ±2.55	20.44 ±5.53
Iowa	18.02 ±11.14	15.41 ±6.96	3.70 ±1.79	.21 ±6.86	62.47 ±9.50	14.77 ±4.00	25.21 ±8.67
Kansas	29.75 ±6.49	21.55 ±4.06	.91 ±1.10	8.81 ±4.24	80.00 ±5.42	5.35 ±2.43	18.64 ±5.26
Missouri	47.31 ±8.39	39.00 ±5.24	5.42 ±1.51	3.06 ±5.80	70.07 ±7.18	13.59 ±3.40	16.63 ±7.36
area population:							
500,000 or more	38.74 ±5.23	30.88 ±3.45	3.82 ± .95	5.71 ±3.65	72.10 ±4.65	10.24 ±2.09	20.04 ±4.53
50,000- 499,999	28.02 ±7.28	22.03 ±4.55	2.96 ±1.33	3.28 ±5.11	74.51 ±6.23	12.27 ±2.99	16.78 ±6.49
10,000- 49,000	21.89 ±10.35	21.26 ±6.47	3.11 ±1.68	3.47 ±6.43	73.83 ±8.81	11.34 ±3.75	13.57 ±8.12
less than 10,000	31.81 ±8.12	19.59 ±5.07	2.34 ±1.35	11.39 ±5.10	62.93 ±6.78	8.72 ±2.96	30.52 ±6.41
overall	33.27 ±17.26	25.04 ±10.78	2.60 ±2.77	6.20 ±10.64	72.85 ±14.71	8.80 ±6.20	20.07 ±13.44

FACTORS AFFECTING PARTICIPATION IN
CHILD NUTRITION PROGRAMS

by

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AN ABSTRACT OF A MASTER'S THESIS

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ABSTRACT

The expanded use of the term "accountability" and the recent emphasis on nutrition education have made participation statistics in child nutrition programs more important now than ever before. The objective of this study was to assess factors affecting student participation in these programs. Specific objectives of the study were to compare participation rates in the school lunch and breakfast programs in relation to a number of selected variables, to determine the alternatives to the NSLP that are available to students, to assess data on school facilities being used in school foodservice programs, and to study activities and functions identified as components of school foodservice program quality.

The instrument used for the study was adapted from a questionnaire provided by the staff of the United States Department of Agriculture, Food and Nutrition Service (USDA/FNS), which was developed for a proposed national study of factors affecting participation in child nutrition programs. This study was designed to modify and pretest the questionnaire and utilize the revised instrument to collect data from a selected sample of schools in four states in the USDA/FNS Mountain Plains Region. Initial approval for the project was obtained from various USDA officials and each state school foodservice director in the four states involved in the study. Questionnaires were mailed to randomly selected schools in Colorado, Iowa, Kansas, and Missouri; school officials were asked to complete the survey form using October, 1979 school foodservice records. After telephone and letter follow-up, an 85.3 per cent overall return resulted (N = 722).

Data from the instruments were analyzed using cross tabulations and general linear model analysis of variance and analysis of covariance. Schools were divided into three categories, elementary, secondary, and combined (i.e., those serving both levels of students), for analysis of questionnaire items. State and school type by area population were variables used to analyze school and child nutrition program operational characteristics. These two variables and selected other variables including price, school size, percentage of students qualifying for free or reduced price meals, percentage of bussed students, and lunch quality scores, were used to analyze factors affecting program participation data.

A high percentage of the schools surveyed participated in the National School Lunch Program (NSLP) and the Special Milk Program (SMP). Participation in the School Breakfast Program (SBP) was limited; only eighty-nine of the 722 schools surveyed provided breakfast.

The mean percentage of students qualifying for free lunches ranged from 13.6 per cent in Iowa to 22.8 per cent in Missouri. In the elementary schools in large cities almost 40 per cent of the students enrolled had approved applications on file for free meals.

The mean price for lunches ranged from 53 cents in Iowa schools to 64 cents in Kansas schools. Mean lunch prices in the secondary schools were from 4 to 13 cents higher than elementary lunch prices. The overall mean lunch price was 57 cents. Mean breakfast prices varied from 25 cents in Iowa to 31 cents in Colorado schools. Breakfast prices were lowest in the small rural areas (mean, 24 cents).

Extent of availability of alternatives to the USDA school lunch was greater and on site preparation of meals was more frequent in secondary

than in elementary or combined schools. Including students in the menu planning process, obtaining student evaluations, using taste panels, and arranging class tours of foodservice facilities generally were infrequent practices. Student advisory councils were reported in 25 per cent or less of the schools.

Alternate meal approaches were offered by 68.4 per cent of the secondary schools, whereas only about 7 per cent of the elementary schools provided any type of meal alternatives. Choices within the regular lunch menu pattern were served in two-thirds of the secondary, 40 per cent of the combined, and 12.6 per cent of the elementary schools. Plate waste and serving temperature checks were common practices in most schools.

Average daily participation (ADP) in the NSLP varied significantly among schools in the four states surveyed, with Missouri schools reporting the lowest and Iowa schools the highest ADP. Participation rates were lowest in secondary schools in the two largest population areas (50,000 to 499,999 and >500,000 populations). Overall ADP in relation to school enrollment was 73.7 per cent, varying from 50.1 per cent in urban secondary schools to 81.5 per cent in rural elementary schools. Percentage of students qualifying for free meals and a food quality index were factors with significant effects on ADP in the lunch program.

In the small number of schools providing the breakfast program, the ADP in relation to average daily attendance was 29.5 per cent. Over two-thirds of the breakfasts served were to students qualifying for free meals.