VIII. FOOD AND NUTRIENT COMPOSITION OF SBP MEALS

This chapter presents results of the analysis of data gathered in the on-site meal observations. The analysis examines the food and nutrient composition of the average SBP meal at three levels: (1) as offered by participating schools, (2) as selected by participating students, and (3) as actually consumed by participating students. At each level, the overall nutritional adequacy of the average SBP meal is compared to the Recommended Dietary Allowances for essential nutrients. The nutrient density of average NSLP meals is examined along with the fat, cholesterol and sodium content. Finally, food-level analyses are presented which provide information on the types of food offered to students in the SBP, the foods students typically select from those available, and the foods students tend to waste.

BACKGROUND

The School Breakfast Program was authorized in 1966, and was targeted toward "nutritionally needy" children in low-income school districts.1/ The 1975 Amendments to the Child Nutrition Act extended the SBP to all schools who wished to participate. Today, approximately 41 percent of all elementary and secondary school students have the program available to them and, on an average day, almost 4 million breakfasts are served.2/

Like the NSLP, meals served in the SBP must comply with meal pattern requirements set forth in program regulations in order to be eligible for Federal reimbursement. The requirements specify both the components (types of food to be included in an SBP meal), and quantities (minimum portions of food to be served.) The current SBP meal pattern requirements, summarized in Exhibit VIII.1, were issued in March 1989. The meal pattern calls for one more food item than had been required prior to 1989, i.e., a pattern SBP meal now includes four components instead of three. Expansion of the SBP meal pattern requirements was undertaken as a result of P.L. 99-591 which

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1/The Child Nutrition Act of 1966, P.L. 89-642.

2/Annual Historical Review of FNS Programs: Fiscal Year 1989. USDA, Food and Nutrition Service, 1990.

Exhibit VIII.1

SBP Meal Pattern Requirements

Food Components/Items	Minimum Required Quantities Grades K-12
MINIMUM REQUIREMENTS	
4 components must be offered:	
• One serving of fluid milk	
• One serving of fruit or vegetable or both	
• Two servings of bread/bread alternate or meat/meat alternate, or one serving of each	
MILK (Fluid):	
(As a beverage, on cereal, or both)	1/2 pint
JUICE/FRUIT/VEGETABLE:[1]	
Fruit and/or vegetable; or full-strength fruit juice or vegetable juice	1/2 cup
BREAD/BREAD ALTERNATES:	
Bread (whole-grain or enriched)	1 slice
Biscuit, roll, muffin, or equal serving of cornbread, etc. (whole-grain or enriched meal or flour)	1 serving
Cereal (whole-grain, enriched or fortified)	1/4 cup or 1 ounce
MEAT/MEAT ALTERNATES:	
Meat/poultry, or fish	1 oz.
Cheese	1 ounce
Egg (large)	1/2
Peanut Butter or other nut or seed butters	1 1/2 tbsp.
Cooked dry beans and peas	4 tbsp.
Nuts and/or Seeds	1 ounce

[1] It is recommended that a citrus juice or fruit or a fruit or vegetable or juice that is a good source of vitamin C be offered daily.

directed USDA to revise the breakfast meal pattern in order to improve the nutritional quality of SBP meals.1/

P.L. 99-591 also instructed the Agency to extend the offer-versus-serve option (OVS) to the SBP, in order to increase local flexibility in implementing the Program and thereby increase the number of schools electing to offer the Program. Under the OVS option, students must be offered all four breakfast components (milk, fruit or juice, and either 2 bread/bread alternate choices, 2 meat/meat alternate choices or 1 bread choice and 1 meat/meat alternate) but may refuse one of the four food items and still have the breakfast qualify as a reimbursable meal.2/

While previous studies have evaluated the nutritional benefits of the SBP, such analyses have not been undertaken since the revised meal pattern requirements went into effect. FNS therefore needs more current information on the nutritional value of meals offered in the SBP and the types of food schools offer in SBP meals. In addition, the Recommended Dietary Allowances (RDAs), the standards traditionally used in evaluating nutritional adequacy, have recently been updated and the current standards for several nutrients are different than the 1980 standards.3/ Most significantly, the RDAs for vitamin B_6, iron and magnesium have decreased for several age groups. Standards for other key nutrients have also changed (increased or decreased) for some groups of children. The analyses presented here evaluate the nutritional quality of SBP meals in light of the most recent recommendations for nutrient intake.

KEY RESEARCH ISSUES

In view of the information needs identified above, the primary objective of this portion of the study is to describe the food and nutrient composition of SBP meals at three levels:

- as offered, i.e., meals planned in accordance with program guidelines and made available to participating students;
- as selected, i.e., the combination of foods actually selected by students from all the options available to them; and

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1/The 1980 National Evaluation of School Nutrition Programs (NESNP-I) revealed that while SBP breakfasts were superior to other types of breakfasts in calcium and magnesium content, they were inferior in vitamin A, vitamin B_6 and iron content.

2/7 CFR 245, Part 220.

3/National Research Council, Committee on Dietary Allowances. Recommended Dietary Allowances, tenth edition. Washington, D.C.: National Academy Press, 1989.

- as consumed, i.e., the portions of food actually consumed by students.

A secondary objective is to examine potential nutritional differences between exemplary and typical SFAs and between elementary and middle/secondary schools.1/

The following research questions were addressed for each level of analysis--meals as offered, selected and consumed:

- What is the nutrient content of the average SBP meal?
- How does the nutrient content of the average SBP meal compare to the Recommended Dietary Allowances (RDAs)?
- What is the nutrient density or quality of the average SBP meal?
- What is the fat, saturated fat, cholesterol and sodium content of the average SBP meal?

Research questions were also posed to assess nutritional differences among SBP meals as offered, selected and consumed:2/

- Is the nutrient content of the average SBP meal as selected significantly different from the nutrient content of the average meal offered?
- Is the nutrient content of the average SBP meal consumed significantly different from the nutrient content of the average SBP meal selected?

A number of additional research questions related to food availability, food selection and food consumption are also addressed within the appropriate analysis:

1/Exemplary SFAs were reported to have initiated some efforts to decrease the amount of fat and/or sodium in school meals. The 10 exemplary SFAs were selected from a pool of 70 SFAs that were nominated by FNS Regional Office staff, the American School Food Service Association and directors of State Child Nutrition Programs (see Chapter I).

2/The original plans for this study also included research questions designed to assess the nutritional impact of the OVS option by comparing the nutrient content of meals offered, selected and consumed in schools with and without the OVS option. The final sample of schools that did not practice OVS was too small, however, (n = 9) to support meaningful analysis.

Meals offered

- How much choice is available to students, i.e., how often are students offered choices within a major meal component category?
- What specific foods are being offered to students in SBP meals?
- Are there differences between elementary and middle/secondary schools in terms of the specific types and amounts of food offered to students?

Meals selected

- In the presence of the offer-vs-serve (OVS) option, how many of the five items included in the SBP meal pattern do students select? Which items are refused (not selected) most often?
- Of the specific foods available in each meal component category, which do students select most often?
- Are there differences between elementary and middle/secondary schools in terms of the number or types of food items selected by students?
- How many schools offer a la carte items in the same serving line as SBP meals? What food items are typically available on an a la carte basis?
- Does the availability of a la carte items vary by school type?
- What proportion of children select one or more a la carte items, in addition to their SBP meal, when a la carte items are available?

Meals consumed

- How much of the food that students select in SBP meals is actually consumed, in total, and by food type?
- Are there differences in food consumption between elementary and middle/secondary school students?

DATA AND VARIABLES

Data were gathered in mid-March, 1990. On-site observations were conducted in 44 schools within 20 SFAs. In each school, observations were conducted during breakfast for four consecutive days.1/ Two separate analyses (nutrient content and food composition) were undertaken at three different levels (meals offered, selected and consumed.) A thorough description of the procedures used to aggregate meal observation data for the various analyses is provided in Chapter VII. The reader is referred to this chapter for a complete description of how the analyses were conducted. Key points are summarized below.

Nutrient Content Analysis

Unit of Analysis. The unit of analysis for evaluation of the nutrient content of SBP meals is the average meal offered, selected or consumed in each of the sampled schools. The nutrient content of the average meal is determined by averaging across the four days of observation.

Comparing Nutrient Content to Recommended Standards. Once the nutrient content of the average SBP meal was determined at all three levels (offered, selected and consumed), three different measures were computed to assess overall nutritional adequacy and quality. These included: percent contribution to Recommended Dietary Allowances (RDAs), indices of nutritional quality (INQs), and comparison to the Dietary Guidelines for Americans. Each is described briefly in the following paragraphs.

Recommended Dietary Allowances (RDAs). The RDAs are the accepted standard for determining the relative adequacy of mean nutrient intakes of population groups. SBP regulations, unlike NSLP regulations, do not include a specific RDA target goal for nutrient content. For these analyses, 25 percent of the RDA was used as a target level against which to compare nutrient content of SBP meals. This level was chosen rather than the 33 percent target used for NSLP meals because most children eat more often than 3 times each day. Snacks play an important role in childrens' diets, accounting for up to one-third of total calories.2/ Thus, it is not necessary for the breakfast meal to supply the same level of calories and nutrients as the other two "main" meals.

1/Basic data collection procedures and available sample sizes are described in Chapter I; a more detailed description of the meal observation methodology is included in Appendix B.

2/Farris, R.P., et. al., "Macronutrient intakes of 10-year old children, 1973 to 1982." Journal of the American Dietetic Association. 86: 765, 1986.

The most recent (1989) Recommended Dietary Allowances (see Appendix F) were used as reference standards. The proportion of the RDA provided in SBP meals was evaluated for those nutrients that have established RDAs. The nutrient content of the average SBP meal was examined separately for elementary and middle/secondary schools. Because the RDAs are defined on the basis of age and sex, the average SBP meal in each type of school was compared to the appropriate age- and sex-group RDA values.1/

As was the case for NSLP meals (see Chapter VII), the RDA comparisons presented in this chapter are based on the meals selected or consumed by "average" students in each school. No age- or sex-specific data were collected for the students who were observed. It is not possible, therefore, to identify with certainty specific groups of students who may be selecting or consuming meals that provide less than one-third of the RDA for a given nutrient.2/ This issue is discussed in detail in Chapter VII.

Indices of Nutritional Quality (INQs). The INQ was used to measure the nutrient density or nutritional quality of the average SBP meal. The INQ measures the nutrient contribution of a meal relative to it's caloric content.3/ An INQ was computed for each nutrient within each RDA age/sex group. An INQ score of 1.0 or greater indicates that the meal is high in nutritional quality, i.e., calories and nutrients are optimally balanced.4/

Dietary Guidelines for Americans. Several important aspects of nutritional quality are not addressed in the RDA standards. Specifically, the RDAs do not address fat (both quantity and type), cholesterol and sodium content. The Dietary Guidelines for Americans (hereafter referred to as the Dietary Guidelines) issued jointly by USDA and the U.S. Department of Health and Human Services (DHHS) recommends moderate intake of these dietary constituents.5/ Currently, Child Nutrition Programs are

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1/The RDAs define separate, and frequently different, nutrient needs for 4-6 year olds, 7-10 year olds, 11-14 year old males, 11-14 year old females, 15-18 year old males and 15-18 year old females.

2/FNS is collecting these data through the ongoing Special Nutritional Dietary Assessment Study.

3/Sorenson, W., Wyse, B., Wittwer, A., and Hansen, R.G. (1976). "An Index of Nutritional Quality for a Balanced Diet." Journal of the American Dietetic Association, 68:236-242.

4/The equation used in computing INQs is provided in Chapter VII.

5/Specific recommendations in The Dietary Guidelines for Americans are summarized in Chapter VII.

not required to address the Dietary Guidelines in planning menus for the SBP. However, USDA has encouraged School Nutrition Programs to consider them. The Menu Planning Guide for School Food Service highlights the Dietary Guidelines recommendations and encourages menu planners to keep fat, sugar and salt at a "moderate level."1/ The Department has recently identified incorporation of the Dietary Guidelines principles as a goal that school districts should be striving to meet by the year 2000.

In this report, the Dietary Guidelines are used as reference standards for evaluating the percent of calories from total fat and saturated fat in SBP meals. The Dietary Guidelines do not include specific recommendations for sodium or cholesterol intake. The National Research Council (NRC) recommends that adults and children limit salt intake to 6 grams per day (equivalent to 2400 mg. of sodium), and dietary cholesterol intake to less than 300 mg. per day.2/ The NRC guidelines for sodium and cholesterol intake are not endorsed by USDA, but are presented in this report as reference points to assist the reader in interpreting the data.

Food-Level Analysis

Unit of Analysis. The primary objective of the food-level analysis is to provide FNS with up-to-date information on the types of food offered to, selected by and consumed by children participating the the SBP. In order to obtain this information it is necessary to focus not on the 4-day "average" SBP meal used in the nutrient content analysis, but on each of the specific meals offered, and in the case of data on food selection and consumption, on the individual student-level observations.

Thus, for research questions related to foods included in SBP meals as offered, the unit of analysis is the SBP meal offered in each school on each day of observation (n=176). 3/ For research issues related to food selection decisions and food consumption patterns, the unit of analysis is the SBP meal as selected or consumed by each of the students observed. 4/

1/Menu Planning Guide for School Food Service. U.S. Department of Agriculture, Food and Nutrition Service, 1983.

2/National Research Council, Food and Nutrition Board, Committee on Diet and Health. Diet and Health. Washington, D.C.: National Academy Press, 1989.

3/Breakfast was observed for 4 consecutive days in 44 schools, for a total of 176 meals offered.

4/On each day of observation, food selection was observed for approximately 60 children (or in some cases as many children as ate breakfast), and plate waste (food consumption) was observed for approximately 12 children. A total of 10,560 student meals were available for analyses focusing on meals selected, and 2,024 student meals were available for analyses dealing with meals consumed.

General Analytic Approach

Analysis of both the nutrient content and food-level data employs simple descriptive statistics, such as means, proportions, and frequency distributions. Statistics are calculated and presented separately for each of the three types of SBP meals--offered, selected and consumed. Data are also stratified by school type (elementary and middle/secondary) and, in some cases, by SFA type (exemplary and typical).

T-tests or chi-square tests have been performed to test the statistical significance of selected differences between SFAs (exemplary and typical) and schools (elementary and middle/secondary). T-tests have also been used to evaluate the significance of differences in nutrient content between meals offered and meals selected, and between meals selected and meals consumed. Because of the large number of t-tests calculated in this analysis, discussions are limited to variables that exhibit a difference that is statistically significant at the .01 level rather than the more liberal .05 level. This approach compensates for the possibility of finding large numbers of comparisons significant by chance alone. (See Chapter VII for a more detailed discussion of this issue.)

SBP MEALS OFFERED

This section presents data on the food and nutrient composition of the average SBP meal offered in elementary and middle/secondary schools.1/ First, the nutrient contribution of the average SBP meal offered in each type of school is evaluated in light of age- and sex-appropriate RDA standards and the target level of 25 percent used in these analyses. Second, INQ scores are examined. Third, the nutrient content of the average SBP meal offered is compared to the Dietary Guidelines recommendations. Finally, food-level analyses are presented and findings related to the types of food offered in SBP meals are discussed.

Nutrient Content

Exhibit VIII.2 presents mean levels of calories and nutrients for the average breakfast offered in elementary and middle/secondary schools in SY 1989-90. The exhibit illustrates a tendency for breakfasts offered in middle/secondary schools to be slightly higher in calories and most nutrients, however these differences were not statistically significant. This finding is not surprising in view of the fact that SBP guidelines specify one meal pattern (i.e., types and amounts of food) for all students in grades K-12 (Exhibit VIII.1), although program guidance material encourages SFAs to serve larger portions to older students when possible.

1/For reasons that will be explained later in this chapter, data for exemplary and typical SFAs have been pooled for all analyses.

Exhibit VIII.2

Mean Calorie and Nutrient Content of the Average SBP Meal Offered in Elementary and Middle/Secondary Schools (SY 1989-90)

	Elementary (n=31)	Middle/Secondary (n=13)	All Schools (n=44)
Calories	469	522	484
Protein (gm)	16	17	17
Total Fat (gm)	16	17	17
Saturated Fat (gm)	7	8	7
Unsaturated Fat (gm)	8	8	8
Cholesterol (mg)	56	58	56
Total Carbohydrate (gm)	66	77	69
Vitamin A (mcg R.E.)	353	344	350
Vitamin C (mg)	30	35	32
Thiamin (mg)	.48	.53	.49
Riboflavin (mg)	.77	.81	.78
Niacin (mg N.E.)	4.76	4.77	4.76
Vitamin B_6 (mg)	.47	.47	.47
Calcium (mg)	380	406	387
Phosphorus (mg)	388	425	398
Magnesium (mg)	70	72	70
Iron (mg)	4.23	5.11	4.49
Sodium (mg)	621	645	628

Note: None of the differences between elementary and middle/secondary schools is statistically significant at the .01 level.

Data Source: On-Site Meal Observations.

Percent Contribution to RDAs

When compared to the RDAs for the groups of children that typically attend each type of school, the average SBP meal offered in both elementary and middle/secondary schools provided approximately 25 percent or more of students' daily nutritional needs in all but a few cases.1/

The average breakfast offered in elementary schools supplied one-fourth or more of the RDA for all nutrients for 4-6 year olds, 7-10 year olds and 11-14 year olds (Exhibit VIII.3). It supplied 25 percent of daily calorie needs for 4-6 year old students, but fell short of this level for 7-10 year olds (23 percent), 11-14 year old females (21 percent) and 11-14 year old males (19 percent). The average breakfast offered in middle/secondary schools also provided approximately one-fourth of students' calorie and nutrient needs, with three exceptions: calories (21 percent) for 11-14 year old males and calories (17 percent) and magnesium (18 percent) for 15-18 year old males (Exhibit VIII.4).

With the exception of magnesium for 15-18 year old males, the only apparent nutritional shortcoming of the average SBP meal as offered was its inability to provide approximately 25 percent of students' daily calorie needs. The significance of this finding is open to question, however. As previously mentioned, children typically obtain a substantial proportion of their daily calories from between-meal snacks--in some cases 30 percent or more--and therefore may not need to acquire a full 25 percent of their daily calorie requirements from an SBP meal.2/

Indices of Nutritional Quality (INQs)

INQ scores for the average meals offered in both elementary and middle/secondary schools met or exceeded 1.0 for all nutrients examined (Exhibits VIII.5 and VIII.6). This indicates that SBP meals planned in accordance with program meal component guidelines were high in nutritional quality and balanced across a number of key nutrients. While the overall caloric value of the average SBP meal may have been somewhat low, the meals were very high in nutrient density supplying in excess of 30 percent of the RDA for most nutrients examined.

1/Program regulations do not specify a target RDA level for SBP meals. Twenty-five percent of the RDA was used as a target in these analyses. Any nutrient supplied at 24 percent or more of the RDA was judged to meet the target goal of approximately 25 percent of the RDA.

2/Farris, R.P., et al., "Macronutrient intakes of 10-year old children, 1973 to 1982." Journal of the American Dietetic Association. 86: 765, 1986.

Exhibit VIII.3

Percentage of Recommended Dietary Allowances Provided in the Average SBP Meal Offered in Elementary Schools (SY 1989-90)

	Nutrients in Meal Offered	Students 4-6 years		Students 7-10 years		Male Students 11-14 years		Female Students 11-14 years	
		One-Fourth Daily RDA	Percent Daily RDA	One-Fourth Daily RDA	Percent Daily RDA	One-Fourth Daily RDA	Percent Daily RDA	One-Fourth Daily RDA	Percent Daily RDA
Calories	469	450	26%	500	23%	625	19%	550	21%
Protein (gm)	16	6	67	7	58	11	36	12	35
Vitamin A (mcg R.E.)	353	125	71	175	50	250	35	200	44
Vitamin C (mg)	30	11	67	11	67	12	60	12	60
Thiamin (mg)	.48	.22	53	.25	48	.32	37	.28	43
Riboflavin (mg)	.77	.28	70	.30	64	.38	51	.32	59
Niacin (mg N.E.)	4.76	3.00	40	3.25	37	4.25	28	3.75	32
Vitamin B_6 (mg)	.47	.28	43	.35	34	.42	28	.35	34
Calcium (mg)	380	200	47	200	47	300	32	300	32
Phosphorus (mg)	388	200	48	200	48	300	32	300	32
Magnesium (mg)	70	30	58	42	41	68	26	70	25
Iron (mg)	4.23	2.50	42	2.50	42	3.00	35	3.75	28

NOTE: Target goal used in these analyses in one-fourth of the RDA for all age groups.

Data Source: On-Site Meal Observations.

Exhibit VIII.4

Percentage of Recommended Dietary Allowances Provided in the Average SBP Meal Offered in Middle/Secondary Schools (SY 1989-90)

	Nutrients in Meal Offered	Male Students 11-14 years		Female Students 11-14 years		Male Students 15-18 years		Female Students 15-18 years	
		One-Fourth Daily RDA	Percent Daily RDA	One-Fourth Daily RDA	Percent Daily RDA	One-Fourth Daily RDA	Percent Daily RDA	One-Fourth Daily RDA	Percent Daily RDA
Calories	522	625	21%	550	24%	750	17%	550	24%
Protein (gm)	17	11	38	12	38	15	29	11	39
Vitamin A (mcg R.E.)	344	250	34	200	43	250	34	200	43
Vitamin C (mg)	35	12	71	12	71	15	59	15	59
Thiamin (mg)	.53	.32	41	.28	48	.38	35	.28	48
Riboflavin (mg)	.81	.38	54	.32	63	.45	45	.32	63
Niacin (mg N.E.)	4.77	4.25	28	3.75	32	5.00	24	3.75	32
Vitamin B_6 (mg)	.47	.42	28	.35	34	.50	24	.38	31
Calcium (mg)	406	300	34	300	34	300	34	300	34
Phosphorus (mg)	425	300	35	300	35	300	35	300	35
Magnesium (mg)	72	68	27	70	26	100	18	75	24
Iron (mg)	5.11	3.00	43	3.75	34	3.00	43	3.75	34

NOTE: Target goal used in these analyses is one-fourth of the RDA for all age groups.

Data Source: On-Site Meal Observations.

Exhibit VIII.5

Indices of Nutritional Quality (INQs) for
the Average SBP Meal Offered in Elementary Schools
(SY 1989-90)

	INQs for Students 4-6 Years	INQs for Students 7-10 Years	INQs for Male Students 11-14 Years	INQs for Female Students 11-14 Years
Protein (gm)	2.58	2.52	1.89	1.67
Vitamin A (mcg R.E.)	2.73	2.17	1.84	2.10
Vitamin C (mg)	2.58	2.91	3.16	2.86
Thiamin (mg)	2.04	2.09	1.95	2.05
Riboflavin (mg)	2.69	2.78	2.68	2.81
Niacin (mg N.E.)	1.54	1.61	1.47	1.52
Vitamin B_6 (mg)	1.65	1.48	1.47	1.62
Calcium (mg)	1.81	2.04	1.68	1.52
Phosphorus (mg)	1.85	2.09	1.68	1.52
Magnesium (mg)	2.23	1.78	1.37	1.19
Iron (mg)	1.62	1.83	1.84	1.33

NOTE: An INQ of 1.0 or more indicates that the meal is of high nutritional quality. INQs below 1.0 indicate that the meal will not provide 100% of the target level RDA (one-third) unless the target RDA for calories is exceeded.

Data Source: On-Site Meal Observations.

Exhibit VIII.6

Indices of Nutritional Quality (INQs) for
the Average SBP Meal Offered in Middle/Secondary Schools
(SY 1989-90)

	INQs for Male Students 11-14 Years	INQs for Female Students 11-14 Years	INQs for Male Students 15-18 Years	INQs for Female Students 15-18 Years
Protein (gm)	1.81	1.58	1.71	1.63
Vitamin A (mcg R.E.)	1.62	1.79	2.00	1.79
Vitamin C (mg)	3.38	2.96	3.47	2.46
Thiamin (mg)	1.95	2.00	2.06	2.00
Riboflavin (mg)	2.57	2.63	2.65	2.63
Niacin (mg N.E.)	1.33	1.33	1.41	1.33
Vitamin B_6 (mg)	1.33	1.42	1.41	1.29
Calcium (mg)	1.62	1.42	2.00	1.42
Phosphorus (mg)	1.67	1.46	2.06	1.46
Magnesium (mg)	1.29	1.08	1.06	1.00
Iron (mg)	2.05	1.42	2.53	1.42

NOTE: An INQ of 1.0 or more indicates that the meal is of high nutritional quality. INQs below 1.0 indicate that the meal will not provide 100% of the target level RDA (one-third) unless the target RDA for calories is exceeded.

Data Source: On-Site Meal Observations.

Comparison to Dietary Guidelines for Americans

Exhibit VIII.7 summarizes the mean proportion of calories provided by the three macronutrients--fat (both total fat and saturated fat), carbohydrate and protein--as well as the mean cholesterol and sodium content of average SBP meals offered in elementary and middle/secondary schools in SY 1989-90. The average breakfast offered in both schools provided approximately 30 percent of total calories from fat, which is the level recommended by the Dietary Guidelines for Americans. The level of saturated fat, however, exceeded the Dietary Guidelines recommendation of 10 percent of calories in both elementary (14 percent) and middle/secondary (13 percent) schools. The levels of cholesterol and sodium in average SBP meals were within acceptable ranges.

Frequency distributions of fat, saturated fat, cholesterol and sodium content of the average breakfasts offered in each of the individual schools are presented in Exhibit VIII.8. The exhibit illustrates that while the overall mean for calories from fat met the Dietary Guidelines recommendations, more than half of the individual schools in the sample offered breakfasts that, on average, provided more than 30 percent of calories from fat. This was particularly true of elementary school breakfasts, where the average SBP meal in 61 percent of schools exceeded this standard. Only 7 percent of the schools in the study sample offered breakfasts that, on average, supplied less than 10 percent of calories from saturated fat.

Food-Level Analysis

Three issues are of interest in examining the specific foods offered in SBP meals:

- How much choice is available to students, i.e., how often are they offered more than one item within a major meal component category?
- What specific foods are being offered to students in the SBP?
- Are there differences between elementary and middle/secondary schools in the number, type or amount of foods offered?

Each of these issues is addressed, in turn, in the following sections.

Availability of Choices within Meal Component Categories. Exhibit VIII.9 summarizes the number of options offered, within meal component category, in breakfasts observed in the selected elementary and middle/secondary schools. As the exhibit illustrates, in SY 1989-90 students had relatively few options when choosing an SBP meal.

In both elementary and middle/secondary schools, students had the greatest number of options when it came to choosing milk. Overall, only 16 percent of the breakfasts offered limited the availability of milk to one particular type. Middle/secondary schools tended to offer more choices than elementary schools, however.

Exhibit VIII.7

Macronutrient, Cholesterol and Sodium Content of the Average SBP Meal Offered in Elementary and Middle/Secondary Schools Compared to the Dietary Guidelines for Americans (SY 1989-90)

	USDA/DHHS Dietary Guidelines for Americans	Elementary (n=31)	Middle/ Secondary (n=13)	All Schools (n=44)
Percent Calories from Fat	≤ 30.0	31.4	29.5	30.8
Percent Calories from Saturated Fat	< 10.0	14.0	13.1	13.7
Percent Calories from Carbohydrate	55.0-65.0[1]	56.5	58.6	57.1
Percent Calories from Protein	5.0-15.0[1]	14.0	13.4	13.8
Mean Cholesterol (mg)	n.q.[2]	56	58	56
Mean Sodium (mg)	n.q.[2]	621	645	628

[1]The USDA/DHHS Dietary Guidelines do not provide specific recommendations for the proportion of calories from carbohydrates and protein. RDAs for protein for school age children range from 5 to 8 percent of total calories. In general, the average protein intake considerably exceeds the RDA. The National Research Council (NRC) report Diet and Health recommends maintaining total protein at levels lower than twice the RDA for all age groups and that the intake of carbohydrates be more than 55% of total calories. To achieve the recommended levels of calories from fat, carbohydrate and protein content would need to be in these ranges.

[2]Not quantified. There is no established Recommended Dietary Allowance or Estimated Safe and Adequate Intake for cholesterol or sodium. The Dietary Guidelines for Americans recommend choosing a diet low in cholesterol and use of salt and sodium only in moderation. The National Research Council (NRC) report Diet and Health recommends that adults and children limit salt intake to 6 grams per day, equal to 2400 mg. of sodium, and dietary cholesterol intake to less than 300 mg. per day.

Note: None of the differences between elementary and middle/secondary schools are statistically significant.

Data Source: On-Site Meal Observations.

Exhibit VIII.8

Frequency Distribution of the Level of Fat, Cholesterol, and Sodium Provided in the Average SBP Meal Offered in Elementary and Middle/Secondary Schools (SY 1989-90)

	Elementary (n=31)	Middle/ Secondary (n=13)	All Schools (n=44)
Percent Calories from Fat			
≤ 30 percent (D.G. Goal)[1]	39%	69%	48%
31-35 percent	39	31	36
36-38 percent	19	0	14
39-40 percent	3	0	2
Percent Calories from Saturated Fat			
< 10 percent (D.G. Goal)[1]	6	8	7
11-13 percent	39	38	39
14-16 percent	39	54	43
>17 percent	16	0	11
Cholesterol (mg)[2]			
≤ 75 mg	84	85	84
76-100 mg	13	0	9
> 100 mg	3	15	7
Sodium (mg)[2]			
≤ 600 mg	39	39	38
601-800 mg	48	46	48
801-1,000 mg	13	15	14
1,000 mg	0	0	0

[1]Level of intake recommended in the USDA/DHHS Dietary Guidelines for Americans.

[2]The Dietary Guidelines for Americans recommend choosing a diet low in cholesterol and use of salt and sodium only in moderation. The National Research Council (NRC) report Diet and Health recommends that adults and children limit salt intake to 6 grams per day (equal to 2,400 mg. of sodium) and dietary cholesterol intake to less than 300 mg. per day.

Note: None of the differences between elementary and middle/secondary schools is statistically significant.

Data Source: On-Site Meal Observations.

Exhibit VIII.9

Number of Options Available Within Meal Component Categories in Breakfasts Offered in Elementary and Middle/Secondary Schools (SY 1989-90)

Meal Component Category/ Number of Options	Percent of SBP Meals Offered		
	Elementary (n=124)	Middle/Secondary (n=52)	All Schools (n=176)
Milk*			
1 option only	22%	2%	16%
2 options	35	37	36
3 options	24	40	29
4 or more options	19	21	19
Fruit/Fruit Juice			
1 option only	73	71	72
2 options	20	13	18
3 options	6	13	8
4 or more options	2	2	2
Vegetables/Vegetable Juice			
None offered	97	90	95
1 option only	3	10	5
Bread/Bread Alternate			
1 option only	45	31	41
2 options	35	40	36
3 options	18	17	18
4 or more options	2	12	5
Meat/Meat Alternate*			
None offered	54	44	51
1 option only	42	38	41
2 options	4	2	3
3 options	0	4	1
4 options	0	8	2
5 options	0	4	1

*Chi-square test of difference between elementary and middle/secondary schools is statistically significant at the .01 level.

Data Source: On-Site Meal Observations.

Schools generally offered students few options to meet the fruit/juice/vegetable requirement. Almost three-quarters of all breakfast meals offered only one type of fruit or fruit juice. Few schools offered vegetables or vegetable juice.

The number of options available for bread/bread alternates was also limited. Thirty-five percent of the breakfasts offered in elementary schools and 40 percent of the breakfasts offered in middle/secondary schools offered only two bread/bread alternates. In many cases, however, students had to take both of these items in order to select a breakfast that fully complied with meal pattern regulations.1/

Forty-five percent of elementary schools and 31 percent of middle/secondary schools offered only one bread/bread alternate. In some cases, this was complemented by a meat/meat alternate offering. In many other cases, however, this one offering was counted as two servings of a bread/bread alternate following program guidelines. This occurred most frequently for muffins and doughnuts. Program guidance defines a serving of bread as 25 gm. Many doughnuts and muffins weigh twice as much as this, and are therefore considered to be equivalent to 2 bread/bread alternate servings.

Meat and meat alternates were offered in only about half of the breakfasts examined. Middle/secondary schools offered meat selections more frequently than elementary schools. When a meat/meat alternate was included in the breakfast meal, there is generally only one item available. A small percentage of middle/secondary schools included a more substantial number of options in this category. The breakfasts offered in these schools actually looked more like lunches, in that full cafeteria service was available and, as Exhibit VIII.10 illustrates, included everything from cheeseburgers to lasagna to pizza.2/

Specific Food Items Offered. Exhibit VIII.10 summarizes data on the specific food items offered in the 176 SBP meals that were observed in SY 1989-90. Estimates for elementary and middle/secondary schools were compared, and significant differences between the two types of schools are identified.

1/Schools can offer 2 meat/meat alternates or 1 bread and 1 meat instead of 2 bread/bread alternates, however, as the exhibit shows, only about half of all schools offered meats or meat alternates.

2/Several kitchen managers indicated that full-service menus were available at breakfast because some students were so fully scheduled during the day that they did not have time to eat lunch.

Exhibit VIII.10

Foods Offered in SBP Meals in Elementary and Middle/Secondary Schools (SY 1989-90)

Meal Component/Food Item	Percent of Meals Offering Each Item: Elementary Schools (n=124)	Middle/Secondary Schools (n=52)
MILK	100%	100%
Whole Milk	66	77
Lowfat Milk	88	98
Skim Milk	28	29
Flavored Milk	57*	75
FRUIT	99	100
FRESH FRUIT	24*	8
Apple	7	2
Banana	6	4
Grapefruit	1	0
Grapes	1	0
Orange	11	2
CANNED FRUIT	35	38
Applesauce	10	17
Apricots	2	2
Fruit Cocktail	10	13
Peaches	7	8
Pears	4	2
Pineapple	4	6
Plums	0	4
Strawberries/Other Berries	2	2
FRUIT JUICE	66*	85
DRIED FRUIT	3	0
VEGETABLES	3	10
POTATOES		
Fried Potatoes	3	2
Other Potatoes	0	2
SOUPS	0	6

-continued-

Exhibit VIII.10
(continued)

Meal Component/Food Item	Percent of Meals Offering Each Item: Elementary Schools (n=124)	Percent of Meals Offering Each Item: Middle/Secondary Schools (n=52)
BREADS/BREAD ALTERNATES[1]	87%	92%
Bagels	6	0
Bisquits/Croissants	8	8
Bread, Toast	48	44
Cereal, Cold	52	56
Cereal, Hot	7	6
Crackers	2	0
Doughnuts	10*	37
Rolls	2	10
Sweet Buns	6*	21
Fruit Muffins/Breads	14	10
Tortillas, Taco Shells	3	0
Rice	2	0
Pancakes, Waffles	5	15
MEAT/MEAT ALTERNATES	46	56
EGGS/MEATS/CHEESE, ETC.	30	31
Eggs	13	17
Bacon, Sausage	17	19
Peanut Butter, Nuts	19	8
Cheese	7	0
Baked, BBQ Chicken	0	2
Chicken Nuggets, Patty	0	2
MEAT AND GRAIN COMBINATIONS	20*	38
Egg and/or Sausage Sandwich	5	15
French Toast	3	6
Grilled Cheese Sandwich	5	10
Peanut Butter & Jelly Sandwich	2	0
Tuna Salad Sandwich	0	2
Pizza	4	4
Hamburger, Cheeseburger	0	8
Hot Dogs, Corn Dogs	0	8
Ham & Cheese Sandwich	0	10
MISCELLANEOUS MEAT ITEMS	0	2
Lasagna,Ravioli, etc.	0	2
Stuffed Cabbage	0	2

[1] Includes breads/bread alternates offered as a separate item, i.e., not included in combination items such as french toast, egg sandwiches, etc.

*Difference between elementary and middle/secondary schools is statistically significant at the .01 level.

Data Source: On-Site Meal Observations.

The types of milk offered most frequently in both elementary and middle/secondary schools were, in descending order, low-fat (unflavored) milk, whole milk and flavored milk. Skim milk was offered in fewer than 30 percent of breakfast meals.

As noted above, approximately three-quarters of all breakfasts offered only one option for the fruit/juice/vegetable requirement. As Exhibit VIII.10, fruit juice is the item most commonly offered in both elementary and middle/secondary schools. Details about the specific types of juice offered were not retained when the data were aggregated. However, a review of the original data set indicates that orange juice is by far the most common type of juice offered. Fruit was offered relatively infrequently in the SBP meals observed in this study. Fresh fruits were particularly uncommon, especially in middle/secondary school breakfasts. Only about one-quarter of the elementary school breakfasts and eight percent of middle/secondary school breakfasts included fresh fruit.1/

In both elementary and middle/secondary schools, cold cereal and toast were the most common bread/bread alternate offerings. In middle/secondary schools, the next most common bread alternates were doughnuts (37 percent of the observed breakfasts) and sweet buns/rolls (21 percent of breakfasts). In contrast, doughnuts and sweet buns/rolls were offered in only 10 percent and six percent of elementary school breakfasts, respectively. (These differences were statistically significant.)

Finally, the types of meat and meat alternates offered in elementary and middle/secondary schools were comparable with eggs, bacon and sausage being the most common. In elementary schools, peanut butter and/or nuts were offered slightly more often than either bacon, sausage or eggs. Combination items like egg and bacon or sausage sandwiches, were more common in middle/secondary schools than elementary schools.

Portion Sizes. The SBP meal pattern specifies a uniform set of minimum portion sizes for students in grades K-12. Program guidance materials, however, encourage schools to be flexible in serving the needs of their students and, whenever possible, to offer more food to older children. Data from this study indicate that, for the most part, breakfasts offered in middle/secondary schools do include larger portions for each meal component category (Exhibit VIII.11). The average serving in middle/secondary schools is significantly larger for milk (some middle/secondary schools offer 16 oz. containers of milk in addition to the traditional 8 oz. container), fruit, breads/bread alternates and meat/meat alternates.

1/The timing of meal observations (in mid-March) may have affected the prevalence with which SFAs were observed to offer fresh fruit.

Exhibit VIII.11

Average Portion Sizes of Foods Offered in SBP Meals in Elementary and Middle/Secondary Schools (SY 1989-90)

Meal Component Category	Average Portion Size (in grams)		
	Elementary (n=124)	Middle/Secondary (n=52)	All Schools (n=176)
Milk	239 gm*	252 gm	243 gm
Fruit	104*	121	109
Breads/Bread Alternates	43*	54	47
Meat/Meat Alternates	32*	56	41
Meat and Bread Combination Entrees	74	96	87

*Difference between elementary and middle/secondary schools is statistically significant at the .01 level.

Data Source: On-Site Meal Observations.

SBP MEALS SELECTED

This section discusses the food and nutrient composition of the average SBP meal as selected by participating students in SY 1989-90. Nutrient content, percent contribution to RDAs and INQ scores are examined, along with comparisons to Dietary Guidelines recommendations. Differences are examined at two levels:

- differences between the average meal offered and the average meal selected, within each school type; and
- differences between elementary schools and middle/secondary schools in the nutritional characteristics of the average SBP meal selected.

The food-level analyses reported in this section describe the food selection patterns of students in elementary and middle/secondary schools, including the number of items selected, the SBP meal components included, and the most common combinations of meal components. Detailed data on the percentage of students selecting various types of food offered in SBP meals is also presented. Finally, the availability of a la carte items in the sampled elementary and middle/secondary schools is described.1/

Nutrient Content

As Exhibit VIII.12 illustrates, differences between the average breakfast offered and the average breakfast selected are generally quite small, and none reached statistical significance. This finding suggests that, overall, students are selecting meals that include all or most of the components contained in the pattern SBP meal.2/

Comparison of the nutrient content of the average breakfast selected in elementary schools with the average breakfast selected in middle/secondary schools revealed only one significant difference. The average breakfast selected in middle/secondary schools contains more calories than the average breakfast selected in elementary schools. This difference is at least partially due to the larger portion sizes offered in

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1/The calculated nutrient content of average SBP meals as selected does not include calories or nutrients from a la carte foods. Data reflect nutritional characteristics of reimbursable SBP foods only.

2/The few instances where the nutrient content of the average meal selected is slightly greater than the average meal offered can be attributed to student selection patterns or the fact that some students took more than one serving of a given item, e.g., multiple strips of bacon or sausage, extra toast, etc.

Exhibit VIII.12

Mean Calorie and Nutrient Content of the Average SBP Meal Offered and Selected in Elementary and Middle/Secondary Schools (SY 1989-90)

	Elementary Schools (n=40)			Middle/Secondary Schools (n=20)		
	Offered	Selected	Difference (%) (Sel vs. Off)	Offered	Selected	Difference (%) (Sel vs. Off)
Calories	469	445*	-5.1%	522	519	-0.6%
Protein (gm)	16	15	-6.2	17	17	0.0
Total Fat (gm)	16	15	-6.2	17	18	+5.9
Saturated Fat (gm)	7	7	0.0	8	8	0.0
Cholesterol (mg)	56	50	-10.7	58	66	+13.8
Total Carbohydrate (gm)	66	66	0.0	77	74	-3.9
Vitamin A (mcg R.E.)	353	319	-9.6	344	293	-14.8
Vitamin C (mg)	30	30	0.0	35	36	-2.9
Thiamin (mg)	.48	.44	-8.3	.53	.47	-11.3
Riboflavin (mg)	.77	.72	-6.5	.81	.74	-8.6
Niacin (mg N.E.)	4.76	4.12	-13.4	4.77	3.86	-19.1
Vitamin B_6 (mg)	.47	.42	-10.6	.47	.38	-19.1
Calcium (mg)	380	365	-4.0	406	388	-4.4
Phosphorus (mg)	388	365	-5.9	425	415	-3.5
Magnesium (mg)	70	64	-8.6	72	65	-9.7
Iron (mg)	4.23	3.84	-9.2	5.11	4.05	-20.7
Sodium (mg)	621	579	-6.8	645	645	0.0

*Difference between elementary and middle/secondary schools is statistically significant at the .01 level.

NOTE: None of the differences between the nutrient content of the average meal offered and the average meal selected, within school type, is statistically significant.

Date Source: On-Site Meal Observations.

middle/secondary schools, but may also be related to differences in the types of food selected by middle/secondary students.

Percent Contribution to RDAs

Evaluating the percent RDA contribution of the average SBP meal as selected by students is not a straightforward exercise. As explained in Chapter VII, the nutrient content of the average meal selected represents the nutrient content of the meal selected by the average student in each school.1/ Therefore, it is inappropriate to compare the mean nutrient content of the average breakfast selected to the various RDA standards and draw conclusions about nutrient shortfalls for particular groups of children.

It is more appropriate to utilize the age-appropriate RDA standards to define a target range of nutrient content for each school type. The target range for each nutrient is defined by the lowest and highest RDA values for each school, based on a goal for breakfast of 25 percent of the RDA. If the average meal selected provides a level of calories or nutrients between these two extremes then we can conclude it is within the target range.2/ If it falls outside the lower limit of the target range, then a significant nutritional deficiency is evident; conversely, a value that exceeds the high end of the target range indicates that the average meal selected is likely to provide more than the goal RDA level for most students.

Exhibit VIII.13 presents comparisons of the nutrient content of the average SBP meal as selected in elementary schools with each of the appropriate RDA standards. The exhibit shows that the average breakfast selected in elementary schools met or exceeded the target range for all nutrients except calories. Students aged 4-6 selecting the average elementary school breakfast would receive 25 percent of the RDA for calories. All other elementary school age groups, however, would not. The proportion of calories provided ranged from 18 percent of the RDA for 11-14 year old males to 22 percent of the RDA for 7-10 year olds. The available data do not indicate, however, how the meals selected by these students may have differed from the average. Given USDA's policy of encouraging schools to serve larger portions or additional foods to older students, it is possible that these students did in fact select meals that provided more calories than the average SBP meal, and thereby satisfied their increased caloric needs. It is also important to bear in mind the previously-mentioned caveat about whether it is necessary for an SBP meal to supply 25 percent of daily calorie needs.

1/The reader is referred to Chapter VII for a more thorough discussion of this issue and its analytic implications.

2/A value within the target range does not prove that every student in the sample selected a meal that contained 25 percent of the appropriate RDA.

Exhibit VIII.13

Percentage of Recommended Dietary Allowances Provided in the Average SBP Meal Selected in Elementary Schools (SY 1989-90)

	Nutrients in Meal as Selected	Students 4-6 years		Students 7-10 years		Male Students 11-14 years		Female Students 11-14 years	
		One-Fourth Daily RDA	Percent Daily RDA	One-Fourth Daily RDA	Percent Daily RDA	One-Fourth Daily RDA	Percent Daily RDA	One-Fourth Daily RDA	Percent Daily RDA
Calories	445	450	25%	500	22%	625	18%	550	20%
Protein (gm)	15	6	62	7	53	11	33	12	33
Vitamin A (mcg R.E.)	319	125	64	175	46	250	32	200	40
Vitamin C (mg)	30	11	66	11	66	12	60	12	60
Thiamin (mg)	.44	.22	49	.25	44	.32	34	.28	40
Riboflavin (mg)	.72	.28	65	.30	60	.38	48	.32	55
Niacin (mg N.E.)	4.12	3.00	34	3.25	32	4.25	24	3.75	27
Vitamin B_6 (mg)	.42	.28	38	.35	30	.42	25	.35	30
Calcium (mg)	365	200	46	200	46	300	30	300	30
Phosphorus (mg)	365	200	46	200	46	300	30	300	30
Magnesium (mg)	64	30	54	42	38	68	24	70	23
Iron (mg)	3.84	2.50	38	2.50	38	3.00	32	3.75	26

NOTE: Target goal used in these analyses is one-fourth of the RDA for all age groups. Percentages in this table are based on the nutrient content of the meal selected by the average student in each school. No age- or sex-specific data were collected.

Data Source: On-Site Meal Observations.

The average SBP meal selected in middle/secondary schools exceeded the target range for all nutrients except niacin, vitamin B_6, calories and magnesium (Exhibit VIII.14). The amount of niacin and vitamin B_6 supplied in the average SBP meal was within the target range, but fell very near the lowest end. Female middle/secondary school students consuming the average SBP meal would receive approximately 25 percent of their needs for niacin and vitamin B_6; male students consuming the same meal, however, would not. The amount of calories and magnesium supplied in the average middle/secondary school breakfast fell below the target range, indicating that the average SBP meal as selected is unlikely to meet 25 percent of middle/secondary students' daily needs for calories and magnesium.

Indices of Nutritional Quality (INQs)

INQ scores for the average SBP meal selected in elementary and middle/secondary schools are presented in Exhibits VIII.15 and VIII.16, respectively. Because these measures are based on RDA standards the caveats about data interpretation outlined above (and in detail in Chapter VII) still apply. That is, these data represent the nutrient density of meals selected by average students. Because sufficient data on students' age and sex were not available, we can not say with certainty that any particular age/sex group would, in fact, select meals comparable to the average meals considered in this analysis.

The INQ scores in Exhibits VIII.15 and VIII.16 indicate that the average SBP meals selected by both groups of students were well-balanced in terms of total calories and relative nutrient density. Values for the average meals selected differed only slightly from the average meals offered (see Exhibits VIII.5 and VIII.6). INQ scores for magnesium fell slightly below the optimal score of 1.0 for some middle/secondary school students.

Comparison to Dietary Guidelines for Americans

In SY 1989-90, the average SBP meal selected in both elementary and middle/secondary schools, like the average meal offered, complied with the Dietary Guidelines recommendations for calories from total fat (Exhibit VIII.17). Likewise, the average meal selected in both types of school exceeded Dietary Guidelines recommendations for saturated fat. Sodium and cholesterol content compared favorably with NRC Diet and Health recommendations. Exhibit VIII.18 presents frequency distributions for these variables for the average SBP meal selected in both elementary and middle/secondary schools.

Food-Level Analysis

This section examines several issues related to the types of foods included in SBP meals as selected by students:

- In the presence of the offer-vs-serve (OVS) option, how many of the four components included in the SBP meal pattern do students select? Which items are refused (not selected) most often?

Exhibit VIII.14

Percentage of Recommended Dietary Allowances Provided in the Average SBP Meal Selected in Middle/Secondary Schools (SY 1989-90)

	Nutrients in Meal As Selected	Male Students 11-14 years		Female Students 15-18 years		Male Students 15-18 years		Female Students 15-18 years	
		One-Fourth Daily RDA	Percent Daily RDA	One-Fourth Daily RDA	Percent Daily RDA	One-Fourth Daily RDA	Percent Daily RDA	One-Fourth Daily RDA	Percent Daily RDA
Calories	519	625	21%	550	24%	750	17%	550	24%
Protein (gm)	17	11	38	12	37	15	29	11	38
Vitamin A (mcg R.E.)	293	250	29	200	37	250	29	200	37
Vitamin C (mg)	36	12	71	12	71	15	60	15	60
Thiamin (mg)	.47	.32	36	.28	43	.38	31	.28	43
Riboflavin (mg)	.74	.38	49	.32	57	.45	41	.32	57
Niacin (mg N.E.)	3.86	4.25	23	3.75	26	5.00	19	3.75	26
Vitamin B_6 (mg)	.38	.42	22	.35	27	.50	19	.38	25
Calcium (mg)	388	300	32	300	32	300	32	300	32
Phosphorus (mg)	410	300	34	300	34	300	34	300	34
Magnesium (mg)	65	68	24	70	23	100	16	75	22
Iron (mg)	4.05	3.00	34	3.75	27	3.00	34	3.75	27

NOTE: Target goal used in these analyses is one-fourth of the RDA for all age groups. Percentages in this table are based on the nutrient content of the meal selected by the average student in each school. No age- or sex-specific data were collected.

Data Source: On-Site Meal Observations.

Exhibit VIII.15

Indices of Nutritional Quality (INQs) for
the Average SBP Meal Selected in Elementary Schools
(SY 1989-90)

	INQs for Students 4-6 Years	INQs for Students 7-10 Years	INQs for Male Students 11-14 Years	INQs for Female Students 11-14 Years
Protein (gm)	2.48	2.41	1.83	1.65
Vitamin A (mcg R.E.)	2.56	2.09	1.78	2.00
Vitamin C (mg)	2.64	3.00	3.33	3.00
Thiamin (mg)	1.96	2.00	1.89	2.00
Riboflavin (mg)	2.60	2.73	2.67	2.75
Niacin (mg N.E.)	1.36	1.45	1.33	1.35
Vitamin B_6 (mg)	1.52	1.36	1.39	1.50
Calcium (mg)	1.84	2.09	1.67	1.50
Phosphorus (mg)	1.84	2.09	1.67	1.50
Magnesium (mg)	2.16	1.73	1.33	1.15
Iron (mg)	1.52	1.73	1.78	1.30

NOTE: An INQ of 1.0 or more indicates that the meal is of high nutritional quality. INQs below 1.0 indicate that the meal will not provide 100% of the target level RDA (one-third) unless the target RDA for calories is exceeded.

Data Source: On-Site Meal Observations.

Exhibit VIII.16

Indices of Nutritional Quality (INQs) for
the Average SBP Meal Selected in Middle/Secondary Schools
(SY 1989-90)

	INQs for Male Students 11-14 Years	INQs for Female Students 11-14 Years	INQs for Male Students 15-18 Years	INQs for Female Students 15-18 Years
Protein (gm)	1.81	1.54	1.71	1.58
Vitamin A (mcg R.E.)	1.38	1.54	1.71	1.54
Vitamin C (mg)	3.38	2.96	3.53	2.50
Thiamin (mg)	1.71	1.79	1.82	1.79
Riboflavin (mg)	2.33	2.38	2.41	2.38
Niacin (mg N.E.)	1.10	1.08	1.12	1.08
Vitamin B_6 (mg)	1.05	1.13	1.12	1.04
Calcium (mg)	1.52	1.33	1.88	1.33
Phosphorus (mg)	1.62	1.42	2.00	1.42
Magnesium (mg)	1.14	0.96	0.94	0.92
Iron (mg)	1.62	1.13	2.00	1.12

NOTE: An INQ of 1.0 or more indicates that the meal is of high nutritional quality. INQs below 1.0 indicate that the meal will not provide 100% of the target level RDA (one-third) unless the target RDA for calories is exceeded.

Data Source: On-Site Meal Observations.

Exhibit VIII.17

Macronutrient, Cholesterol and Sodium Content of the Average SBP Meal Offered and Selected in Elementary and Middle/Secondary Schools Compared to the Dietary Guidelines for Americans (SY 1989-90)

	USDA/DHHS Dietary Guidelines for Americans	Elementary Schools (n=40)			Middle/Secondary Schools (n=20)		
		Offered	Selected	Difference (%) (Sel vs. Off)	Offered	Selected	Difference (%) (Sel vs. Off)
Percent of Calories from Fat	≤30.0	31.4	29.4	-2.0%	29.5	30.9	+1.4
Percent of Calories from Saturated Fat	<10.0	14.0	13.5	-0.5	13.1	13.8	+0.7
Percent Calories from Carbohydrate	55.0-65.0[1]	56.5	58.9	+2.4	58.6	57.4	-1.2
Percent Calories from Protein	5.0-15.0[1]	14.0	13.5	-0.5	13.4	13.1	-0.3
Mean Cholesterol (mg)	n.q.[2]	56	50	-10.7	58	66	+13.8
Mean Sodium (mg)	n.q.[2]	621	579	-6.8	645	645	0.0

[1]The USDA/DHHS Dietary Guidelines do not provide specific recommendations for the proportion of calories from carbohydrates and protein. RDAs for protein for school age children range from 5 to 8 percent of total calories. In general, the average protein intake considerably exceeds the RDA. The National Research Council (NRC) report Diet and Health recommends maintaining total protein levels lower than twice the RDA for all age groups and that the intake of carbohydrates be more than 55% of total calories. To achieve the recommended levels of calories from fat, carbohydrate and protein content would need to be in these ranges.

[2]Not quantified. There is no established Recommended Dietary Allowance or Estimated Safe and Adequate Intake for cholesterol or sodium. The Dietary Guidelines for Americans recommend choosing a diet low in cholesterol and use of salt and sodium only in moderation. The National Research Council (NRC) report Diet and Health recommends that adults and children limit salt intake to 6 grams per day, equal to 2400 mg of sodium, and dietary cholesterol intake to less than 300 mg per day.

NOTE: None of the differences between elementary and middle/secondary schools or between the nutrient content of breakfasts offered and selected, within school type, is statistically significant.

Data Source: On-Site Meal Observations.

Exhibit VIII.18

Frequency Distribution of the Level of Fat, Cholesterol and Sodium Provided in the Average SBP Meal Selected in Elementary and Middle/Secondary Schools (SY 1989-90)

	Percent of Schools		
	Elementary (n=31)	Middle/ Secondary (n=13)	All Schools (n=44)
Percent Calories from Fat			
≤ 30 percent (D.G. Goal)[1]	55%	54%	55%
31-35 percent	32	23	30
36-38 percent	10	15	11
39-40 percent	0	0	0
> 40 percent	3	8	5
Percent Calories from Saturated Fat			
< 10 percent (D.G. Goal)[1]	10	8	9
11-13 percent	39	38	39
14-16 percent	39	46	41
> 16 percent	13	8	11
Cholesterol (mg)[2]			
≤ 75 mg	90	77	86
76-100 mg	6	8	7
> 100 mg	4	15	7
Sodium (mg)[2]			
≤ 600 mg	58	54	57
601-800 mg	35	23	32
801-1000 mg	6	15	9
> 1000 mg	0	8	2

[1]Level of intake recommended in the USDA/DHHS Dietary Guidelines for Americans.

[2]The Dietary Guidelines for Americans recommend choosing a diet low in cholesterol and use of salt and sodium only in moderation. The National Research Council (NRC) report Diet and Health recommends that adults and children limit salt intake to 6 grams per day (equal to 2,400 mg. of sodium) and dietary cholesterol intake to less than 300 mg. per day.

Note: None of the differences between elementary and middle/secondary schools are statistically significant.

Data Source: On-Site Meal Observations.

- Of the specific foods available in each meal component category, which do students select most often?

- How many schools offer a la carte items in the same serving line as SBP meals? What food items are typically available on an a la carte basis?

- What proportion of children select one or more a la carte items, in addition to their SBP meal, when a la carte is available?

Food Selection Patterns Under OVS. To address FNS' interest in food selection patterns under the OVS option, two separate analyses were carried out on meals selected in the subsample of schools that had the OVS option available. (This subsample actually represents a substantial portion of the full sample, since all of the middle/secondary schools, and 22 of the 31 elementary schools had implemented the OVS option in SY 1989-90.1/) First, meals selected by each of the students observed in these schools were examined to determine the number of meal components included; results are presented in Exhibit VIII.19. The data indicate that approximately two-thirds of students in school with the OVS option selected a breakfast that included all four of the SBP meal pattern components.

To determine which of the four meal components students omitted when they did select a breakfast containing fewer than four components, each individual student-level observation was inspected for presence or absence of the four SBP meal components. This cross-check revealed that the component most frequently omitted is the second bread/bread alternate or meat/meat alternate serving, particularly at the elementary school level (Exhibit VIII.20). Few students omitted milk or the fruit/juice component, but middle/secondary students were more likely to do so than elementary school students.

1/Because of the problem with discrepancies between SFA reports about OVS implementation and actual behavior in the individual schools (see Chapter VII and Appendix B), all data books were examined to confirm the presence or absence of OVS-like behavior (i.e., evidence that some students refused one of the four available components). In all cases, the patterns in the data matched the SFA managers' reports.

Exhibit VIII.19

Number of SBP Meal Components Included in Breakfasts
Selected in Elementary and Middle/Secondary Schools with the OVS Option
(SY 1989-90)

Number of Components[1]*	Percent of Breakfasts Selected		
	Elementary Schools[2] (n=4,603)	Middle/ Secondary Schools (n=2,011)	All Schools 6,614)
3 components	34%	33%	34%
4 or more components	66	67	66

[1]Refers to specific foods, sometimes part of a combination item, considered to contribute to the SBP meal pattern, rather than descrete food items. For example, a breakfast sandwich of egg and English muffin is considered to satisfy two of the four meal component requirements (meat/meat alternate and bread.) Since program regulations permit SFAs to define a serving for the bread/bread alternate component by weight, discrete bread/bread alternates that were heavy enough to count as two servings (50 grams or more) have been counted as representing two components.

[2]Includes only observations in subsample of elementary schools that had the OVS option available. (All middle/secondary schools had OVS.)

Exhibit VIII.20

Proportion of Breakfasts Selected in
Elementary and Middle/Secondary Schools with the OVS Option
that Included Various SBP Meal Components
(SY 1989-90)

Meal Component Category	Percent of Breakfast Selected		
	Elementary Schools[1] (n=4,603)	Middle/ Secondary Schools (n=2,011)	All Schools (n=6,614)
Milk*	95%	90%	93%
Fruit/Juice*	91	79	87
Bread/Bread Alternate*			
- 1 serving only	35	34	35
- 2 servings[2]	62	64	63
Meat/Meat Alternate*	29	42	33

[1] Includes only observations in subsample of elementary schools that had the OVS option available.

[2] Includes cases where two separate food items are selected as well as individual foods that were large (heavy) enough to count as two servings.

*Chi-square test of difference between elementary and middle/secondary schools is statistically significant at the .01 level.

Data Source: On-Site Meal Observations.

Specific Foods Included in SBP Meals Selected by Students. Exhibit VIII.21 presents data on the average percentage of student meals that included particular food items when they were offered.1/ Patterns for elementary and middle/secondary students were examined and the significance of observed differences were evaluated.

As the exhibit demonstrates, the foods included in breakfasts in both types of schools were fairly comparable. Elementary school students were more likely to include milk and a fruit/juice selection, as mentioned above, than middle/secondary school students.

Flavored milk was selected most often by students in both elementary and middle/secondary schools, followed by low-fat (unflavored) milk and whole milk. Skim milk was selected infrequently, particularly in middle/secondary schools. Fruit juice (almost always orange juice) was most often selected to satisfy the fruit/juice/vegetable component, largely because alternatives were rarely available.

For the bread/bread alternate requirement, elementary school students selected toast and cold cereal most frequently. Bagels, biscuits and croissants, doughnuts, and pancakes and waffles were also selected frequently when available, however these items were offered in 10 percent or less of the breakfasts observed. Middle/secondary school students selected cold cereal, doughnuts and toast most often.

To obtain a more complete picture of the characteristics of SBP meals selected by participating students, a variable was created that reflected the specific types of food included in each student meal, using the major food taxonomy groupings. The results of this analysis are presented in Exhibit VIII.22. While 15 different meal component combinations were encountered, five combinations accounted for all but ten percent of all breakfasts. The most common breakfast in both school types, representing over half of all SBP meals, consisted of milk, fruit or juice, and a bread/bread alternate. Considering the most common foods offered and selected, as discussed above, an

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1/This analysis included all observations of student meals, i.e., meals in both OVS and non-OVS schools. Evaluation of the data revealed that inclusion of non-OVS schools did not substantially alter the data (e.g., reported percentages), and did not affect the statistical significance of any findings. Thus, the term "selected" is used here in the broadest sense to reflect the foods that were actually on a student's tray. Students may or may not have had a true option to "select" or reject the food because 1) the OVS option may not have been available, or 2) there may have been no alternative choice, e.g., only one choice was offered for a given meal component.

Exhibit VIII.21

Foods Included in SBP Meals Selected by Students
in Elementary and Middle/Secondary Schools
(SY 1989-90)

Meal Component/Food Item	Elementary Schools		Middle/Secondary Schools	
	Percent of Meals Offering (n=124)	Percent of Meals Including[1]	Percent of Meals Offering (n=52)	Percent of Meals Including[1]
MILK	100%	96%*	100%	92%
Whole Milk	66	30	77	25
Lowfat Milk	88	47	98	34
Skim Milk	28	15	29	6
Flavored Milk	57*	53	75	50
FRUIT	99	92*	100	82
FRESH FRUIT	24	62	8	40
Apple	7	66	2	7
Banana	6	61	4	43
Grapefruit	1	100++	0	NA
Grapes	1	12	0	NA
Orange	11	47	2	67
CANNED FRUIT	35	55	38	38
Applesauce	10	58	17	31
Apricots	2	28	2	17
Fruit Cocktail	10	47	13	11
Peaches	7	63	8	54
Pears	4	39	2	10
Pineapple	4	32	6	50
Plums	0	NA	4	7
Strawberries/Other Berries	2	15	2	8
FRUIT JUICE	66*	87	85	81
DRIED FRUIT	3	57	0	NA
VEGETABLES	3	76*	10	17
POTATOES	3	76	2	30
Fried Potatoes	3	76	2	53
Other Potatoes	0	NA	2	8
SOUPS	0	NA	6	83

-continued-

Exhibit VIII.21

(continued)

Meal Component/Food Item	Elementary Schools: Percent of Meals Offering	Elementary Schools: Percent of Meals Including[1]	Middle/Secondary Schools: Percent of Meals Offering	Middle/Secondary Schools: Percent of Meals Including[1]
BREADS/BREAD ALTERNATES[2]	87%	95%*	92%	83%
Bagels	6	91	0	NA
Bisquits/Croissants	8	80	8	93
Bread, Toast	48	75	44	54
Cereal, Cold	52	67*	56	48
Cereal, Hot	7	62	6	70
Crackers	2	51	0	NA
Doughnuts	10*	73	37	70
Rolls	2	36	0	27
Sweet Buns	6*	70	21	36
Fruit Muffins/Breads	14	66*	10	11
Tortillas, Taco Shells	3	19	0	NA
Rice	2	26	0	NA
Pancakes, Waffles	5	89*	15	34
MEAT/MEAT ALTERNATES	46	65	56	65
EGGS/MEATS/CHEESE, ETC.	30	57	31	46
Eggs	13	42	17	35
Bacon, Sausage	17	47*	19	87
Peanut Butter, Nuts	19	21	8	17
Cheese	7	50	0	NA
Baked, BBQ Chicken	0	NA	2	15
Chicken Nuggets, Patty	0	NA	2	7
MEAT AND GRAIN COMBINATIONS	20*	75	38	62
Egg and/or Sausage Sandwich	5	57	15	74
French Toast	3	92	6	37
Grilled Cheese Sandwich	5	87	10	21
Peanut Butter & Jelly Sandwich	2	23	0	NA
Tuna Salad Sandwich	0	NA	2	2
Pizza	4	82	4	85
Hamburger, Cheeseburger	0	NA	8	5
Hot Dogs, Corn Dogs	0	NA	8	1
Ham & Cheese Sandwich	0	NA	10	36
MISCELLANEOUS MEAT ITEMS	0	NA	2	2
Lasagna, Ravioli, etc.	0	NA	2	2
Stuffed Cabbage	0	NA	2	2

[1]Percentages reflect the proportion of student meals that included each item (or category) when the food was available. Sample size not reported because it varies for every item in the table.

[2]Includes breads/bread alternates offered as a separate item, i.e., not in combination items such as french toast, egg sandwiches, etc.

*Difference between elementary and middle/secondary schools is statistically signficant at the .01 level.

++Percentage of elementary school student meals is based on only one meal, when the OVS option was not available.

NA: Selection data not available because none of the schools offered this item.

Data Source: On-Site Meal Observations.

Exhibit VIII.22

Most Common Meal Component Combinations in SBP Meals Selected in Elementary and Middle/Secondary Schools[1] (SY 1989-90)

Meal Component Combinations*	Percent of Students Selecting		
	Elementary Schools (n=6,528)	Middle/ Secondary Schools (n=2,011)	All Schools (n=8,539)
Milk, Fruit/Juice, Bread/Bread Alternate	55%	43%	52%
Milk, Fruit/Juice, Meat and Bread Combination Item[1]	14	15	15
Milk, Fruit/Juice, Bread/Bread Alternate, Meat/Meat Alternate	15	8	13
Milk, Bread/Bread Alternate	6	9	7
Milk, Meat and Bread Combination Item[1]	1	10	3
Other Combinations	9	15	10

[1]Examples: Egg and/or sausage sandwich.

*Chi-square analysis of the difference between elementary and middle/secondary schools was statistically significant at the .01 level.

Data Source: On-Site Meal Observations.

example of the actual meal represented by this combination would be: for elementary schools, flavored milk, orange juice, toast and/or cold cereal. In middle/secondary schools, the meal would be similar--flavored milk and orange juice, with either cold cereal and/or toast, a doughnut or sweet bun/roll.

Availability of A La Carte Items. The final research issue addressed in this section is the availability of a la carte items. During on-site observations, field staff collected information on the types of a la carte items that were available in the same serving line as the reimbursable meals that were being observed. These data provide some insight into the prevalence of a la carte items in SBP schools. The reader should bear in mind, however, that the data undoubtedly underestimate the full prevalence of a la carte items in schools, since a la carte items were frequently available elsewhere in the cafeteria.

As Exhibit VIII.23 demonstrates, a la carte items were generally not offered at breakfast in the schools in this sample. None of the elementary schools offered a la carte breakfast items, and only about a third of the middle/secondary schools did so.

During meal observations, observors indicated whether the student selected for observation had taken any a la carte items.1/ Only 9 percent of the students that had a la carte items available (all in middle/secondary schools) included an a la carte selection in the meal that was observed.

SBP MEALS CONSUMED

This portion of the analysis discusses the food and nutrient composition of the average SBP meal as actually consumed by participating students. Nutrient content and percentage contribution to RDAs are examined, along with INQ scores and the levels of fat cholesterol and sodium. Nutritional differences are again examined at two levels:

- differences between the average meal selected and the average meal consumed within school type; and
- differences between elementary and middle/secondary schools in the nutritional characteristics of the average meal consumed.

The food-level analysis included in this section deals with the issue of food consumption in the SBP, i.e., what proportion of the foods selected are actually consumed, and which specific types of food generate the greatest amount of waste?

1/The type of a la carte item was not recorded.

Exhibit VIII.23

Availability of A la Carte Items at Breakfast in Elementary and Middle/Secondary Schools (SY 1989-90)

	Percent of Schools	
	Elementary Schools (n=31)	Middle/Secondary Schools (n=13)
Any A la carte available?		
No	100%	62%
Yes	0	38
Categories of A la carte items available [1]		
1 category	0	40
3 categories	0	20
4 categories	0	20
6 categories	0	20
Categories of A la carte items available[1]		
Beverages	0	40
Fruits and Vegetables	0	40
Entrees	0	40
Desserts	0	80
Chips, Pretzels, Snacks	0	40
Other	0	60

[1]Percentages reflect schools that had a la carte items available.

Data Source: On-Site Meal Observations.

Nutrient Content

The mean nutrient content of the average breakfast as offered, selected and consumed in elementary and middle/secondary schools is summarized in Exhibit VIII.24. As the exhibit shows, the nutrient content of the average meal consumed was consistently lower than the nutrient content of the average meal selected in both elementary and middle/secondary schools. This indicates that, in general, students did not consume all of the foods they selected.

The magnitude of the differences between the average meal selected and the average meal consumed was consistently greater for elementary schools. In elementary schools, the average meal consumed contains significantly less calories and lower concentrations of all nutrients except vitamin A, vitamin C, niacin, vitamin B_6 and iron than the average meal selected. On average, elementary school students wasted about 24 percent of the nutrients that were available in the meals they had selected. In middle/secondary schools, on the other hand, the average meal consumed was only about 9 percent lower in nutritional content than the average meal selected, and none of the individual differences were statistically significant. As was seen in the preceding analysis of NSLP meals (Chapter VII), elementary school students waste a larger portion of their meals than do middle/secondary school students.

Percent Contribution to RDAs

The nutrient content of the average breakfast consumed in elementary schools is evaluated in light of the target RDA ranges (defined as 25 percent of the RDA), in Exhibit VIII.25. Despite the nutrient losses associated with student plate waste, the average breakfast as consumed in elementary schools exceeded the target nutrient range for vitamin C, thiamin and riboflavin (i.e., it provided more than 25 percent of the RDA for these nutrients for all age-sex groups). It was within the target range for protein, vitamin A, niacin, vitamin B_6, calcium, phosphorus, magnesium and iron. Results indicate, however, that the students with the greatest nutrient needs, 11-14 year old males and females, would need to consume a meal containing greater amounts of these nutrients than the "average" meal in order to satisfy one-fourth of their daily nutrient needs. The average SBP meal in elementary schools as consumed failed to provide 25 percent of daily caloric needs for even the youngest students (4-6 year olds).

The average breakfast consumed in middle/secondary schools (Exhibit VIII.26) exceeded the target range for protein, vitamin A, vitamin C, thiamin, riboflavin, calcium, phosphorus and iron. It fell below the target range for calories and magnesium and just reached the lowest end of the target range for niacin and vitamin B_6.

When viewed in concert, the results of the three analyses (i.e., SBP meals as offered, selected and consumed) indicate that meals planned in accordance with program guidelines and offered to students were very successful in meeting the goal used in this

Exhibit VIII.24

Mean Calorie and Nutrient Content of the Average SBP Meal Offered, Selected and Consumed in Elementary and Middle/Secondary Schools (SY 1989-90)

	Elementary Schools (n=31)				Middle/Secondary Schools (n=13)			
	Offered	Selected	Consumed	Difference (%) (Con vs. Sel)	Offered	Selected	Consumed	Difference (%) (Con vs. Sel)
Calories	469	445*	342*	-23.1%+	522	519	467	-10.0
Protein (gm)	16	15	11*	-26.7+	17	17	15	-11.8
Total Fat (gm)	16	15	11*	-26.7+	17	18	16	-11.1
Saturated Fat (gm)	7	7	5*	-28.6+	8	8	7	-12.5
Cholesterol (mg)	56	50	38	-24.0+	58	66	59	-10.6
Total Carbohydrate (gm)	66	66	51*	-22.7+	77	74	67	-9.5
Vitamin A (mcg R.E.)	353	319	247	-22.6	344	293	267	-12.3
Vitamin C (mg)	30	30	26	-13.3	35	36	34	-5.5
Thiamin (mg)	.48	.44	.35	-20.4+	.53	.47	.44	-6.4
Riboflavin (mg)	.77	.72	.53	-26.4+	.81	.74	.66	-10.8
Niacin (mg N.E.)	4.76	4.12	3.34	-18.9	4.77	3.86	3.68	-4.7
Vitamin B_6 (mg)	.47	.42	.33	-21.4	.47	.38	.35	-7.9
Calcium (mg)	380	365	256*	-29.9+	406	388	341	-12.1
Phosphorus (mg)	388	365	262*	-28.2+	425	410	365	-11.0
Magnesium (mg)	70	64	47*	-26.6+	72	65	58	-10.8
Iron (mg)	4.23	3.84	2.96	-22.9	5.11	4.05	3.84	-5.2
Sodium (mg)	621	579	454*	-21.6+	645	645	594	-7.9

*Difference between elementary and middle/secondary schools is statistically significant at the .01 level.

+Difference between nutrient content of the average meal consumed and the average meal selected, within school type, is statistically significant at the .01 level.

Data Source: On-site Meal Observations.

Exhibit VIII.25

Percentage of Recommended Dietary Allowances Provided in the Average SBP Meal Consumed in Elementary Schools (SY 1989-90)

	Nutrients In Meal As Consumed	Students 4-6 years		Students 7-10 years		Male Students 11-14 years		Female Students 11-14 years	
		One-Fourth Daily RDA	Percent Daily RDA	One-Fourth Daily RDA	Percent Daily RDA	One-Fourth Daily RDA	Percent Daily RDA	One-Fourth Daily RDA	Percent Daily RDA
Calories	342	450	19%	500	17%	625	14%	550	16%
Protein (gm)	11	6	46	7	39	11	24	12	24
Vitamin A (mcg R.E.)	247	125	49	175	35	250	25	200	31
Vitamin C (mg)	26	11	58	11	58	12	52	12	52
Thiamin (mg)	.35	.22	39	.25	35	.32	27	.28	32
Riboflavin (mg)	.53	.28	48	.30	44	.38	35	.32	41
Niacin (mg N.E.)	3.34	3.00	28	3.25	26	4.25	20	3.75	22
Vitamin B_6 (mg)	.33	.28	30	.35	24	.42	20	.35	24
Calcium (mg)	256	200	32	200	32	300	21	300	21
Phosphorus (mg)	262	200	33	200	33	300	22	300	22
Magnesium (mg)	47	30	39	42	28	68	17	70	17
Iron (mg)	2.96	2.50	30	2.50	30	3.00	25	3.75	20

NOTE: Target goal used in these analyses is one-fourth of the RDA for all age groups. Percentages in this table are based on the nutrient content of the meal consumed by the average student in each school. No age- or sex-specific data were collected.

Data Source: On-Site Meal Observations.

Exhibit VIII.26

Percentage of Recommended Dietary Allowances Provided in the Average SBP Meal Consumed in Middle/Secondary Schools (SY 1989-90)

	Nutrients in Meal Selected	Male Students 11-14 years		Female Students 11-14 years		Male Students 15-18 years		Female Students 15-18 years	
		One-Fourth Daily RDA	Percent Daily RDA	One-Fourth Daily RDA	Percent Daily RDA	One-Fourth Daily RDA	Percent Daily RDA	One-Fourth Daily RDA	Percent Daily RDA
Calories	467	625	19%	550	21%	750	16%	550	21%
Protein (gm)	15	11	34	12	33	15	26	11	35
Vitamin A (mcg R.E.)	267	250	27	200	33	250	27	200	33
Vitamin C (mg)	34	12	68	12	68	15	57	15	57
Thiamin (mg)	.44	.32	33	.28	40	.38	29	.28	40
Riboflavin (mg)	.66	.38	44	.32	51	.45	37	.32	51
Niacin (mg N.E.)	3.68	4.25	22	3.75	25	5.00	18	3.75	25
Vitamin B_6 (mg)	.35	.42	21	.35	25	.50	17	.38	23
Calcium (mg)	341	300	28	300	28	300	28	300	28
Phosphorus (mg)	365	300	30	300	30	300	30	300	30
Magnesium (mg)	58	68	21	70	21	100	14	75	19
Iron (mg)	3.84	3.00	32	3.75	26	3.00	32	3.75	26

NOTE: Target goal used in these analyses is one-fourth of the RDA for all age groups. Percentages in this table are based on the nutrient content of the meal consumed by the average student in each school. No age- or sex-specific data were collected.

Data Source: On-Site Meal Observations.

analysis--25 percent of the RDA. Further, the nutrient content of meals selected by students were, with few exceptions, within the target range for all nutrients. Significant nutrient shortfalls arose only in the meals actually consumed by students, particularly at the elementary school level. Thus, the key to ensuring that students receive approximately one-fourth of their daily nutritional needs from an SBP meal, is to increase the likelihood that students will actually consume the meals they select. It is also important to ensure that the oldest students in each school have the ability to receive larger or additional portions of food.

The average SBP meal in both elementary and middle/secondary schools did not consistently meet 25 percent of students' daily energy needs. As has been mentioned throughout this chapter, however, the need for an average SBP meal to supply this proportion of daily energy needs is open to debate.

Indices of Nutritional Quality (INQs)

SBP meals consumed by students in both elementary and middle/secondary schools were high in nutrient density, as evidenced by the INQ scores shown in Exhibits VIII.27 and VIII.28. This demonstrates that, while the total calorie level of the meals may have been somewhat low, students received concentrated amounts of key nutrients in every calorie they consumed.

Comparison to Dietary Guidelines for Americans

Exhibit VIII.29 summarizes the fat, cholesterol and sodium content of the average SBP meal as offered, selected and consumed. As the exhibit illustrates, student plate waste had little impact on these measures. In general, the conclusions drawn in previous analyses still hold: the average SBP meal, at all levels and in both school types, contained appropriate amounts of total fat, cholesterol and sodium, but exceeded Dietary Guidelines recommendations for saturated fat. As Exhibit VIII.30 indicates, the average breakfast as consumed met the Dietary Guidelines recommendations for saturated fat in only 11 percent of schools.

Food-Level Analysis

To investigate the amount of plate waste in the SBP program, food selection and plate waste data for the sample of students included in plate waste observations were utilized to measure the average percent consumption for each food item included in the food group taxonomy. The following method was used to determine the percent consumption for each food item:

$$\text{percent consumption} = \frac{[\text{food selected (gm)} - \text{plate waste (gm)}] \times 100}{\text{food selected (gm)}}$$

An aggregate consumption measure was also computed using the total weight of all foods included in a meal and the total weight of the foods that were not consumed.

Exhibit VIII.27

Indices of Nutritional Quality (INQs) for
the Average SBP Meal Consumed in Elementary Schools
(SY 1989-90)

	INQs for Students 4-6 Years	INQs for Students 7-10 Years	INQs for Male Students 11-14 Years	INQs for Female Students 11-14 Years
Protein (gm)	2.42	2.29	1.71	1.50
Vitamin A (mcg R.E.)	2.58	2.06	1.79	1.94
Vitamin C (mg)	3.05	3.41	3.71	3.25
Thiamin (mg)	2.05	2.06	1.93	2.00
Riboflavin (mg)	2.53	2.59	2.50	2.56
Niacin (mg N.E.)	1.47	1.53	1.43	1.38
Vitamin B_6 (mg)	1.58	1.41	1.43	1.50
Calcium (mg)	1.68	1.88	1.50	1.31
Phosphorus (mg)	1.74	1.94	1.57	1.38
Magnesium (mg)	2.05	1.65	1.21	1.06
Iron (mg)	1.58	1.76	1.79	1.25

NOTE: An INQ of 1.0 or more indicates that the meal is of high nutritional quality. INQs below 1.0 indicate that the meal will not provide 100% of the target level RDA (one-third) unless the target RDA for calories is exceeded.

Data Source: On-Site Meal Observations.

Exhibit VIII.28

Indices of Nutritional Quality (INQs) for
the Average SBP Meal Consumed in Middle/Secondary Schools
(SY 1989-90)

	INQs for Male Students 11-14 Years	INQs for Female Students 11-14 Years	INQs for Male Students 15-18 Years	INQs for Female Students 15-18 Years
Protein (gm)	1.79	1.57	1.63	1.67
Vitamin A (mcg R.E.)	1.42	1.57	1.69	1.57
Vitamin C (mg)	3.58	3.24	3.56	2.71
Thiamin (mg)	1.74	1.90	1.81	1.90
Riboflavin (mg)	2.32	2.43	2.31	2.43
Niacin (mg N.E.)	1.16	1.19	1.13	1.19
Vitamin B_6 (mg)	1.11	1.19	1.06	1.10
Calcium (mg)	1.47	1.33	1.75	1.33
Phosphorus (mg)	1.58	1.43	1.88	1.43
Magnesium (mg)	1.11	1.00	0.88	0.90
Iron (mg)	1.68	1.24	2.00	1.24

NOTE: An INQ of 1.0 or more indicates that the meal is of high nutritional quality. INQs below 1.0 indicate that the meal will not provide 100% of the target level RDA (one-third) unless the target RDA for calories is exceeded.

Data Source: On-Site Meal Observations.

Exhibit VIII.29

Macronutrient, Cholesterol and Sodium Content of the Average SBP Meal Offered, Selected and Consumed in Elementary and Middle/Secondary Schools Compared to the Dietary Guidelines for Americans (SY 1989-90)

	USDA/DHHS Dietary Guidelines for Americans	Elementary Schools (n=31)				Middle/Secondary Schools (n=13)			
		Offered	Selected	Consumed	Difference (%) (Con vs. Sel)	Offered	Selected	Consumed	Difference (%) (Con vs. Sel)
Percent Calories from Total Fat	≤30.0	31.4	29.4	28.9	-0.5%	29.5	30.9	30.1	-0.8%
Percent Calories from Saturated Fat	<10.0	14.0	13.5	13.0	-0.5	13.1	13.8	13.4	-0.4
Percent Calories from Carbohydrate	55.0-65.0[1]	56.5	58.9	60.1	+0.2	58.6	57.4	58.1	+0.7
Percent Calories from Protein	5.0-15.0[1]	14.0	13.5	12.8	-0.7	13.4	13.1	13.1	0.0
Mean Cholesterol (mg)	n.q.[2]	56	50	38	-24.0	58	66	59	-10.6
Mean Sodium (mg)	n.q.[2]	621	579	455	-21.6	645	645	594	-7.9

[1]The USDA/DHHS Dietary Guidelines do not provide specific recommendations for the proportion of calories from carbohydrates and protein. RDAs for protein for school age children range from 5 to 8 percent of total calories. In general, the average protein intake considerably exceeds the RDA. The National Research Council (NRC) report Diet and Health recommends maintaining total protein levels lower than twice the RDA for all age groups and that the intake of carbohydrates be more than 55% of total calories. To achieve the recommended levels of calories from fat, carbohydrate and protein content would need to be in these ranges.

[2]Not quantified. There is no established Recommended Dietary Allowance or Estimated Safe and Adequate Intake for cholesterol or sodium. The Dietary Guidelines for Americans recommend choosing a diet low in cholesterol and use of salt and sodium only in moderation. The National Research Council (NRC) report Diet and Health recommends that adults and children limit salt intake to 6 grams per day, equal to 2400 mg of sodium, and dietary cholesterol intake to less than 300 mg per day.

Note: None of the differences between school types or between meals selected and consumed, within school type, is statistically significant.

Data Source: On-Site Meal Observations.

Exhibit VIII.30

Frequency Distribution of the Level of Fat, Cholesterol and Sodium Provided in the Average SBP Meal Consumed in Elementary and Middle/Secondary Schools (SY 1989-90)

	Percent of Schools		
	Elementary (n=31)	Middle/ Secondary (n=13)	All Schools (n=44)
Percent Calories from Fat			
≤ 30 percent (D.G. Goal)[1]	55%	62%	57%
31-35 percent	35	23	32
36-38 percent	6	8	7
39-40 percent	0	0	0
< 40 percent	3	8	5
Percent Calories from Saturated Fat			
< 10 percent (D.G. Goal)[1]	10	15	11
11-13 percent	42	46	43
14-16 percent	42	23	36
>16 percent	6	15	9
Cholesterol (mg)[2]			
≤ 75 mg	96	77	91
76-100 mg	3	15	7
> 100 mg	0	8	2
Sodium (mg)[2]			
≤ 600 mg	90	69	84
601-800 mg	6	15	9
801-1000	4	8	5
> 1000 mg	0	8	2

[1]Level of intake recommended in the USDA/DHHS Dietary Guidelines for Americans.

[2]The Dietary Guidelines for Americans recommend choosing a diet low in cholesterol and use of salt and sodium only in moderation. The National Research Council (NRC) report Diet and Health recommends that adults and children limit salt intake to 6 grams per day (equal to 2400 mg. of sodium) and cholesterol intake to less than 300 mg. per day.

Note: None of the differences between elementary and middle/secondary schools is statistically significant.

Data Source: On-Site Meal Observations.

Measures for individual food items were averaged by food group across all observations to compute an overall average for each food group in each type of school. These data are presented in Exhibit VIII.31. The percent consumption column in this exhibit can be interpreted as the converse of plate waste, i.e., it represents the proportion of available food that, on average, was consumed by children in each school.

Overall, elementary school students consumed about two-thirds of the foods they selected, and middle/secondary school students consumed over 80 percent the foods they selected. The food group with the highest level of consumption (i.e., least amount of plate waste) was meat/meat alternates; elementary school children consumed an average of 84 percent of these foods and middle/secondary school children consumed an average of 92 percent. The next best-consumed food group was bread/bread alternates (77 percent consumed by elementary school children and 85 percent consumed by middle/secondary school children). Results for milk and fruit/juice selections differ for the two types of students. Elementary school students on average tended to consume more of the fruit or juice they selected than the milk. Middle/secondary school students, on the other hand, consumed more of the milk and less of the fruit/juice.

As the preceding nutritional analyses suggested, elementary students wasted significantly more of the food they selected than did middle/secondary students. This result is in keeping with research on plate waste in the National School Lunch Program.1/,2/ Data from this study indicate that elementary school students consumed less of their meal, overall, and specifically consumed less milk (except for flavored milk) and fruit juice than middle/secondary school students.

Exemplary SFAs vs. Typical SFAs

As in the preceding analysis of NSLP meals (Chapter VII), a comparison of SBP meals offered, selected and consumed in exemplary and typical SFAs revealed no significant differences. As Exhibits ET-VIII.1 through ET-VIII.6 demonstrate, this included comparisons of the means of exemplary and typical SFAs for all nutrients, stratified by school type, for SBP meals as offered,

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1/Jansen, G.R. and Harper, J.M., "Consumption and Plate Waste of Menu Items in the National School Lunch Program," Journal of the American Dietetic Association 73: 395, 1978; and Lilly, H.D., et al., "Findings of the report on food consumption and nutritional evaluation in the National School Lunch Program," School Food Service Research Review 4: 7, 1980.

2/No plate waste studies specific to the SBP Program could be located in the literature.

Exhibit VIII.31

Average Consumption of Food Portions Selected By or Served to Students in SBP Meals in Elementary and Middle/Secondary Schools (SY 1989-90)

Meal Component/Food Item	Elementary Schools		Middle/Secondary Schools	
	Percent of Meals Offering (n=124)	Average Percent Consumed[1]	Percent of Meals Offering (n=52)	Average Percent Consumed[1]
ALL ITEMS	--	69%*	--	81%
MILK	100%	66	100%	82
Whole Milk	66	58*	77	81
Lowfat Milk	88	64*	98	81
Skim Milk	28	61	29	81
Flavored Milk	57*	74*	77	84
FRUIT	99	79	100	91
FRESH FRUIT	24*	70	8	87
Apple	7	63	2	100
Banana	6	70	4	75
Grapefruit	1	36	0	NA
Grapes	1	100	0	NA
Orange	11	81	2	100
CANNED FRUIT	35	71	38	81
Applesauce	10	76	17	86
Apricots	2	63	2	50
Fruit Cocktail	10	70	13	91
Peaches	7	69	8	72
Pears	4	48	2	100
Pineapple	4	88	6	88
Plums	0	NA	4	50
Strawberries/Other Berries	2	100	2	++
FRUIT JUICE	66*	84*	85	93
DRIED FRUIT	3	90	0	NA
VEGETABLES	3	76	10	92
POTATOES	3	76	2	95
Fried Potatoes	3	76	2	100
Other Potatoes	0	NA	2	63
SOUPS	0	NA	6	83

-continued-

Exhibit VIII.31

(continued)

Meal Component/Food Item	Elementary Schools: Percent of Meals Offering (n=124)	Elementary Schools: Average Percent Consumed[1]	Middle/Secondary Schools: Percent of Meals Offering (n=52)	Middle/Secondary Schools: Average Percent Consumed[1]
BREADS/BREAD ALTERNATES[2]	87%	80%	92%	89%
Bagels	6	66	0	NA
Bisquits/Croissants	8	77	8	84
Bread, Toast	48	77*	44	88
Cereal, Cold	52	86	56	91
Cereal, Hot	7	71	6	59
Crackers	2	81	0	NA
Doughnuts	10*	91	37	98
Rolls	2	53	0	67
Sweet Buns	6*	81	21	81
Fruit Muffins/Breads	14	72	10	100
Tortillas, Taco Shells	3	95	0	NA
Rice	2	68	0	NA
Pancakes, Waffles	5	88	15	96
MEAT/MEAT ALTERNATES	46	74	56	95
EGGS/MEATS/CHEESE/ETC.	30	86	31	89
Eggs	13	75	17	81
Bacon, Sausage	17	90	19	95
Peanut Butter, Nuts	19		8	
Cheese	7		0	NA
Baked, BBQ Chicken	0	NA	2	83
Chicken Nuggets, Patty	0	NA	2	100
MEAT AND GRAIN COMBINATIONS	20*	83	38	98
Egg and/or Sausage Sandwich	5	73*	15	96
French Toast	3	84	6	100
Grilled Cheese Sandwich	5	87	10	99
Peanut Butter & Jelly Sandwich	2	90	0	NA
Tuna Salad Sandwich	0	NA	2	
Pizza	4	89	4	99
Hamburger, Cheeseburger	0	NA	8	100
Hot Dogs, Corn Dogs	0	NA	8	
Ham & Cheese Sandwich	0	NA	10	100
MISCELLANEOUS MEAT ITEMS	0	NA	2	100
Lasagna, Ravioli, etc.	0	NA	2	100
Stuffed Cabbage	0	NA	2	100

[1]The average percentage of each selected food item (or category) that was actually consumed. Sample size not reported because it varies for every item in the table.

[2]Includes breads/bread alternates offered as a separate item, i.e., not included in combination items such as french toast, egg sandwiches, etc.

*Difference between elementary and middle/secondary schools is statistically significant at the .01 level.

++Consumption data not available because none of the students included in the plate waste observations selected this item.

NA: Consumption data not available because none of the schools offered this item.

Data Source: On-Site Meal Observations.

selected and consumed, and the mean proportions of calories supplied by fat, saturated and unsaturated fat.1/ Possible explanations for the lack of discernible differences between these two groups of SFAs are discussed in Chapter VII. In light of the comparability of the nutritional characteristics of breakfasts offered, selected and consumed in the two groups of SFAs, data were pooled for all analyses presented in this report.

1/The frequency distributions were also examined for all nutrients in all three levels of meal analysis; no significant differences were noted. In addition, the two types of "typical" SFAs--those participating in USDA menu modification grants and those that were not (see Chapter I)--were compared. No significant differences were detected.

PART 4: EXTENDED TABLES

Food and Nutrient Composition of NSLP Meals

- Exhibits ET-VII.1 - ET-VIII.8

Food and Nutrient Composition of SBP Meals

- Exhibits ET-VIII.1 - ET-VIII.6

Exhibit ET-VII.1

Food Group Taxonomy Used in Food Level Analysis

Major Categories	Subgroups	Food Items
MILK	None	Whole Milk
		Lowfat Milk
		Skim Milk
		Flavored Milk
FRUIT	Fresh Fruit	Apple
		Banana
		Cantalope
		Grapefruit
		Grapes
		Orange
		Pear
		Watermelon
		Fruit Salads
	Canned Fruit	Applesause
		Apricots
		Fruit Cocktail
		Peaches
		Pears
		Pineapple
		Plums
		Strawberries
		Other Berries
	Fruit Juice	(all juices)
	Dried Fruit	(all dried fruits)
	Other Fruit Items	Crisps, Cobblers, Gelatins (with fruit or juices)
		Juice Bars, Misc.
VEGETABLES[1]	Raw Vegetables	Lettuce, Salad
		Other Raw Vegetables
		Cole Slaw, Miscellaneous Salads
	Cooked Vegetables	Corn
		Green Beans
		Broccoli
		Cabbage
		Peas
		Carrots
		Mixed Vegetables
		Onion Rings
		Spinach, Greens
		Miscellaneous Vegetables

-continued-

Exhibit ET-VII.1

Major Categories	Subgroups	Food Items
VEGETABLES (con't.)	Potatoes	French Fries, Tater Tots, etc. Other Potatoes
	Beans, Legumes	(all types)
	Soups	(all vegetable soups; contained little or no meat or poultry)
BREADS/BREAD ALTERNATES[2]	None	Bagels Bisquits, Croissants Bread, Toast Cornbread Crackers Rolls Sweet Buns Fruit Muffins, Breads Tortillas, Taco Shells Rice Pasta, Noodles Pancackes, Waffles Hot Cereals (Breakfast Only) Cold Cereals (Breakfast Only) Doughnuts (Breakfast Only)
ENTREES	Meat, Poultry or Fish[3]	Beef-Roast, Ribs Breaded Fried Steak Broiled Steak Meatloaf Pork Chop Baked, BBQ Chicken Chicken Nuggets, Patty Chicken or Turkey Croquettes Roast Turkey Fish Nuggets, Sticks Fried Clams Breaded Fish Portion Bacon, Sausage Chili (Mostly Meat) Cold Meat, Cheese Plate Eggs (Breakfast Only)

-continued-

Exhibit ET-VII.1

Major Categories	Subgroups	Food Items
ENTREES (cont'd.)	Meat/Bread Combinations	
	-Burgers/Sandwiches	Hamburger, Cheeseburger Steak, Roast Beef Sandwich Sloppy Joe, BBQ Beef Hot Dogs, Corn Dogs Fried Chicken Sandwich Fried Fish Sandwich Coldcut Sandwich, Submarine Sandwich Ham & Cheese Sandwich Grilled Cheese Sandwich Tuna Salad Sandwich Egg Salad Sandwich Peanut Butter & Jelly Sandwich Turkey Sandwich
	-Other Meat/Bread Combination Items	Pizza Burrito, Enchilada Taco, Nacho (without vegetables) Pot Pies French Toast Macaroni & Cheese Beef & Noodles, Goulash, Miscellaneous Pancakes & Sausage (Breakfast only) Egg/Sausage Sandwich (Breakfast only)
	Meat, Bread, Vegetable Combinations[4]	Spaghetti with Meat Sauce Lasagna, Ravioli, etc. Taco, Taco Salad Salad Bar[5]
	Meat, Vegetable Combinations[4]	Chef Salad[6] Salad Bar[6] Potato Bar Stir Fry, Miscellaneous Items

-continued-

Exhibit ET-VII.1

Major Categories	Subgroups	Food Items
DESSERT	None	Pies, Tarts Cookies Cakes, Brownies Gelatins Ice Cream, Puddings

[1] Includes vegetables offered as a separate item, i.e., not included in combination items such as chef salad, tacos, taco salad, etc.

[2] Includes breads/bread alternates offered as a separate item, i.e., not included in combination items such as sandwiches, burgers, pasta dishes, etc.

[3] Meat, poultry and fish items offered separately, i.e., not in combination items.

[4] SFAs considered these items to meet part or all of the vegetable/fruit meal pattern requirement.

[5] These salads included a roll, crackers, pasta salad or other item that met a portion or all of the bread/bread alternate requirement.

[6] These salads did not include bread/bread alternate components.

Exhibit ET-VII.2

A la Carte Items Available at Lunch in Elementary and Middle/Secondary Schools (SY 1989-90)

A la Carte Item	Percent of Schools[1] Elementary Schools (n=23)	Middle/Secondary Schools (n=16)
Beverages	22%	69%
- Carbonated soft drinks	0	12
- Non-carbonated soft drinks	4	62
- Juice (100%)	17	38
- Tea, coffee, iced tea	0	19
- Milkshakes, malts	0	25
Fruits and Vegetables	9	62
- Fresh fruits	4	25
- Canned fruits	4	12
- French fries	0	31
- Salad Bar	0	44
- Side salads/raw vegetables	0	6
Entrees		
- Pizza	0	44
- Tacos, Nachos, burritos	0	38
- Hamburgers, cheeseburgers	0	25
- Hot dogs	0	12
- Sandwiches	0	12
Desserts	96	75
- Cakes, cupcakes	22	38
- Cookies, brownies	65	44
- Pies, turnovers, crisps	4	44
- Donuts, sweetrolls	0	38
- Ice cream, sherbet	44	50
- Frozen Ices, Popsicles	9	0
- Puddings	13	0
- Fruit roll-ups	17	0
- Other	13	12
Chips, Pretzels, Snacks	30	62
- potato chips, cornchips	4	31
- pretzels, corn nuts	4	12

-continued-

Exhibit ET-VII.2
(continued)

A la Carte Item	Percent of Schools[1]	
	Elementary Schools (n=23)	Middle/Secondary Schools (n=16)
Chips, Pretzels, Snacks (cont'd.)		
- cheese puffs	4	12
- popcorn	26	12
- other saltysnacks	13	31
Other	22	62
- yogurt	9	19
- muffins	0	6
- soups	0	6
- bagel/cream cheese	0	19
- candy	9	12
- granola bars	4	6
Candy	9	12

[1]Ns and percentages reflect schools that had some a la carte food service available.

Data Source: On-Site Meal Observations.

Exhibit ET-VII.3

Mean Calorie and Nutrient Content of the Average NSLP Lunch Offered in Elementary and Middle/Secondary Schools in Exemplary and Typical SFAs (SY 1989-90)

	Elementary Schools		Middle Secondary Schools		All Schools	
	Exemplary (n=20)	Typical (n=20)	Exemplary (n=10)	Typical (n=10)	Exemplary (n=30)	Typical (n=30)
Calories	723	719	801	814	749	751
Protein (gm)	31	30	35	33	32	31
Total Fat (gm)	31	31	34	35	32	32
Saturated Fat (gm)	12	12	13	14	12	13
Cholesterol (mg)	87	82	88	110	87	91
Total Carbohydrate (gm)	83	84	92	95	86	88
Vitamin A (mcg R.E.)	348	300	354	383	350	327
Vitamin C (mg)	29*	21	35	37	31	26
Thiamin (mg)	.49	.48	.57	.56	.51	.51
Riboflavin (mg)	.76	.76	.88	.85	.80	.79
Niacin (mg N.E.)	6.22	5.97	7.08	6.46	6.50	6.14
Vitamin B_6 (mg)	.49	.46	.56	.52	.51	.48
Calcium (mg)	478	475	548	528	501	493
Phosphorus (mg)	569	554	632	622	590	576
Magnesium (mg)	102	93	106	105	103	97
Iron (mg)	4.20	4.08	4.83	4.76	4.41	4.30
Sodium (mg)	1,112	1,092	1,316	1,366	1,180	1,183

*Difference between exemplary and typical SFAs is statistically significant at the .01 level.

Data Source: On-Site Meal Observations.

Exhibit ET-VII.4

Mean Proportion of Calories Provided
by Fat, Carbohydrate and Protein in the Average NSLP Lunch
as Offered in Elementary and Middle/Secondary Schools
in Exemplary and Typical SFAs
(SY 1989-90)

	Elementary Schools		Middle Secondary Schools		All Schools	
	Exemplary (n=20)	Typical (n=20)	Exemplary (n=10)	Typical (n=10)	Exemplary (n=30)	Typical (n=30)
Percent Calories from Fat	38.4	38.3	37.9	38.1	38.2	38.2
Percent Calories from Saturated Fat	14.4	15.2	14.9	15.2	14.6	15.2
Percent Calories from Carbohydrate	46.1	46.0	46.7	46.7	46.1	46.7
Percent Calories from Protein	17.1	16.6	17.6	16.5	17.2	16.6

Note: None of the differences between exemplary and typical SFAs is statistically significant.

Data Source: On-Site Meal Observations.

Exhibit ET-VII.5

Mean Calorie and Nutrient Content of the Average NSLP Lunch Selected in Elementary and Middle/Secondary Schools in Exemplary and Typical SFAs (SY 1989-90)

	Elementary Schools		Middle Secondary Schools		All Schools	
	Exemplary (n=20)	Typical (n=20)	Exemplary (n=10)	Typical (n=10)	Exemplary (n=30)	Typical (n=30)
Calories	696	717	819	842	737	758
Protein (gm)	29	29	35	35	31	31
Total Fat (gm)	28	29	34	36	30	31
Saturated Fat (gm)	11	12	14	14	12	13
Cholesterol (mg)	80	77	83	102	81	85
Total Carbohydrate (gm)	85	88	96	96	89	91
Vitamin A (mcg R.E.)	299	300	334	317	311	306
Vitamin C (mg)	26	21	31	31	28	24
Thiamin (mg)	.45	.48	.57	.55	.49	.50
Riboflavin (mg)	.73	.73	.79	.80	.75	.75
Niacin (mg N.E.)	5.84	5.88	7.51	7.24	6.39	6.33
Vitamin B_6 (mg)	.46	.46	.56	.54	.49	.48
Calcium (mg)	450	449	489	499	463	466
Phosphorus (mg)	544	541	623	624	570	569
Magnesium (mg)	94	90	103	104	97	95
Iron (mg)	4.16	4.26	5.14	5.13	4.49	4.55
Sodium (mg)	1,098	1,136	1,346	1,455	1,180	1,242

Note: None of the differences between exemplary and typical SFAs is statistically significant.

Data Source: On-Site Meal Observations.

Exhibit ET-VII.6

Mean Proportion of Calories Provided
by Fat, Carbohydrate and Protein in the Average NSLP Lunch
as Selected in Elementary and Middle/Secondary Schools
in Exemplary and Typical SFAs
(SY 1989-90)

	Elementary Schools		Middle Secondary Schools		All Schools	
	Exemplary (n=20)	Typical (n=20)	Exemplary (n=10)	Typical (n=10)	Exemplary (n=30)	Typical (n=30)
Percent Calories from Fat	35.7	36.1	37.3	38.9	36.2	37.1
Percent Calories from Saturated Fat	13.8	14.5	14.9	15.2	14.2	14.7
Percent Calories from Carbohydrate	49.0	49.4	47.2	45.3	48.4	48.0
Percent Calories from Protein	16.9	16.2	16.9	16.8	16.9	16.4

Note: None of the differences between exemplary and typical SFAs is statistically significant.

Data Source: On-Site Meal Observations.

Exhibit ET-VII.7

Mean Calorie and Nutrient Content of the Average NSLP Lunch Consumed in Elementary and Middle/Secondary Schools in Exemplary and Typical SFAs (SY 1989-90)

	Elementary Schools		Middle Secondary Schools		All Schools	
	Exemplary (n=20)	Typical (n=20)	Exemplary (n=10)	Typical (n=10)	Exemplary (n=30)	Typical (n=30)
Calories	524	565	730	784	593	638
Protein (gm)	22	23	31	32	25	26
Total Fat (gm)	21	23	31	34	24	27
Saturated Fat (gm)	8	9	12	13	10	11
Cholesterol (mg)	61	61	78	94	66	72
Total Carbohydrate (gm)	64	69	84	90	71	76
Vitamin A (mcg R.E.)	209	222	293	296	237	247
Vitamin C (mg)	19	16	27	32	22	21
Thiamin (mg)	.33	.38	.51	.51	.39	.42
Riboflavin (mg)	.55	.58	.74	.76	.61	.64
Niacin (mg N.E.)	4.29	4.69	6.60	6.68	5.06	5.35
Vitamin B_6 (mg)	.34	.36	.49	.50	.39	.40
Calcium (mg)	346	361	456	481	383	401
Phosphorus (mg)	414	431	566	586	465	483
Magnesium (mg)	69	71	91	98	76	80
Iron (mg)	3.06	3.29	4.61	4.75	3.58	3.77
Sodium (mg)	828	895	1,245	1,344	967	1,044

Note: None of the differences between exemplary and typical SFAs is statistically significant.

Data Source: On-Site Meal Observations.

Exhibit ET-VII.8

Mean Proportion of Calories Provided by Fat, Saturated Fat, Unsaturated Fat, Carbohydrate and Protein in the Average NSLP Lunch Consumed in Elementary and Middle/Secondary Schools in Exemplary and Typical SFAs (SY 1989-90)

	Elementary Schools		Middle Secondary Schools		All Schools	
	Exemplary (n=20)	Typical (n=20)	Exemplary (n=10)	Typical (n=10)	Exemplary (n=30)	Typical (n=30)
Percent Calories from Fat	35.8	36.4	37.6	38.5	36.4	37.1
Percent Calories from Saturated Fat	14.0	14.7	15.1	15.0	14.4	14.8
Percent Calories from Unsaturated Fat	19.2	19.2	19.8	20.8	19.4	19.7
Percent Calories from Carbohydrate	49.0	48.8	46.4	45.8	48.1	47.8
Percent Calories from Protein	16.8	16.3	17.3	16.7	17.0	16.5

Note: None of the differences between exemplary and typical SFAs are statistically significant.

Data Source: On-Site Meal Observations.

Exhibit ET-VIII.1

Mean Calorie and Nutrient Content of the Average SBP Breakfast Offered in Elementary and Middle/Secondary Schools in Exemplary and Typical SFAs (SY 1989-90)

	Elementary Schools		M/S Schools		All Schools	
	Exemplary (n=15)	Typical (n=16)	Exemplary (n=6)	Typical (n=7)	Exemplary (n=21)	Typical (n=23)
Calories	450	486	504	537	466	502
Protein (gm)	16	16	18	16	17	16
Total Fat (gm)	15	18	17	17	16	17
Saturated Fat (gm)	7	8	8	7	7	8
Cholesterol (mg)	55	56	73	45	60	53
Total Carbohydrate (gm)	65	67	69	83	66	72
Vitamin A (mcg R.E.)	369	339	219	450	326	373
Vitamin C (mg)	31	30	25	45	29	34
Thiamin (mg)	.48	.47	.44	.60	.47	.51
Riboflavin (mg)	.77	.77	.72	.89	.75	.81
Niacin (mg N.E.)	4.84	4.69	3.36	5.98	4.41	5.08
Vitamin B_6 (mg)	.48	.46	.32	.60	.44	.50
Calcium (mg)	378	381	430	386	393	382
Phosphorus (mg)	399	377	443	409	412	387
Magnesium (mg)	71	69	67	76	70	71
Iron (mg)	4.60	3.89	3.39	6.58	4.26	4.71
Sodium (mg)	627	614	665	627	638	618

Note: None of the differences between exemplary SFAs and typical SFAs is statistically significant.

Data Source: On-Site Meal Observations

Exhibit ET-VIII.2

Mean Proportion of Calories Provided by Fat, Carbohydrate and Protein in the Average SBP Breakfast Offered in Elementary and Middle/Secondary Schools in Exemplary and Typical SFAs (SY 1989-90)

	Elementary Schools		M/S Schools		All Schools	
	Exemplary (n=15)	Typical (n=16)	Exemplary (n=6)	Typical (n=7)	Exemplary (n=21)	Typical (n=23)
Percent Calories from Fat	29.8	32.8	31.0	28.2	30.1	31.4
Percent Calories from Saturated Fat	13.2	14.7	13.9	12.5	13.4	14.1
Percent Calories from Carbohydrate	57.8	55.3	55.3	61.4	57.1	57.2
Percent Calories from Protein	14.5	13.5	14.7	12.3	14.5	13.1

Note: None of the differences between exemplary SFAs and typical SFAs is statistically significant.

Data Source: On-Site Meal Observations

Exhibit ET-VIII.3

Mean Calorie and Nutrient Content of the Average SBP Breakfast as Selected in Elementary and Middle/Secondary Schools in Exemplary and Typical SFAs (SY 1989-90)

	Elementary Schools		M/S Schools		All Schools	
	Exemplary (n=15)	Typical (n=16)	Exemplary (n=6)	Typical (n=7)	Exemplary (n=21)	Typical (n=23)
Calories	426	464	514	523	451	482
Protein (gm)	15	15	18	16	16	15
Total Fat (gm)	13	16	21	15	15	16
Saturated Fat (gm)	6	7	9	7	7	7
Cholesterol (mg)	46	53	92	44	59	51
Total Carbohydrate (gm)	64	67	64	83	64	72
Vitamin A (mcg R.E.)	325	314	200	372	289	331
Vitamin C (mg)	31	29	24	46	29	34
Thiamin (mg)	.44	.44	.40	.53	.43	.47
Riboflavin (mg)	.70	.73	.67	.80	.69	.75
Niacin (mg N.E.)	4.15	4.08	2.70	4.85	3.74	4.32
Vitamin B_6 (mg)	.43	.41	.24	.49	.38	.44
Calcium (mg)	353	377	408	370	369	375
Phosphorus (mg)	369	361	435	389	388	370
Magnesium (mg)	65	64	59	70	64	66
Iron (mg)	3.98	3.71	2.56	5.32	3.57	4.20
Sodium (mg)	568	590	691	606	603	595

Note: None of the differences between exemplary SFAs and typical SFAs is statistically significant.

Data Source: On-Site Meal Observations.

Exhibit ET-VIII.4

Mean Proportion of Calories Provided by Fat, Carbohydrate and Protein in the Average SBP Breakfast as Selected in Elementary and Middle/Secondary Schools in Exemplary and Typical SFAs (SY 1989-90)

	Elementary Schools		M/S Schools		All Schools	
	Exemplary (n=20)	Typical (n=20)	Exemplary (n=10)	Typical (n=10)	Exemplary (n=30)	Typical (n=30)
Percent Calories from Fat	28.2	30.6	36.2	26.3	30.5	29.3
Percent Calories from Saturated Fat	12.8	14.1	16.1	11.9	13.7	13.5
Percent Calories from Carbohydrate	59.9	58.0	50.4	63.4	57.2	59.6
Percent Calories from Protein	13.9	13.1	14.0	12.3	14.0	12.9

Note: None of the differences between exemplary SFAs and typical SFAs is statistically significant.

Data Source: On-Site Meal Observations

Exhibit ET-VIII.5

Mean Calorie and Nutrient Content of the Average Breakfast as Consumed in Elementary and Middle/Secondary Schools in Exemplary and Typical SFAs (SY 1989-90)

	Elementary Schools		M/S Schools		All Schools	
	Exemplary (n=15)	Typical (n=16)	Exemplary (n=6)	Typical (n=7)	Exemplary (n=21)	Typical (n=23)
Calories	319	365	490	440	368	388
Protein (gm)	10	11	18	13	13	12
Total Fat (gm)	10	12	19	13	12	13
Saturated Fat (gm)	4	6	9	6	6	6
Cholesterol (mg)	34	42	86	35	49	40
Total Carbohydrate (gm)	49	53	62	70	53	58
Vitamin A (mcg R.E.)	247	246	196	321	232	269
Vitamin C (mg)	27	25	25	42	26	30
Thiamin (mg)	.35	.35	.39	.47	.36	.39
Riboflavin (mg)	.51	.55	.65	.66	.55	.59
Niacin (mg N.E.)	3.34	3.34	2.72	4.41	3.16	3.67
Vitamin B_6 (mg)	.34	.33	.25	.43	.31	.36
Calcium (mg)	236	275	394	293	281	280
Phosphorus (mg)	256	269	423	310	203	282
Magnesium (mg)	47	48	57	57	50	50
Iron (mg)	3.10	3.03	2.64	4.77	2.97	3.56
Sodium (mg)	434	474	675	517	502	487

Note: None of the differences between exemplary SFAs and typical SFAs is statistically significant.

Data Source: On-Site Meal Observations.

Exhibit ET-VIII.6

Mean Proportion of Calories Provided by Fat, Carbohydrate and Protein in the Average SBP Breakfast as Consumed in Elementary and Middle Schools in Exemplary and Typical SFAs (SY 1989-90)

	Elementary Schools		M/S Schools		All Schools	
	Exemplary (n=20)	Typical (n=20)	Exemplary (n=10)	Typical (n=10)	Exemplary (n=30)	Typical (n=30)
Percent Calories from Fat	27.4	30.4	34.7	26.3	29.5	29.1
Percent Calories from Saturated Fat	12.2	13.9	15.5	11.6	13.1	13.2
Percent Calories from Carbohydrate	61.4	58.8	51.8	63.6	58.6	60.3
Percent Calories from Protein	13.2	12.5	14.3	12.1	13.5	12.4

Note: None of the differences between exemplary and typical SFAs is statistically significant.

Data Source: On-Site Meal Observations

PART 5: APPENDICES

APPENDIX A

YEAR TWO SFA MANAGER SURVEY

1990 SCHOOL LUNCH SURVEY

INTRODUCTION

Hello, this is _____. I am calling from Abt Associates in Cambridge, Massachusetts. We are doing a study of the National School Lunch Program and other Child Nutrition Programs for the U.S. Department of Agriculture. You may remember that we called you for this study last spring and I hope that you will be willing to help with the study this year.

X1. Recently, we sent you a letter and brochure describing the study and the types of information we need. The same letter was sent to over 1,700 school districts across the country. Do you remember the letter?

YES (SKIP TO Q.X3).....	1	14/
NO.....	2	

Let me briefly describe what the study is about. The study is funded by the U.S. Department of Agriculture. It calls for an annual national survey of more than 1,700 school districts so that the Department can learn about several important issues related to the Child Nutrition Programs. This year, some of the issues to be covered in the survey include: CN Labeling, commodity distribution, meal prices, school lunch participation, and technical assistance.

X3. Is this a good time to do the interview?

YES (SKIP TO Q.X5).....	1	15/
NO.....	2	

X4. SCHEDULE CALL BACK. INDICATE ON FACE SHEET WHETHER REMAIL IS NEEDED. IF REMAIL, VERIFY RESPONDENT'S NAME AND ADDRESS.

X5. Since the interview covers many different topics, I may need to talk to more than one person. If, for any topic, you feel that you are not the best person to talk to, just tell me the name and telephone number of the person I will need to talk to.

SECONDARY RESPONDENT: _____

TITLE: _____

TELEPHONE # _____

NUMBER OF SCHOOLS

1. I would like to ask you some questions about the number of schools in your school district and the number of schools that are participating in the National School Lunch Program or the School Breakfast Program for this, the 1989 to 1990, school year.

Can you answer these questions first for all your elementary schools and then for a combination of your middle and secondary schools?

YES (SKIP TO Q.1B).....	1	16/
NO (CONTINUE).....	2	

1A. ALL SCHOOLS

1a1.	In total, how many schools are there in your school district?	____	17-19/
1a2.	How many of them participate in the National School Lunch Program?	____	20-22/
1a3.	How many participate in the School Breakfast Program?	____	23-25/
1a4.	How many participate in the Breakfast Program as severe need schools?	____	26-28/

SKIP TO QUESTION 2

1B. ELEMENTARY SCHOOLS

1b1.	First, for your elementary schools, how many elementary schools are there in your school district?	____	29-31/
1b2.	How many of them participate in the National School Lunch Program?	____	32-34/
1b3.	How many participate in the School Breakfast Program?	____	35-37/
1b4.	How many participate in the Breakfast Program as severe need schools?	____	38-40/

1C. MIDDLE/SECONDARY SCHOOLS

Now, for middle and secondary schools:

1c1.	How many middle and secondary schools are there in your school district?	____	41-43/
1c2.	How many of them participate in the Lunch Program?	____	44-46/
1c3.	How many participate in the Breakfast Program?	____	47-49/
1c4.	How many participate in the Breakfast Program as severe need schools?	____	50-52/

SECONDARY RESPONDENT: _____

TITLE: _____

TELEPHONE # _____

2. ENROLLMENT AND ATTENDANCE

The next questions are about the number of children enrolled in your school district this year. Can you answer these questions separately for elementary and then for middle and secondary schools?

YES (SKIP TO Q.2B).....	1	53/
NO (CONTINUE).....	2	

2A. ALL SCHOOLS

2a1. In total, how many children were enrolled in your school district as of October 1st? ____ 54-59/

2a2. How many of these children had the opportunity to participate in the School Lunch Program? That is, exclude any child who is ordinarily in school for a half-day and is not offered lunch, such as half-day kindergarteners. ____ 60-65/

2a3. How many had the opportunity to participate in the Breakfast Program? ____ 66-71/

2a4. Has the racial mix of children in your school district changed substantially from last year?

YES.....	1	72/
NO (SKIP TO Q.2a6).....	2	
DON'T KNOW (SKIP TO Q.2a6).....	8	

Card 2
12-13/02

2a5. How many children in your district are Black or Hispanic? ____ 14-19/

2a6. ASK ONLY IF INDICATED ON FACE SHEET
How many are female? ____ 20-25/

SKIP TO QUESTION 3

2B. ELEMENTARY SCHOOLS

2b1. How many children were enrolled in elementary schools in your school district as of October 1? ____ 26-31

2b2. How many of these children had the opportunity to participate in the School Lunch Program? That is, exclude any child who is ordinarily in school for a half-day and is not offered lunch, such as half-day kindergarteners. ____ 32-37/

2b3. How many had the opportunity to participate in the Breakfast Program? ____ 38-43/

2b4. Has the racial mix of children in your schools changed substantially from last year?

YES..... 1 44/
NO (SKIP TO Q.2b6)..... 2
DON'T KNOW (SKIP TO Q.2b6)..... 8

2b5. How many children in your elementary schools are Black or Hispanic? ____ 45-50/

2b6. ASK ONLY IF INDICATED ON FACE SHEET

How many children in your elementary schools are female? ____ 51-56/

2C. MIDDLE/SECONDARY SCHOOLS

2c1. How many children were enrolled in middle and secondary schools in your school district as of October 1? ____ 57-62/

2c2. How many of these children had the opportunity to participate in the School Lunch Program? ____ 63-68/

2c3. How many had the opportunity to participate in the Breakfast Program? ____ 69-74/

2c4. Has the racial mix of children in your schools changed substantially from last year?

Card 3
12-13/03

YES..... 1 14/
NO (SKIP TO Q.2c5)..... 2
DON'T KNOW (SKIP TO Q.2c5)..... 8

2c41. How many children in your middle/secondary schools are Black or Hispanic? ____ 15-20/

2c5. ASK ONLY IF INDICATED ON FACE SHEET

How many children in your middle/secondary schools are female? ____ 21-26/

SECONDARY RESPONDENT: _____

TITLE: _____

TELEPHONE # _____

3. AVERAGE DAILY ATTENDANCE

The next questions are about average daily attendance in your school district for the month of October of this school year.

3A. ELEMENTARY SCHOOLS

3a1. What was the average daily attendance for elementary school children in your school district for the month of October of this school year? ____ 27-32/

DON'T KNOW (SKIP TO Q.3C)..... 1 33/

3B. MIDDLE AND SECONDARY SCHOOLS

3b1. What was the average daily attendance for middle and secondary school children in your school district for the month of October of this school year? ____ 34-39/

ASK "ALL SCHOOLS" QUESTIONS ONLY IF RESPONDENT COULD NOT ANSWER FOR ELEMENTARY AND MIDDLE/SECONDARY SCHOOLS

3C. ALL SCHOOLS

3c1. What was the average daily attendance for all children in your school district for the month of October of this school year? ____ 40-45/

SECONDARY RESPONDENT: _____

TITLE: _____

TELEPHONE # _____

4. CHILDREN APPROVED

The next questions have to do with the number of children approved for free and reduced-price meals as of October 31 of this school year.

4A. ELEMENTARY SCHOOLS

4a1. For elementary schools, how many children were approved for free meals by October 31st of this school year? ____ 46-51/

DON'T KNOW (SKIP TO Q.4C)..... 999998

4a2. For elementary schools, how many children were approved for reduced-price meals by October 31st of this school year? ____ 52-57/

4a3. For elementary schools, how many children applied but were denied free or reduced-price meals this school year? ____ 58-63/

4B. MIDDLE AND SECONDARY SCHOOLS

4b1. For middle and secondary schools, how many children were approved for free meals by October 31st of this school year? ____ 64-69/

4b2. For middle and secondary schools, how many children were approved for reduced-price meals by October 31st of this school year? ____ 70-75/

Card 4
12-13/04

4b3. For middle and secondary schools, how many children applied but were denied free or reduced-price meals this school year? ____ 14-19/

ASK "ALL SCHOOLS" QUESTIONS ONLY IF RESPONDENT COULD NOT ANSWER FOR ELEMENTARY AND MIDDLE/SECONDARY SCHOOLS

4C. ALL SCHOOLS

4c1. For all schools, how many children were approved for free meals by October 31st of this school year? ____ 20-25/

4c2. For all schools, how many children were approved for reduced-price meals by October 31st of this school year? ____ 26-31/

4c3. For all schools, how many children applied but were denied free or reduced-price meals this school year? ____ 32-37/

SECONDARY RESPONDENT: _____

TITLE: _____

TELEPHONE # _____

5. LUNCH PRICES

Now I have questions about your lunch prices for this school year. First I will ask you about lunch prices in your elementary schools, then about prices in your middle schools, and then in your secondary schools. If you have more than one standard reimbursable lunch, please give me the price for the one that is purchased most frequently.

5A. ELEMENTARY SCHOOLS

5a1. For elementary schools, what price did you charge at the start of this school year for a standard reimbursable school lunch for children who pay full price? $___.___ 38-40/

5a2. What price did you charge at the start of this school year for children who pay reduced-price? $___.___ 41-43/

5a3. What price did you charge at the start of this school year for meals served to adults in elementary schools? $___.___ 44-46/

5a4. Did the prices charged for your elementary school lunches change since the beginning of this school year?

YES.....	1	47/
NO (SKIP TO Q.5a5).....	2	
DON'T KNOW (SKIP TO Q.5a5).....	8	

5a41. What did the price change to for (READ LIST). IF NO CHANGE, RECORD CURRENT PRICE)

Full Price	$___.___	48-50/
Reduced Price	$___.___	51-53/
Adult Price	$___.___	54-56/

5a5. Does the price of a standard reimbursable lunch differ between your middle and secondary schools?

YES.....	1	57/
NO (SKIP TO Q.5C).....	2	
DON'T KNOW (SKIP TO Q.5c).....	8	

5B. MIDDLE SCHOOLS

5b1. For middle schools, what price did you charge at the start of this school year for a standard reimbursable school lunch for children who pay full price? $___.___ 58-60/

5b2. What price did you charge at the start of this school year for children who pay reduced-price? $___.___ 61-63/

5b3. What price did you charge at the start of this school year for meals served adults in middle schools? $___.___ 64-66/

5b4. Did the prices charged for your middle school lunches change since the beginning of this school year?

YES	1	67/
NO (SKIP TO Q.5c)	2	
DON'T KNOW (SKIP TO Q.5c)	8	

5B41. What did the price change to for (READ LIST. IF NO CHANGE, RECORD CURRENT PRICE)

Full Price	$___.___	68-70/
Reduced Price	$___.___	71-73/
Adult Price	$___.___	74-76/

Card 5
12-13/05

5C. SECONDARY SCHOOLS

5c1. For secondary schools, what price did you charge at the start of this school year for a standard reimbursable school lunch for children who pay full price? $___.___ 14-16/

5c2. What price did you charge at the start of this school year for children who pay reduced-price? $___.___ 17-19/

5c3. What price did you charge at the start of this school year for meals served to adults in secondary schools? $___.___ 20-22/

5c4. Did the price charged for your secondary school lunches change since the beginning of this school year?

YES	1	23/
NO (SKIP TO Q.6)	2	
DON'T KNOW (SKIP TO Q.6)	8	

5c41. What did the price change to for (READ LIST. IF NO CHANGE, RECORD CURRENT PRICE)

Full Price	$___.___	24-26/
Reduced Price	$___.___	27-29/
Adult Price	$___.___	30-32/

6. BREAKFAST PRICES SKIP TO Q.7 IF NO SCHOOLS SERVE BREAKFAST

The next questions are about your breakfast prices for this school year. First I will ask you about breakfast prices in your elementary schools, then about prices in your middle schools, and then in your secondary schools. If you have more than one standard reimbursable breakfast, please give me the price for the one that is purchased most frequently.

6A. ELEMENTARY SCHOOLS

6a1. For elementary schools, what price did you charge at the start of this school year for a standard reimbursable school breakfast for children who pay full price? $___.___ 33-35/

6a2. What price did you charge at the start of this school year for children who pay reduced-price? $___.___ 36-38/

6a3. What price did you charge at the start of this school year for meals served to adults in elementary schools? $___.___ 39-41/

6a4. Did the prices charged for your elementary school breakfasts change since the beginning of this school year?

YES.....	1	42/
NO (SKIP TO Q.6a5).....	2	
DON'T KNOW (SKIP TO Q.6a5).....	8	

6a41. What did the price change to for (READ LIST. IF NO CHANGE, RECORD CURRENT PRICE)

Full Price	$___.___	43-45/
Reduced Price	$___.___	46-48/
Adult Price	$___.___	49-51/

6a5. Does the price of a standard reimbursable breakfast differ between your middle and secondary schools?

YES.....	1	52/
NO (SKIP TO Q.6C).....	2	
DON'T KNOW (SKIP TO Q.6C).....	8	

6B. MIDDLE SCHOOLS

6b1. For middle schools, what price did you charge at the start of this school year for a standard reimbursable school breakfast for children who pay full price? $___.___ 53-55/

6b2. What price did you charge at the start of this school year for children who pay reduced-price? $___.___ 56-58/

6b3. What price did you charge at the start of this school year for meals served to adults in middle schools? $__.__ 59-61/

6b4. Did the prices charged for your middle school breakfasts change since the beginning of this school year?

YES	1	62/
NO (SKIP TO Q.6C)	2	
DON'T KNOW (SKIP TO Q.6c)	8	

6b41. What did the price change to for (READ LIST. IF NO CHANGE, RECORD CURRENT PRICE)

Full Price	$__.__	63-65/
Reduced Price	$__.__	66-68/
Adult Price	$__.__	69-71/

6C. SECONDARY SCHOOLS

6c1. For secondary schools, what price did you charge at the start of this school year for a standard reimbursable school breakfast for children who pay full price? $__.__ 72-74/

6c2. What price did you charge at the start of this school year for children who pay reduced-price? $__.__ 75-77/

Card 6
12-13/06

6c3. What price did you charge at the start of this school year for meals served to adults in secondary schools? $__.__ 14-16/

6cd. Did the price charged for your secondary school breakfasts change since the beginning of this school year?

YES	1	17/
NO (SKIP TO Q.7)	2	
DON'T KNOW (SKIP TO Q.7)	8	

6c41. What did the price change to for (READ LIST. IF NO CHANGE, RECORD CURRENT PRICE)

Full Price	$__.__	18-20/
Reduced Price	$__.__	21-23/
Adult Price	$__.__	24-26/

SECONDARY RESPONDENT: _____

TITLE: _____

TELEPHONE # _____

7. CN LABELING

7A. Do you know what CN labeling is?

YES	1	27/
NO (SKIP TO Q.8)	2	

7B. Do you require CN labeling for any of the foods that you purchased this year?

YES	1	28/
NO (SKIP TO Q.7C)	2	
DON'T KNOW (SKIP TO Q.7C)	8	

7b1. Do you require CN labels for..READ LIST. RECORD A RESPONSE FOR EACH ITEM

		YES	NO	
7b11.	Meat or poultry	1	2	29/
7b12.	Seafood	1	2	30/
7b13.	Non-meat products such as cheese, eggs, nut or seed butter, dry beans or dry peas	1	2	31/
7b14.	Juice drinks	1	2	32/

7C. Do you prepare bid specifications for any products that could have CN labels?

YES	1	33/
NO (SKIP TO Q.7D)	2	
DON'T KNOW (SKIP TO Q.7D)	8	

7c1. When you prepare bid specifications for products that could have CN labels, do you include CN labeling as part of those bid specifications for all bids, most bids, a few bids, or none of your bids?

All	1	34/
Most	2	
A Few	3	
None	4	

7D. What percentage of your commercially-purchased entree items are CN labeled this year?

_____% 35-37/

7E. Please give me your opinion--for your school district, are the following statements true or false?

		TRUE	FALSE	DK	
7e1.	CN labeling ensures standard portions.....	1	2	8	38/
7e2.	CN labeling ensures higher quality.....	1	2	8	39/
7e3.	CN labeling allows me to buy foods at lower prices.....	1	2	8	40/
7e4.	CN labeling ensures that products meet the meal pattern requirements.....	1	2	8	41/
7e5.	CN labeling allows many vendors to bid for my business.....	1	2	8	42/
7e6.	CN labeled products are nutritionally better than other products.....	1	2	8	43/

7e7. What most influenced your overall opinion about CN labeling? Was it. READ LIST. CIRCLE ONE RESPONSE.

Your direct experience.....	1	44/
Comments by other school personnel.....	2	
Comments by the State Child Nutrition Director.....	3	
Comments by manufacturers or distributors, or.....	4	
Comments by others? SPECIFY _____.....	5	45-46/

7f. Aside from any possible advantages listed above, are there any other advantages to using CN labeled foods?

YES.....	1	47/
NO (SKIP TO Q.7g).....	2	
DON'T KNOW (SKIP TO Q.7g).....	8	

7f1. What are the advantages?

_____ 48-49/

_____ 50-51/

_____ 52-53/

7g. Are there any disadvantages to using CN labeled foods?

YES.....	1	54/
NO (SKIP TO Q.7h).....	2	
DON'T KNOW (SKIP TO Q.7h).....	8	

7g1. What are the disadvantages?

_____ 55-56/

_____ 57-58/

_____ 59-60/

7h. How important is CN labeling to your school district? Is it...
READ LIST AND CIRCLE ONE

Very important.....	1	61/
Important.....	2	
Somewhat important.....	3	
Not important at all.....	4	

SECONDARY RESPONDENT: _____

TITLE: _____

TELEPHONE # _____

8. FOOD DONATION PROGRAM

8A. BUY AMERICA

8a1. The Commodity Distribution Reform Act of 1987 requires that, whenever possible, school districts purchase food products that are produced or manufactured in the United States. Do you know about this "Buy American" provision?

YES.....	1	62/
NO (SKIP TO Q.8B).....	2	

8a2. What, if anything, is your school district doing to implement this requirement?

_____ 63-64/
65-66/
_____ 67-68/

_____

_____

_____

8B. COMMODITY INVENTORY AND REDONATION

8b1. Did you have more than a 6-month supply of any USDA commodity in inventory over the past summer?

YES.....	1	69/
NO (SKIP TO Q.8b12).....	2	
DON'T KNOW (SKIP TO Q.8b12).....	8	

8b11. For which commodities did you have more than a 6-month supply in inventory and why did this excess inventory exist? Was it an unpopular item, was it delivered late in the year, did you voluntarily store State inventory, or was there some other reason for the excess inventory?

Commodity		Reason for Excess							
		Unpopular item		Delivered Late in Year		Voluntary		Other	
_____	70-71/	1	72/	2	73/	3	74/	_____	75-76/ Card 7 12-13/07
_____	14-15/	1	16/	2	17/	3	18/	_____	19-20/
_____	21-22/	1	23/	2	24/	3	25/	_____	26-27/
_____	28-29/	1	30/	2	31/	3	32/	_____	33-34/

8b12. Did your school district "transfer out" any commodities that you had in inventory last year to any other agency? We are not interested in transfers between schools in your school district, or transfers from one school district to another.

YES	1	35/
NO (SKIP TO Q.8b13)	2	
DON'T KNOW (SKIP TO Q.8b13)	8	

8b121. What commodities were "transferred out" last year, what was the value of these transferred foods, and who received the food?

Food Product		Amount		Recipient	
_____	36-37/	$_____.00	38-43/	_____	44-45/
_____	46-47/	$_____.00	48-53/	_____	54-55/

8b13. Were any commodities "transferred in" to your district last year from other agencies? We are not interested in transfers from school to school inside your school district or transfers from other school districts.

YES	1	56/
NO (SKIP TO Q.8C)	2	
DON'T KNOW (SKIP TO Q.8C)	8	

8b131. What commodities were transferred in last year, what was the value of these transferred foods, and from whom was the food received?

Food Product		Amount		From	
_____	57-58/	$_____.00	59-64/	_____	65-66/
_____	67-68/	$_____.00	69-74/	_____	75-76/

SECONDARY RESPONDENT: _____

TITLE: _____

TELEPHONE # _____

8C. PROCESSING

8c1. Are you purchasing any processed end-products made with USDA commodities through a commercial distributor this year?

YES.....	1	14/
NO (SKIP TO Q.8D).....	2	
DON'T KNOW (SKP TO Q.8D).....	3	

8c11. When you buy processed end-products containing USDA commodities, how often do your vendors show the value of the commodities contained in those end-products on the invoice? Do they show the value...

All of the time (SKIP TO Q.8D).....	1	15/
Most of the time.....	2	
Some of the time.....	3	
Never.....	4	

8c12. How did you know the value of the discount included in the price or the value of the rebate due you?

_____ 16-17/

_____ 18-19/

_____ 20-21/

SECONDARY RESPONDENT: _____

TITLE: _____

TELEPHONE # _____

8D. DELIVERY SYSTEMS

8d1. I'm going to read a list of several methods that are used to deliver USDA commodities to school districts. For each one that you use, please tell me how frequently you usually receive commodities by this method.

Do you use (READ LIST RECORD RESPONSE ON GRID BELOW).

IF YES, ASK:

How often do you receive commodities by this method, that is, about how many weeks is it between deliveries?
RECORD ON GRID

		USED YES	NO	DK		IF YES: # Weeks	
(a)	Commercial distribution where USDA commodities are delivered by a commercial distributor to school districts directly as part of a delivery of commercially purchased foods.	1	2	8	22/	____	23-24/
(b)	Commercial distribution where USDA commodities are delivered by a commercial distributor to school districts but are <u>not</u> combined with the delivery of commercially purchased foods.	1	2	8	25/	____	26-27/
(c)	Commercial carrier arranged by the State where USDA commodities processed end products are delivered by a commercial trucking firm to school districts.	1	2	8	28/	____	29-30/
(d)	State-operated distribution where USDA commodities are delivered by a State-operated vehicle to school districts.	1	2	8	31/	____	32-33/
(e)	Direct delivery of USDA commodities to school districts from USDA suppliers arranged for by the State Distributing Agency.	1	2	8	34/	____	35-36/
(f)	Recipient Agency pick-up of USDA commodities from a State-owned or contracted central warehouse or regional distribution point.	1	2	8	37/	____	38-39/
(g)	Other type of distribution system.	1	2	8	40/	____	41-42/

8d2. Where are USDA commodities delivered within the school district? Are they delivered to a . . .

Central warehouse.....	1	43/
Individual preparation sites.....	2	
Both, or.....	3	
Other (Specify) _____.....	4	44-45/
DON'T KNOW.....	8	

8d3. To what extent do you know when commodities are scheduled to be delivered or available for pick-up? Do you know about delivery and pick-up schedules . . .

Always.....	1	46/
Most of the time.....	2	
Some of the time, or.....	3	
Never.....	4	
DON'T KNOW.....	8	

8d4. To what extent do you know the types and quantities of commodities you will receive or pick up? Do you know about the type and quantities of commodities expected . . .

Always.....	1	47/
Most of the time.....	2	
Some of the time, or.....	3	
Never.....	4	
DON'T KNOW.....	8	

8d5. To what extent do you know in advance when delivery and distribution schedules change? Do you have advance notice . . .

Always.....	1	48/
Most of the time.....	2	
Some of the time, or.....	3	
Never.....	4	
DON'T KNOW.....	8	

8d6. How would you rate the overall communications between you and your State Distributing Agent? Would you say that communications are . . .

Excellent.....	1	49/
Very good.....	2	
Satisfactory.....	3	
Fair, or.....	4	
Poor.....	5	
DON'T KNOW.....	8	

8d7. To what extent have communications between you and your State Distributing Agent changed in the past few years? Are communications . . .

Much better	1	50/
Better	2	
About the same	3	
Worse, or	4	
Much worse	5	
DON'T KNOW	8	

8d8. How often does your receipt, bill of lading, or invoice correctly reflect the commodities that you receive? Is it correct . . .

All of the time	1	51/
Most of the time	2	
Some of the time, or	3	
Never	4	
DON'T KNOW	8	

8d9. How would you rate the overall performance of the commodity distribution system this year? This rating should reflect the effectiveness of the distribution system and not the availability of specific donated commodities. Would you rate it . . .

Excellent	1	52/
Very good	2	
Good	3	
Satisfactory, or	4	
Poor	5	
DON'T KNOW	8	

8d10. How would you rate the performance of your commodity distribution system this year as compared with previous years? Again, this rating should not reflect differences in the availability of specific donated commodities. Would you rate it . . .

Much better	1	53/
Better	2	
About the same	3	
Worse, or	4	
Much worse	5	
DON'T KNOW	8	

SECONDARY RESPONDENT: _____

TITLE: _____

TELEPHONE # _____

9. TECHNICAL ASSISTANCE:

This set of questions deals with technical assistance offered to school districts this year.

9A. USDA recently began mailing a quarterly newsletter entitled "Commodity Foods" to all school districts in the country to keep them appraised of developments in the commodity donation program.

Has anyone in your school district been receiving this newsletter?

YES.....	1	54/
NO (SKIP TO Q.9B).....	2	
DON'T KNOW (SKIP TO Q.9B).....	8	

9a1. Do you have any suggestions for improving the newsletter?

YES.....	1	55/
NO (SKIP TO Q.9B).....	2	

9a11. What are your suggestions?

_____ 56-57/

_____ 58-59/

_____ 60-61/

9B. USDA is interested in your opinion about some other materials that have been sent to school districts.

Facts about USDA Commodities, FNS-251, contains information on storage, handling, preparation, and cooking for each of 70 commodities purchased by USDA.

Did anyone in your school district receive these?

YES.....	1	62/
NO (SKIP TO Q.9C).....	2	
DON'T KNOW (SKIP TO Q.9C).....	8	

9b1. Did you find them . . .

Very useful.....	1	63/
Somewhat useful, or.....	2	
Not at all useful.....	3	

9C. Nutritive Values of USDA-Donated Commodities, FNS-255, provides calorie and nutrient information for typical serving sizes of USDA-donated commodities.

Did anyone in your school district receive this publication?

YES.....	1	64/
NO (SKIP TO Q.9D).....	2	
DON'T KNOW (SKIP TO Q.9D).....	8	

9c1. Did you find it . . .

Very useful.....	1	65/
Somewhat useful, or.....	2	
Not at all useful.....	3	

9D. The new Quantity Recipes for School Food Service, PA-1371, provides step-by-step directions detailing amounts of ingredients for each recipe for both 50 and 100 servings.

Did anyone in your school district receive these recipes?

YES.....	1	66/
NO (SKIP TO Q.10).....	2	
DON'T KNOW (SKIP TO Q.10).....	8	

9d1. Did you find them . . .

Very useful.....	1	67/
Somewhat useful, or.....	2	
Not at all useful.....	3	

SECONDARY RESPONDENT: _____

TITLE: _____

TELEPHONE # _____

10. OPERATING DAYS

The next set of questions is about the total number of operating days for the School Lunch and School Breakfast Programs during last school year, that is, during school year 1988-89.

10A. ELEMENTARY SCHOOLS

10a1. For elementary schools, how many operating days were there in the School Lunch Program last school year? ____ 68-70/

10a2. For elementary schools, how many operating days were there in the School Breakfast Program last school year? ____ 71-73/

10B. MIDDLE/SECONDARY SCHOOLS

10b1. For middle and secondary schools, how many operating days were there in the School Lunch Program last school year? ____ 74-76/

Card 9
12-13/09

10b2. For middle and secondary schools, how many operating days were there in the School Breakfast Program last school year? ____ 14-16/

ASK "ALL SCHOOLS" QUESTIONS ONLY IF RESPONDENT COULD NOT ANSWER FOR ELEMENTARY AND MIDDLE AND SECONDARY SCHOOLS

10C. ALL SCHOOLS

10c1. For all schools, how many operating days were there in the School Lunch Program last school year? ____ 17-19/

10c2. For all schools, how many operating days were there in the School Breakfast Program last school year? ____ 20-22/

SECONDARY RESPONDENT: _____

TITLE: _____

TELEPHONE # _____

11. REIMBURSABLE LUNCHES

Now I have some questions about the number of reimbursable lunches served and claimed last school year, that is, during school year 1988-89.

Can you answer these questions first for all your elementary schools, and then for a combination of your middle and secondary schools?

YES (SKIP TO Q.11B).....	1	23/
NO (CONTINUE).....	2	

11A. ALL SCHOOLS

11a1. For all schools, how many free lunches were served to children and claimed for reimbursement in the School Lunch Program last year? _____ 24-32/

11a2. For all schools, how many reduced-price lunches were served to children and claimed for reimbursement in the School Lunch Program last year? _____ 33-41/

11a3. For all schools, how many full-price lunches were served to children and claimed for reimbursement in the School Lunch Program last year? _____ 42-50/

| SKIP TO QUESTION 12 |

11B. ELEMENTARY SCHOOLS

11b1. For elementary schools, how many free lunches were served to children and claimed for reimbursement in the School Lunch Program last year? _____ 51-59/

11b2. For elementary schools, how many reduced-price lunches were served to children and claimed for reimbursement in the School Lunch Program last year? _____ 60-68/

11b3. For elementary schools, how many full-price lunches were served to children and claimed for reimbursement in the School Lunch Program last year? _____ 69-77/

11C. MIDDLE/SECONDARY SCHOOLS

11c1. For middle and secondary schools, how many free lunches were served to children and claimed for reimbursement in the School Lunch Program last year? _____ 14-22/

11c2. For middle and secondary schools, how many reduced-price lunches were served to children and claimed for reimbursement in the School Lunch Program last year? _____ 23-31/

11c3. For middle and secondary schools, how many full-price lunches were served to children and claimed for reimbursement in the School Lunch Program last year? _____ 32-40/

12. REIMBURSABLE BREAKFASTS

Now I have some questions about the number of reimbursable breakfasts served and claimed last school year, that is, during school year 1988-89.

Can you answer these questions first for all your elementary schools, and then for a combination of your middle and secondary schools?

YES (SKIP TO Q.12B).....	1	41/
NO (CONTINUE).....	2	

12A. ALL SCHOOLS

12a1. For all schools, how many free breakfasts were served to children and claimed for reimbursement in the School Breakfast Program last year? _____ 42-50/

12a2. For all schools, how many reduced-price breakfasts were served to children and claimed for reimbursement in the School Breakfast Program last year? _____ 51-59/

12a3. For all schools, how many full-price breakfasts were served to children and claimed for reimbursement in the School Breakfast Program last year? _____ 60-68/

| SKIP TO QUESTION 13 |

12B. ELEMENTARY SCHOOLS

12b1. For elementary schools, how many free breakfasts were served to children and claimed for reimbursement in the School Breakfast Program last year? _____ 69-77/

Card 11
12-13/11

12b2. For elementary schools, how many reduced-price breakfasts were served to children and claimed for reimbursement in the School Breakfast Program last year? _____ 14-22/

12b3. For elementary schools, how many full-price breakfasts were served to children and claimed for reimbursement in the School Breakfast Program last year? _____ 23-31/

12C. MIDDLE/SECONDARY SCHOOLS

12c1. For middle/secondary schools, how many free breakfasts were served to children and claimed for reimbursement in the School Breakfast Program last year? _____ 32-40/

12c2. For middle/secondary schools, how many reduced-price breakfasts were served to children and claimed for reimbursement in the School Breakfast Program last year? _____ 41-49/

12c3. For middle/secondary schools, how many full-price breakfasts were served to children and claimed for reimbursement in the School Breakfast Program last year? _____ 50-58/

SECONDARY RESPONDENT: _____

TITLE: _____

TELEPHONE # _____

13. ANNUAL REVENUES

Now I have some questions about the income that was received by your school district's food service program last school year, that is, the 1988-89 school year.

13A. INCOME FROM SCHOOL DISTRICT SOURCES

13a1. What was your cash income from reimbursable meals served to students enrolled in your school district? $_____.00 59-67/

13a2. What was your income from all other cafeteria sales including a la carte and adult meals, as well as sales to other institutions, child care programs, elderly feeding programs, or child care after school feeding programs? $_____.00 68-76/

Card 12
12-13/12

13a3. Did you have any income from the school district, such as a per-meal subsidy from the district or an end-of-year subsidy? If so, how much? IF NONE, ENTER 0 $_____.00 14-22/

13a4. Did you have any income from the community, such as donations? If so, how much? IF NONE, ENTER 0 $_____.00 23-31/

13a5. Did you have any other local income?

YES.....	1	32/
NO.....	2	

13B. INCOME FROM FEDERAL AND STATE SOURCES

13b1. What was your total income from federal and state meal reimbursements? $_____.00 33-41/

13b2. Did you receive an adjustment, either an overclaim or underclaim, from a comprehensive review or audit from the previous year? If so, how much? IF NONE, ENTER 0 $_____.00 42-50/

13b3. Did you have any other federal or state income? If so, how much? IF NONE, ENTER 0 $_____.00 51-59/

13C. OTHER INCOME

13c1. Did you have any other income from any other source? If so, how much?

YES.....	1	60/
NO (SKIP TO Q.14).....	2	
DON'T KNOW (SKIP TO Q.14).....	8	

SOURCE	AMOUNT	
_____	$ _____.00	61-69/
_____	$ _____.00	70-78/
		Card 13 12-13/13
_____	$ _____.00	14-22/

SECONDARY RESPONDENT: _____

TITLE: _____

TELEPHONE # _____

14. ANNUAL EXPENDITURES

Now I have some questions about the expenditures made by your school food service last school year, that is, the 1988-89 school year. These are direct expenditures out of the school food service account.

14A. How much did you spend on labor? Can you give me salary and fringe benefits separately?

14a1.	Total labor	$_____.00	23-31/
14a2.	Salary	$_____.00	32-40/
14a3.	Fringes	$_____.00	41-49/
14b.	How much did you spend on food?	$_____.00	50-58/
14c.	How much did you spend on capital expenditures?	$_____.00	59-67/
14d.	How much did you spend on supplies such as spoons, forks, plates, and all other supplies?	$_____.00	68-76/
14e.	How much did you spend on storage and transportation?	$_____.00	Card 14 12-13/14 14-22/
14f.	How much did you spend for contracted services such as ADP or professional services?	$_____.00	23-31/
14g.	How much did you spend on overhead and indirect costs?	$_____.00	32-40/

14h. Did you have any other expenses?

YES.....	1	41/
NO (SKIP TO CLOSING).....	2	
DON'T KNOW (SKIP TO CLOSING).....	8	

14i. What are they?

SOURCE	AMOUNT	
_____	$ _____.00	42-50/
_____	$ _____.00	51-59/
_____	$ _____.00	60-68/

CLOSING: That's all the questions. We thank you very much for your time.

APPENDIX B

MEAL OBSERVATION METHODOLOGY

MEAL OBSERVATION METHODOLOGY

This appendix summarizes the methodology used in the on-site meal observations. It also includes a summary of the variations in cafeteria environment that complicated or affected data collection. The strategies employed in this study in dealing with these situations are outlined and recommendations for future studies are provided.

OBSERVATION METHODOLOGY

The on-site meal observations were designed to capture data on a full week's worth of school meals in each of 60 selected schools. In schools that participated in only the NSLP, five lunches were observed. In schools that offered both breakfast and lunch, breakfast was observed for four days and lunch was observed for five days. Because of the preparatory work involved in the meal observation protocol, it was not possible to observe breakfast on the first day.

For each of the five days on site, data were collected on reimbursable meals offered to students, meals selected by participating students (i.e., what children actually took/purchased from the available foods), and meals consumed (what the children actually ate.) Data collection strategies and the instruments utilized in collecting these data are described below:

Meals Offered

For each meal, detailed information was collected on the foods actually offered to students. This was based on actual observation rather than reliance on a written menu. In practice, what is planned (i.e., on the menu) is often not what is served. When several options were available, i.e., different fruit, vegetable or entree choices, data were collected for all possible choices. This information included the name of each specific food item as well as a complete description of the food, including brand name and preparation method when appropriate. For foods prepared from scratch, detailed recipes were collected, including ingredients, preparation methods and yields. Observers were trained to carefully probe for details that could effect the fat, sugar or sodium content of foods, since these characteristics were of particular interest to FNS.

Average portion sizes for each food were determined by actually weighing, or measuring in the case of beverages, five portions of each food item served each day, and then computing the average. For self-serve items, observers established a

reference portion size for use in visual estimation following the protocols established and tested by Comstock and Symington.1/

The data collection instruments used in collecting these data are the Menu Record, the Recipe Form and the Serving Size Computation Forms. Samples of all forms are provided in Appendix C.

Meals Selected

To obtain data on which foods children select for inclusion in an NSLP meal, field staff observed approximately 60 children at each meal and recorded the foods and beverages included in their NSLP or SBP meals. Observations were limited to reimbursable meals. The operational definition of a reimbursable meal depended on whether or not the school utilized the offer-vs-serve (OVS) option.2/

Observers positioned themselves at the cash register, or another strategic location, and utilized the Food Selection and Plate Waste Record (see Appendix C) to record the foods actually taken by each child. All menu items eligible for inclusion in a reimbursable meal were recorded on these forms. Observers then recorded the number of servings, or fraction thereof, for each of the food items a child selected.

The following guidelines were utilized in collecting these data:

- observers were instructed to spread the 60 observations across all lunch periods, so that a random sample of children would be observed. Prior to each site visit, the project coordinator at AAI phoned each school and obtained information on the number of lunch periods and age groups (grades) included in each session. The observer could then plan ahead of time on how to space observations.

- in schools where several different food lines were available, i.e., hot lunch, salad bar, or sandwich line, observers were asked to focus on a different line each day. For logistical reasons, it was not possible for one

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1/Comstock, E. M., and Symington, L. E.: "Distribution of serving sizes and plate waste in school lunches." Journal of the American Dietetic Association 81:413, 1982.

2/The offer-vs-serve (OVS) option stipulates that schools must offer meals planned in accordance with USDA meal pattern requirements, but that students may decline up to two of the five NSLP meal components or one of the four SBP meal components. OVS has been mandatory for the NSLP at the secondary school level since 1975. In 1981, the OVS option was extended to elementary schools, at the discretion of the local school district. OVS was extended to the SBP in 1989.

observer to observe more than one line per meal (see discussion in Chapter VII).

- observers indicated whether or not the child being observed had taken any a la carte items along with their reimbursable meal. The specific type of a la carte item was not recorded.

Meals Consumed

During each meal observation period, observers tagged the tray of every fifth child they observed, for a total of 12 trays, in order to observe plate waste. Children whose trays were tagged were instructed to deposit their trays (including trash) in a designated area after they finished eating.

Upon completion of all meal observations, data collectors retrieved the tagged trays and visually estimated the amount of plate waste following the procedures described and validated by Comstock and Symington, and others.1/ These data were recorded in the appropriate columns on the Food Selection and Plate Waste Record (Appendix C). Waste was recorded as fractions of an average serving, i.e., 3/4 serving, 1/2 serving or 1/4 serving. If no trace of food that was selected remained on the plate, a zero was recorded; if the full portion of food remained, a 1 was recorded to indicate that a full average serving was wasted (not consumed). The one exception to the visual estimation rule was beverages. Leftover (wasted) beverages were actually measured, since the opaque nature of the typical serving containers made visual estimations impossible. A la carte items were not included in plate waste observations.

When food items appeared on a plate waste tray that had not been recorded as a food selected, the observation was adjusted to indicate that the student had taken the food if it had actually been offered. Other items (e.g., foods from home, vending or a la carte) were ignored.

CAFETERIA ENVIRONMENT FACTORS

The basic strategy employed for meal observation involved (1) developing a list of the foods offered, based on conversations with the cafeteria manager and on observation of the foods actually available in the serving line; (2) copying the list onto a series of forms which were divided into numbered columns for the observations; and (3) standing at the foot of the food-selection line (usually by the cashier) and checking off the

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1/Comstock, E. M., and Symington, L. E.: "Distribution of serving sizes and plate waste in school lunches." Journal of the American Dietetic Association 81:413, 1982 and Stallings, S. F. and McKibben, G. D., "Validation of plate waste visual assessment techniques in selected elementary schools." School Food Service Research Review 6:9, 1982.

foods observed on each tray by recording the number of servings taken.

A variety of cafeteria characteristics were found to influence the feasibility of collecting certain types and amounts of data. Although a pre-visit scheduling questionnaire provided some details that were useful for planning data collection, each school, and every cafeteria, is unique.

All of the situations and contingencies described below have been observed by staff of the Child Nutrition Program Operations Study. Although anecdotal, they serve to illustrate the variety of situations that exist in school cafeterias and that must be considered in planning data collection for future studies. The issues are divided into the following categories: (1) menu characteristics, (2) cafeteria layout, (3) type of service, (4) money, (5) schedules, and (6) other factors.

Menu Characteristics

Real Menus. Most schools plan and announce their menus weeks ahead of time. Because of contingencies of food supplies, equipment, and staffing, the meals as actually offered usually differed from the "official" menu. The most common aberrations were: (1) addition of leftover items, (2) substitution for items not available (e.g., the offered vegetable would be different from that on the official menu); (3) supplements for foods used up (e.g., offering frozen pizza if the day's official entry sold out); and (4) standard items that are always offered, so they are not listed on the menu (hamburgers, French fries, peanut butter and jelly sandwiches). Thus, the official menu is just a starting point for developing the "real" menu for the day.

Unexpected Items. After the "real" menu had been developed and transferred into observation forms, observers found that additional foods appeared without warning during the course of their observations, or that foods they were told would be available did not appear on any students' trays.

In the former case, observers noted the additional food and incorporated it into their observations. They later checked with the cafeteria manager to obtain the necessary descriptive information, portion size, etc. for the "unplanned" food item. On occasion, these unexpected foods turned out to be special items provided to a very few students (for example, juice provided to one or two students who cannot tolerate milk). When this was the case, the affected observations were deleted.

In the case of foods that were listed on the "real" (observation) menu but did not turn up in any observations, observers must ascertain (either through direct observation or through discussions with the manager) whether the food was indeed offered. It is possible to offer a food that no student takes, especially unpopular commodity items (prunes offered as one of several canned fruits) or alternates to a popular entree (peanut butter sandwiches as an alternate to pizza).

A la Carte Items. If a la carte items are offered, the observer must know whether to record information about the a la carte foods (e.g., ingredients and recipes; whether taken; whether to record plate waste of a la carte items, etc.). Frequently, a la carte items are arrays of prepackaged snacks that are similar in size, price, and nutritional content. If the observer is going to include a la carte items, it may help to be able to aggregate similar items (e.g., all bags of chips, or all cakes).

For the Child Nutrition Program Operations Study, the focus of meal observations was the reimbursable meal. Thus, a la carte items were not recorded or considered when determining nutrient content of meals offered, selected or consumed. Basic descriptive information on the number and type of a la carte items was collected, along with a simple check-off to indicate when students had included an a la carte item (of any type).

A final comment about a la carte foods is in order, for considerations for future studies. A la carte items can be available in a number of locations in the cafeteria. Thus, to accurately record a la carte food selection via student observations, one observer may need to "track" one student through the lunch period.

Depleted Menus. This occurs when an entire food group runs out while students are still selecting their meals. For example, meat and meat alternate foods are popular at salad bars, and may disappear before all students have assembled their salads. Since a reimbursable meal (under OVS) can still be assembled without this component, eligible meals can still be taken. Nevertheless, the observer must deal with the fact that the full pattern meal is not available. In this study, observers were instructed to continue recording observations of reimburseable meals.

Cafeteria Layout

Multiple Serving Lines. If foods are served in more than one location, the observer must know whether to observe foods served in all lines. This is possible if students from all lines go to one cashier. If students may go to any one of a group of cashiers, there may be some bias regarding which lines serve which cashiers, so a random distribution of foods among all cashiers cannot be assumed. If the lines are served by different cashiers, the number of students that can be observed may be reduced. In this study, observers were instructed to distribute observations evenly across lines throughout the lunch period in order to achieve a random distribution of foods.

Specialized Lines. Cafeterias with more than one serving line often serve different menus at different lines (for example, hot lunches in one line, sandwiches in another, and salad bar in a third). Such arrangements often yield a list of available items of unwieldy length. Furthermore, if each line has its own cashier the observer will be able to observe only one group of

foods at a time. If all lines feed into the same cashier (or group of cashiers), the observer may elect to observe the full menu. For logistical reasons, observers in this study were instructed to focus on one specialized line each day when multiple serving lines, that did not funnel down to one cashier area, were present. This approach, when used over a five-day period, still allowed for a random sampling of the various types of meals available.

Apparently Unspecialized Lines. Cafeterias with more than one line may assert that the same items are available through two or more lines, but our experience indicates that no two serving lines are ever quite identical. Leftovers and other limited items often appear in only one line. The lines may offer different soup or sandwiches. Portion sizes may differ among servers. Or the students using one line may differ systematically from the those in the other. We have seen lines habitually frequented by students of a single sex (for no discernable reason), resulting in smaller meals (often too small to be reimbursable, even with OVS) taken in the line frequented by girls. In one school, students were assigned to lines alphabetically, with the result that a significant minority group with atypical food choices was much more prevalently assigned to one line. In summary, all food serving lines must be treated as unique, despite any apparent lack of differences in the items officially offered or in the students using the lines. For this reason, observers in the Child Nutrition Program Operations Study were instructed to distribute observations across all serving lines, even those purported to be identical.

No Lines. Some schools have adopted a "scramble" or "scatter" system of serving that apparently works well from their perspective but wreaks havoc for observers. Typically, students may approach any of several food stations serving various menus, and proceed to any of several cashiers. Self-serve items are frequently offered, and it becomes very difficult to observe a significant number of students. For this study, self-serve lines required that observers track individual students throughout the selection process in order to obtain complete data. In such cases, observers were able to observe only 50-75 percent of the targeted number of students.

Multiple Passes. In most cafeterias, students may return to the line for more food (or to buy a la carte desserts). Thus, it is impossible to observe all foods purchased by an individual student unless (a) there is only one cashier, and (b) students are not allowed to return to the line a second time; or (c) individual students are tracked throughout their lunch period. Since the unit of observation for this study was the reimburseable meal as taken, observers did not observe individual students continuously over the lunch period.

Prepayment. Sometimes, students will pay for a meal before being served all of its components. Most often, condiments such as catsup and salt are available at a station in the cafeteria. But occasionally, major portions of a meal, such as an entire salad bar, are picked up after a student has paid for the meal. To complicate matters more, this system of paying may be combined with a "scramble" system of serving, making the observer's task extremely challenging. Observers may have to resort to the system used for salad bars, of following individual students (selected at random or at predefined intervals) through the entire food selection process.

No Cafeteria. In some schools, due to crowding or temporary building conditions, some or all students may eat lunch in their classrooms. This may influence the way in which lunches are served (for example, pre-plated meals may be brought to students, eliminating opportunities for food choices and OVS) and access to trays for plate waste studies.

Type of Service

Offer-vs.-Serve. If observers are charged with observing only reimbursable meals, OVS can complicate and slow down their observations by increasing the number of trays for which observers must pause to determine eligibility. Generally, at schools lacking OVS, cafeteria personnel enforce the meal pattern requirements and all observed meals are clearly pattern meals.

Reality of OVS. An additional concern is the high prevalence of discrepancies between SFA managers' statements about the presence of OVS in district schools and whether it is actually being practiced. In some elementary schools described by their SFA managers as having OVS, cafeteria managers not only insist that students take the full pattern meal, but they cannot even describe the OVS concept. Alternatively, in some schools that officially do not have OVS, staff interested in averting plate waste will not compel children to take items they certainly will not eat. For this study, data on OVS implementation was originally based on SFA managers' reports. Given the reports received from data collectors, however, it was decided to use a reconstructed OVS variable based on observed behavior rather than reported policy. This approach is recommended for future studies.

Self-Serve. If students are allowed to serve themselves (that is, to determine the portion size, not just to select from among several choices), then observers must be specially trained to visually estimate portion size. If students are serving themselves single items (for example, if they serve themselves from among a selection of hot vegetables), the observers may simply note the portion size as they would otherwise note the number of standard portions served. However, if the self-serve items may be aggregated, such as in a salad bar or "potato bar," then observers at the end of the line cannot determine portion sizes (or even types of foods) for the first foods taken, that

is, the ones at the bottom of the salad, and they must instead observe each salad as it is constructed by selecting students and following them through the line. Such observations take several times longer per student than observations of standardized meals, and severely limit the number of observations that an individual can complete during a single lunch session. (See Chapter VII for a discussion of how this was handled in the CNOPS study).

Intermediate types of service also exist. For example, a "sandwich bar" can consist of bread, meat, and cheese selected by the student but assembled by food service staff, with condiments (including salad vegetables) self-served (salad bar style) after the sandwich is received. In such a case, the observer must still determine the contents of each sandwich, but may be able to determine the bread, meat, and cheese components as each sandwich is handed to each student, leaving the labor-intensive salad bar observations for only the second half of the observation, thus minimizing the amount of time and labor required.

Officially Varying Portion Sizes. Menus usually include a single portion size for each food, but variations exist for several reasons. "Super sizes," officially equal to one and one-half times the standard portion, are offered at some secondary schools to accommodate the greater appetites of some students. These may (or may not) be offered at a premium price.

The USDA meal pattern specifies one set of portion sizes for children in grades K through 3, and larger portions of many foods for grades 4 through 6. Schools may offer different sized portions, especially if students from different grades are served during different lunch sessions, as is often the case.

In both of the above situations, we have found that the portions as actually served (and as our observers weighed several samples of each) do not match the reported portion size or the portion size as specified in the USDA Meal Pattern guidelines. In at least one case, the portion served to older elementary school children was smaller than that served to the younger children. This underscores the importance of weighing and measuring actual portions of food served to students rather than relying on "reported" portion sizes.

Unofficially Varying Portion Sizes. Portion sizes may vary from those stated by both the official menu and the USDA meal pattern. Poor portion control may lead to portions that differ systematically from the planned size. For example, heaping ladles that should be level ladles lead to over-size portions. For this reason, our sample portions for weighing were obtained in the same manner as the students' (e.g., from among the same pre-portioned dishes or during the serving of the meal, for bulk items dished out as students requested them).

Accommodating individual students' preferences often happens when staff serve students individually, rather than pre-portioning foods. Students may request and receive portions smaller or larger than the standard. Our notes on our observations indicate that these variations probably balance each other out, but there is no practical way to determine this.

Money

Price of Meal. If the price of the reimbursable lunch is an even dollar, the line will move much more quickly than if it is an amount that will involve change. Thus, an observer is less likely to be able to observe consecutive trays.

A la Carte. If a la carte items are available in the same line as reimbursable foods, or if many students are buying reimbursable items on an a la carte basis (milk, for example), the rate at which students pass by the cashier will be reduced, thereby facilitating observations.

Free and Reduced-Price Meals. Despite firm discouragement, many school districts persist in using readily discernible methods for identifying students entitled to free and reduced-price meals. Depending on the system used, processing such students may taken more or less time than processing full-price students, and the speed of the line will be affected accordingly, the degree depending on the proportion of free and reduced-price meals served. Especially in small schools where the free-meal students are known to the cashier, they may hardly pause at the checkout, jeopardizing opportunities for observing meals taken. In such cases, it is essential to recruit the cashiers' cooperation in encouraging students to pause at the checkout.

Computerization. Some schools have adopted computers with various capacities for tracking foods purchased, prices to be charged different students, and other bookkeeping tasks. Depending on the tasks and the success with which they are conducted, this aspect may speed or slow down the line.

Schedules

Grades. Students of different ages have different food preferences and appetites. Therefore, especially in elementary schools and in secondary schools serving a broad range of ages, observers must determine whether students of different ages are served lunch at different times. Typically, the youngest children are served first, so any sample of students must be selected during different lunch periods to be representative.

Times. Both the duration of the lunch period and the time between the beginning of one period and the beginning of the next are significant. Short lunch periods (20 to 25 minutes) lead to rushed students an staff, a disorganized atmosphere, and less opportunity to observe all meals served. They may also lead to departures from the official OVS policy. One SFA director told us that he has dropped OVS (in practice) at some secondary schools (although not in the one we observed) because offering choices slows down the lines.

Intervals between lunch periods may vary from 20 minutes to virtually nothing. Longer intervals allow staff to restock foods (thus keeping offerings consistent with the "official" menu) and keep a perspective, enhancing observations in circumstances where time constraints might otherwise occur and in circumstances where the cooperation of the cashier is helpful.

Continuous Serving. To keep lines moving, some schools have instituted serving schedules that call for classes to arrive at the cafeteria at five-minute intervals throughout the lunch period. Such scheduling usually enhances opportunities for observations, because students and cafeteria staff are less rushed. (Students know they will get their full lunch period, unlike the last students served during a typical schedule). On the other hand, cafeteria staff have less "down time" to accommodate observers, restock foods, and catch their own breath.

Other Factors and Relationships Between Factors

Number of Meals Served. Even in schools with active lunch programs, there may be very few breakfasts available for data data collection. In schools offering different menus (e.g., a hot lunch and a salad bar), one may be far more popular among all students, leaving few possibilities for observing the less-popular alternative.

Observation Opportunities. The maximum number of students one observer could potentially record depends on how many students pass by the selected observation point during the entire lunch session, which in turn depends on the number of meals served and the number of points where students may purchase lunches. In addition, the number of observations one observer can make can depend on how long a single observation takes. Observation time can be increased by long food lists, OVS, a la carte items, and physically awkward observation situations (e.g., peering over the cashier's shoulder if there's nowhere else to stand). Obviously, they will not be able to observe consecutive meals if the time required for each observation is greater than the amount of time required for each transaction with the cashier. Time per transaction is influenced by the price of lunch, the presence of a la carte foods, the use of computerized checkouts, and the nature of the system for tracking free and reduced-price meals.

When observers clearly will not be able to observe every transaction, they are instructed to observe meals at specified intervals (every second, third, or fifth tray) if this does not jeopardize their chances of attaining the target number of observations.

Staffing. Understaffed programs will be more difficult to observe because procedures will be rushed or not carried out correctly. For example, salad bars will not be restocked

frequently, and may not offer pattern meals. Overtaxed kitchen managers will be less able to provide needed information on foods offered, recipes, and ingredients. They are more likely to resent the presence of observers and be unmotivated to cooperate. Overtaxed staff will be less likely to offer support in vital areas such as supplying sample foods for weighing, and arranging vantage points for meal observers.

Although kitchen managers will almost certainly speak English, many cafeteria staff do not, and eliciting their cooperation may depend on interpreters or on hiring observation staff who speak a second language.

Contingencies. Crises and contingencies are endemic to studies conducted in schools. Teachers strike. Buildings are flooded, or lose heat. Cafeterias are commandeered for other uses, from administering standardized tests to filming television programs. Food preparation equipment breaks down. Schools conduct emergency evacuation drills in the middle of lunch. Key respondents call in sick, or resign. The principal decides to help out by coming to the cafeteria and "making sure that every student gets a good, hot lunch."

On-site observers must be prepared to deal with unusual situations by receiving thorough training in the principles underlying the data collection system, and they must have continuous access to the project staff responsible for making key data collection decisions.

APPENDIX C

MEAL OBSERVATION INSTRUMENTS

Child Nutrition Program Operations Study
On-Site Data Collection:
Record of Lunch Sent for Chemical Analysis

Day: M Tu W Th F Date: _____, 1990

Site: _____

Collected by: _____

Food Code	Menu Items Sent	Weight (grams) or Fluid Ounces
	Meat:	
	Grain:	
	Fruit/Veg:	
	Fruit/Veg:	
	Other:	

Child Nutrition Program Operations Study
On-Site Data Collection:
A La Carte Items

Breakfast: ___ Lunch: ___

Day: M Tu W Th F Site: _____

Date: _____,1990 Collected by: _____

List all "a la carte" items (i.e., all items not eligible as part of the school meal) that were available in the breakfast or lunch line(s) you observed.

Beverages: _____
_____
_____
_____
_____
_____

Fruits/vegetables: _____
_____
_____

Entrees: _____
_____
_____
_____
_____

Desserts: _____
_____
_____
_____
_____

Chips, pretzels _____
_____
_____

Other: _____
_____
_____

Child Nutrition Program Operations Study
On-Site Data Collection:
Serving Size Computations for Self-Serve Foods

Breakfast: ___ Lunch: ___

Day: M Tu W Th F Site: _____

Date: _____,1990 Collected by: _____

Menu item:

_____

Weight of reference sample of full portion:

_____ grams

Divide by 4=
1/4 portion _____ grams

Multiply by 2=
1/2 portion _____ grams

Multiply by 1.5=
3/4 portion _____ grams

Re-enter
1 portion _____ grams

Multiply by 1.25=
1- 1/4 portion _____ grams

Multiply by 1.2=
1-1/2 portion _____ grams

Multiply by 1.17=
1-3/4 portion _____ grams

Multiply by 1.14=
2 portions _____ grams

Divide by 2= _____ grams
Now, double-check your math.
This figure should match your original portion size!

Menu item:

_____

Weight of reference sample of full portion:

_____ grams

Divide by 4=
1/4 portion _____ grams

Multiply by 2=
1/2 portion _____ grams

Multiply by 1.5=
3/4 portion _____ grams

Re-enter
1 portion _____ grams

Multiply by 1.25=
1- 1/4 portion _____ grams

Multiply by 1.2=
1-1/2 portion _____ grams

Multiply by 1.17=
1-3/4 portion _____ grams

Multiply by 1.14=
2 portions _____ grams

Divide by 2= _____ grams
Now, double-check your math.
This figure should match your original portion size!

APPENDIX D

YEAR TWO NONRESPONSE ANALYSIS FOR SFA MANAGER SURVEY

SFA MANAGER SURVEY NON-RESPONSE ANALYSIS (YEAR TWO)

An analysis of possible non-resonse bias was conducted to determine the extent to which SFAs which responded to the Year Two SFA Manager Survey were systematically different from non-responding SFAs. Analyses were conducted for two sets of SFAs: (1) the 1,222 SFAs contained in the longitudinal data set, and (2) the 1,109 SFAs in the cross-sectional data set. Both groups were compared to the subset of SFAs that did not respond to the survey on three background characteristics: (1) SFA enrollment, (2) percent of enrolled children approved for free or reduced-price meals, and (3) participation in the SBP. A discussion of the results is presented below. Data for the analysis were obtained from State records for the 1986-87 school year (i.e., the data used to construct the sampling frame).

Longitudinal Data Set

Enrollment. Because the distributions of enrollment for responding and non-responding SFAs were skewed (many more small, rather than large SFAs), a simple test of the difference of the two mean values was inappropriate. As a result, enrollment was transformed using a logarithmic function, thus generating symmetric, near-normal distributions. A t-test, comparing the means of the transformed version of enrollment indicated that there is a statistically significant difference between the two distributions (t=-11.93). On average, the non-responding SFAs are smaller than the responding SFAs.

To examine this difference in more detail, Exhibit D.1 classifies SFA enrollment into five levels. Overall, the response rate to the telephone survey was 71 percent. However, for small SFAs--enrollment less than 1,000--the response rate was only 53 percent. A chi-square test on this contingency table indicated a statistically significant relationship between enrollment and response to the telephone survey (X^2 = 139.1).

Participation in SBP. An analysis comparing particiation in the SBP for non-responding and responding SFAs (see Exhibit D.2) revealed that there is no statistically significant differences between the groups (X^2=.80).

Percent Free or Reduced-Price. The percent of free or reduced-price children is defined as the proportion of students within an SFA who are approved to receive either free or reduced-price lunches. As with enrollment, a simple t-test of means is inappropriate because the two distributions are skewed. A t-test of the logarithmically transformed version indicated that there is a statistically significant difference such that SFAs with a high percentage of children approved for free or reduced-price meals are less likely to respond (see Exhibit D.3).

Exhibit D.1

Number and Percentage of Responders and Non-Responders
by SFA Enrollment:
Year Two SFA Manager Survey,
Longitudinal Data Set

Enrollment (Number of Students)	Non-Responder #	Non-Responder %	Responder #	Responder %	Total #	Total %
1-999	254	47%	283	53%	537	100%
1000-4999	167	24	526	76	693	100
5000-9999	42	17	211	83	253	100
10000-24999	24	15	134	85	158	100
25000 or more	10	13	68	87	78	100
Total N	497	29	1,222	71	1,719	100

Data Source: Year Two SFA Manager Survey and Sampling Frame for the Study

Exhibit D.2

Number and Percentage of Responders and Non-Responders,
by SBP Participation:
Year Two SFA Manager Survey,
Longitudinal Data Set

SBP Participation	Non-Responder		Responder		Total	
	#	%	#	%	#	%
NSLP only	287	28%	736	72%	1,023	100%
NSLP + SBP	210	30	486	70	696	100
Total N	497	29	1,222	71	1,719	100

Data Source: Year Two SFA Manager Survey and Sampling Frame for the Study

Exhibit D.3

Number and Percentage of Responders and Non-Responders, by Percent Free or Reduced Price: Year Two SFA Manager Survey, Longitudinal Data Set

Percent Free or Reduced-Price	Non-Responder		Responder		Total	
	#	%	#	%	#	%
0-9.9%	103	26%	286	74%	389	100%
10-24.9%	124	22	449	78	573	100
25-49.9%	108	25	317	75	425	100
50%-74.9%	78	41	114	59	192	100
75% or more	84	60	56	40	140	100
Total N	497	29	1,222	71	1,719	

Data Source: Year Two SFA Manager Survey and Sampling Frame for the Study

Summary. The analyses presented here examined three characteristics of SFAs that did and did not respond to the longitudinal data items on the Year Two SFA Manager Survey. The findings are:

- Enrollment - small SFAs had lower response rates than large SFAs.
- SBP participation - no statistically significant differences between the two groups.
- Percent free or reduced-price - SFAs with a high percentage of children approved for free or reduced-price meals had lower response rates than SFAs with lower percentages of free or reduced-price children.

In summary, there does appear to be a response bias problem with SFAs that are included in the Year Two longitudinal data set. The sample weighting adjustments described in Appendix E work to counteract and compensate for this bias.

Cross-Sectional Data Set

Enrollment. Exhibit D.4 presents information on survey responses for different sizes of SFAs. Overall, the response rate for the mail survey was 64%. However, the exhibit shows that small SFAs had a lower response rate (53%) than any other subgroup.

Participation in SBP. Exhibit D.5 presents the response rates for SFAs that participate only in the NSLP and for those SFAs that offer both the NSLP and SBP. For both groups, the response rate is not substantially different from the overall response rate of 64%. For SFAs that offer lunch only, the response rate was 65%, and for SFAs that offer breakfast as well as lunch, the response rate was 63%.

Percent Free and Reduced-Price. Exhibit D.6 presents response rates for SFAs that have varying percentages of children approved for free or reduced-price meals. It can be seen that SFAs with a high percentage of free or reduced-price children were less likely to respond to the cross-sectional survey than other SFAs.

Summary. In summary, an examination of the relationship between response rates and SFA enrollment, percent of free or reduced-price children, and SBP participation, supports the conclusion that there is a response bias problem with the cross-sectional survey. The sample weighting adjustments described in Appendix E work to counteract and compensate for this bias.

Exhibit D.4

Number and Percentage of Responders and Non-Responders, by SFA Enrollment: Year Two SFA Manager Survey, Cross-Sectional Data Set

SFA Size (Number of Students)	Non-Responder #	Non-Responder %	Responder #	Responder %	Total #	Total %
1-999	253	47%	284	53%	537	100%
1000-4999	216	31	477	69	693	100
5000-9999	74	29	179	71	253	100
10000-24999	39	25	119	75	158	100
25000 or more	29	37	49	63	78	100
Total N	611	36	1,108	64	1,719	100

Data Source: Year Two SFA Manager Survey and Sampling Frame for the Study

Exhibit D.5

Number and Percentage of Responders and Non-Responders,
by SBP Participation:
Year Two SFA Manager Survey,
Cross-Sectional Data Set

SBP Participation	Non-Responder		Responder		Total	
	#	%	#	%	#	%
NSLP only	354	35%	691	65%	1,023	100%
NSLP + SBP	257	37	426	63	696	100
Total N	611	36	1,108	64	1,719	100

Data Source: Year Two SFA Manager Survey and Sampling Frame for the Study

Exhibit D.6

Number and Percentage of Responders and Non-Responders, by Percent Free or Reduced Price: Year Two SFA Manager Survey, Cross-Sectional Data Set

Percent Free or Reduced-Price	Non-Responder #	Non-Responder %	Responder #	Responder %	Total #	Total %
0-9.9%	125	32%	264	68%	389	100%
10-24.9%	179	31	394	69	573	100
25-49.9%	144	34	281	66	425	100
50%-74.9%	84	44	108	56	192	100
75% or more	79	56	61	44	140	100
Total N	611	36	1,108	64	1,719	100

Data Source: Year Two SFA Manager Survey and Sampling Frame for the Study

APPENDIX E

WEIGHTING METHODOLOGY

WEIGHTING METHODOLOGY

This appendix describes the procedures used to calculate the sampling weights that are used to extrapolate sample data to the population of all SFAs in the Nation. The calculation of sampling weights is a multi-stage process involving the following steps which are done separately for the longitudinal component and the cross-sectional component:

Public SFAs

- Assign each public SFA an initial sampling weight equal to the reciprocal of its two-stage selection probability.
- Ratio-adjust the weights of public SFAs for nonresponse based on counts of total approved applicants, separately for self-representing (large) and non-self-representing (smaller) SFAs.
- Ratio-adjust the weights of public SFAs to match the count of all public SFAs in the Nation.
- Truncate the weights of outlying SFAs to reduce their contribution to the total.

Private SFAs

- Follow the same steps as for public SFAs.

All SFAs

- Ratio-adjust the weights of all SFAs so that the weighted count of total lunches served matches FNS' universe count in total and separately for high-poverty and low-poverty SFAs.

These weighting procedures not only allow extrapolation from the sample SFAs to the Nation as a whole, but to the extent possible, they also correct for nonresponse bias in the surveys. As was seen in Appendix D, there is a nonresponse bias in both the longitudinal and cross-sectional survey components such that non-responding SFAs tend to be smaller than responding SFAs. The longitudinal and cross-sectional surveys have a further bias in that nonresponding SFAs have a higher percentage of children approved for free or reduced-price meals (higher poverty level) than responding SFAs.

The weighting procedures specifically correct for the nonresponse bias due to SFA size and for poverty level in that separate weight adjustments are done for self-representing vs.

non-self-representing SFAs and for SFAs that serve 60 percent or more free or reduced-price lunches vs. SFAs that serve 59 percent or fewer free or reduced-price lunches. Self-representing SFAs were included in the sample with certainty (selection probability = 1.0) and are large SFAs. Non-self-representing SFAs are all other (non-large) SFAs.

LONGITUDINAL SAMPLE WEIGHTS

Each sample SFA was assigned an initial sampling weight equal to the reciprocal of its two-stage selection probability. The basic sampling weight was then adjusted for survey non-response.

Non-response Adjustment: Public SFAs. Public SFAs were first divided into two weighting classes--self-representing public SFAs (selection probability of PSU=1.0 and selection probability of SFA within PSU=1.0), and non-self-representing public SFAs. The basic SFA weights of the 243 responding self-representing public SFAs were multiplied by 1.1654, the ratio of the weighted count of total approved applicants for all 308 sample self-representing SFAs to the weighted count for the 243 responding SFAs. The total approved applicant variable referred to here is the SY 1986-87 data reported by the States to FNS for SFAs in the selected sample of 80 PSUs.

The basic SFA weights of the responding non-self-representing public SFAs were also ratio-adjusted in a similar manner. For this class of SFAs, the ratio equalled 1.1343.

After this initial adjustment for non-response, the weighted count of public SFAs equalled 9,273 and the weighted count of total approved applicants equalled 10,727,915. This weighted total of SFAs is lower than the figure of 15,715 public school districts cited in the Digest of Educational Statistics. Therefore, the weights of the non-self-representing public SFAs were further ratio-adjusted by the factor 1.7166 to bring the weighted count of public SFAs up to 15,715. This yielded a weighted total of approved NSLP applicants of 14,402,912.

The next step in the weighting process involved examining the distributions of the sampling weights and of the weighted counts of approved NSLP applicants. The latter distribution indicated that a few public SFAs were contributing disproportionately to the weighted count of 16,402,912 total approved applicants due to their high SFA weight value. The SFA weight of these SFAs was, therefore, truncated to the weight value representing the 95th percentile to the SFA weight distribution, in order to reduce the contribution of these SFAs to the overall total. After truncation, the weighted count of public SFAs declined to 15,050, while the weighted count of total approved applicants declined to 15,581,297.

Non-response Adjustment: Private SFAs. The weighting methodology for private SFAs responding to the longitudinal questions followed the same steps that were used for public SFAs. The only difference is that the weights were initially adjusted so that the weighted count of private SFAs equalled 4,274, the FNS estimate of the number of private SFAs in the U.S. At that point, the weighted count of total approved applicants in private SFAs equalled 220,950.

After examining the distributions of the SFA sampling weights and of the total approved applicants, private SFAs with a high values had their SFA weight truncated to the 90th percentile of the SFA weight distribution. The 90th percentile was selected as the truncation point because the smaller sample size of private SFAs was subject to more weight variability in terms of total approved applicants. This yielded a weighted count of 4,184 private SFAs, and a weighted count of 219,776 approved applicants.

Meal Count Post-Stratification. An important analytical component of the study is the estimation of total meal counts for key domains of the SFA universe. The weighted count of free lunches, reduced-price lunches and paid lunches as reported on the SFA longitudinal survey were all found to be higher than universe counts available from FNS secondary data sources. The magnitude of the difference varied by meal type: +23 percent for free lunches, +39 percent for reduced lunches, and +54 percent for paid lunches. It was important to have the weighted lunch count agree with the FNS universe count.

Although the total weighted lunch count was higher than the FNS count by 41 percent, the difference varied significantly by SFA poverty status. For SFAs that serve 59 percent or fewer free or reduced-price lunches, the difference was +63 percent. On the other hand, for SFAs that serve 60 percent or more free or reduced-price lunches, the difference was -4 percent. The under-representation of lunches in this latter group was caused by a lower response rate among this class of SFAs. Fortunately, FNS secondary data reports total lunches for both of these subgroups of SFAs:

	Total Lunches
59% or less F&R	2,648,127,048
60% or more F&R	1,322,078,422
Total	3,970,205,470

The longitudinal sample SFA weights for both subgroups of SFAs were separately ratio-adjusted to equal the FNS universe counts. After this adjustment the weighted count of free, reduced-price and paid lunches were all within 2 percent of the FNS universe counts. This final weight adjustment lowered the weighted count of total SFAs to 12,834. Weighted counts for key domains are shown in Exhibit E.1.

Exhibit E.1

Weighted Counts for Key Population Domains in Longitudinal Data Set for Year Two SFA Manager Survey

SFA Subgroups	Estimated Number of SFAs		Estimated Total Approved Applicants as Reported in the Survey	
	Number	Percent	Number	Percent
Type of SFA				
Public	10,161	79.2	8,156,778	98.8
Private	2,673	20.8	99,307	1.2
Poverty Level of SFA				
60% or more F&R	2,472	19.3	4,403,882	53.3
0-59% F&R	10,362	80.7	3,852,203	46.7
Participation in SBP				
NSLP and SBP	4,274	33.3	6,672,557	80.8
NSLP Only	8,559	66.7	1,583,528	19.2
Total Sample	12,834	100.0	8,256,085	100.0

In addition to lunch counts, the FNS secondary data also provides the universe count of total breakfasts. For those analyses that include only SFAs that offer the SBP, it was desirable to have the weighted count of breakfasts in agreement with the FNS count. The SFA weights for all SFAs that offer the SBP were therefore ratio-adjusted to equal the FNS count of 623,341,613 breakfasts. This separate set of weights was used only for those analyses involving SFAs that offer the SBP.

CROSS-SECTIONAL SAMPLE WEIGHTS

The cross-sectional sample consists of those SFAs that answered the questions included for the first time in the Year Two survey. The steps in the weighting methodology were exactly the same as for the longitudinal sample; however, no meal count post-stratification was carried out. Rather, the weighted count of total approved applicants in the cross-sectional sample was ratio-adjusted to agree with the weighted count of total approved applicants in the longitudinal sample. Because the ratio-adjustment used total approved applicants, the weighted number of SFAs in the cross-sectional sample does not agree exactly with the weighted count of SFAs in the cross-sectional sample.

APPENDIX F

RECOMMENDED DIETARY ALLOWANCES

Appendix F

Food and Nutrition Board, National Academy of Sciences--National Research Council Recommended Dietary Allowances, Revised 1989[1]

Category/ Age (years)	Protein (gm)	Vitamins						Minerals			
		Vitamin A (mcg RE)	Vitamin C (mg)	Thiamin (mg)	Riboflavin (mg)	Niacin (mg)	Vitamin B_6 (mg)	Calcium (mg)	Phosphorus (mg)	Magnesium (mg)	Iron (mg)
Males											
4-6	24	500	45	0.9	1.1	12	1.1	800	800	120	10
7-10	28	700	45	1.0	1.2	13	1.4	800	800	170	10
11-14	45	1,000	50	1.3	1.5	17	1.7	1,200	1,200	270	12
15-18	59	1,000	60	1.5	1.8	20	2.0	1,200	1,200	400	12
Females											
11-14	46	800	50	1.1	1.3	15	1.4	1,200	1,200	280	15
15-18	44	800	60	1.1	1.3	15	1.5	1,200	1,200	300	15

[1]This table includes RDAs only for nutrients and age groups examined in the Child Nutrition Program Operations Study.

APPENDIX G

SFA MANAGER INTERVIEW

- **Overview**
- **Tabulated Responses**

Exhibit G.2

Credentials of Menu Planners
in Exemplary and Typical SFAs
(SY 1989-90)

Credentials	Number/Percent of SFAs					
	Exemplary SFAs (n=10)		Typical SFAs (n=10)		All SFAs (n=20)	
	n	%	n	%	n	%
Registered Dietician (R.D.)	4	40	4	40	8	40
MS, not R.D.	2	20	1	10	3	15
BS, not R.D.	3	30	2	20	5	25
Some college	0	0	1	10	1	5
High School graduate	1	10	2	20	3	15

Data Source: SFA Manager Interview

Exhibit G.3

Availability of Salt in Exemplary and Typical SFAs (SY 1989-90)

Availability	Number/Percent of SFAs					
	Exemplary SFAs (n=10)		Typical SFAs (n=10)		All SFAs (n=20)	
	n	%	n	%	n	%
On-line	2	20	5	50	7	35
At tables	0	0	0	0	0	0
On request	3	30	1	10	4	20
With selected foods[1]	1	10	0	0	1	5
Not available	4	40	4	40	8	40

[1]Salt is available for french fries.

Data Source: SFA Manager Interview

SFA MANAGER INTERVIEW

Overview

In an effort to determine characteristics which might differentiate "Exemplary" districts from "Typical" districts, a brief interview was completed with the manager in each of the SFAs included in the meal observation study. The interview included questions related to general decision-making responsibilities; nutrition-related policies; nutrition education and student involvement; and steps taken to reduce plate waste. Respondents were also asked to comment on current USDA commodities.

Interviews were completed by the study's senior nutritionist. Five were administered in person during Spring, 1990; the remaining fifteen interviews were conducted via telephone during Summer, 1990. In most cases, the SFA manager was the sole respondent, but occasionally, questions were referred to other staff. Tabulated responses are presented in this Appendix (Exhibits G.1 - G.5). Additional information is presented and discussed in Chapter VII (Part 3) of this report.

Exhibit G.1

Individual(s) with Primary Responsibility for
Food-Service-Related Decisions in Exemplary and Typical SFAs
(SY 1989-90)

Decision/ Responsible Parties	Number and Percent of SFAs					
	Exemplary SFAs (n=10)		Typical SFAs (n=10)		All SFAs (n=20)	
	n	%	n	%	n	%
Type of Food Service:						
SFA Manager	8	80%	7	70%	15	75%
School Board	2	20	3	30	5	25
Food Purchasing:						
SFA Manager	7	70	8	80	15	75
Food Service Supervisor[1]	4	40	2	20	6	30
Recipes and Menus:						
SFA Manager	5	50	6	60	11	55
Food Service Supervisor[1]	4	40	4	40	8	40
Dietician[1]	1	10	0	0	1	1
Participation in SBP:						
SFA Manager	3	30	3	30	6	30
State mandate	2	20	3	30	5	25
School Principals	3	30	1	10	4	20
Superintendent	2	20	1	10	3	15
School Board	1	10	2	20	3	15
School manager	1	10	0	10	2	10
Nutrition education activities:						
SFA Manager	1	10	1	10	2	10
Food Service Supervisor[1]	2	20	4	40	6	30
Teachers	4	40	3	30	7	35
Curriculum committee	3	30	3	30	6	30

[1] In large districts, these tasks were sometimes delegated by the SFA Manager

Data Source: SFA Manager Interview

Exhibit G.4

Nutrition Education Activities
in Exemplary and Typical SFAs
(SY 1989-90)

Net Participation/Activity	Number/Percent of SFAs					
	Exemplary SFAs (n=10)		Typical SFAs (n=10)		All SFAs (n=20)	
	n	%	n	%	n	%
Any current NET activity	4	40	0	0	4	20
Regular training for food service Staff[1]	6	60	2	20	8	40
Recent external funding for NET activities	1	10	1	10	2	20
Nutrition education for students						
None	0	0	4	40	4	20
Classroom curriculum	6	60	1	10	7	35
Separate activities	5	50	5	50	10	50
Kitchen tours only	1	10	0	0	1	5
Student involvement in Food Service						
None	0	0	2	20	2	10
YACs[2]	3	30	4	40	7	35
Menu planning	1	10	1	10	2	10
Product testing	8	80	7	70	15	75
Facility tours	1	10	1	10	2	10
Informal surveys	0	0	1	10	1	5

[1]Excludes answers that described training for new employees or optional, educational sessions at annual meetings, etc. Includes only SFAs that offer regular training programs (>4 hours per year) for staff.

[2]Youth Advisory Councils; frequency established only in senior high schools.

Data Source: SFA Manager Interview

Exhibit G.5

Recent Actions Taken to Reduce Plate Waste
in Exemplary and Typical SFAs
(SY 1989-90)

Action Taken	Exemplary SFAs (n=10)		Typical SFAs (n=10)		All SFAs (n=10)	
	n	%	n	%	n	%
None	0	0	1	10	1	5
Introduce OVS in elementary schools	3	30	5	50	8	40
Provide more choices	3	30	6	60	9	45
Respond to student preferences	3	30	1	10	4	20
Student education	1	10	1	10	2	10
Self-serve fruits/vegetables	0	0	1	10	1	5
Have recess before lunch	0	0	1	10	1	5
Improve food quality	1	10	1	10	2	10

Percentages total more than 100 percent because respondents could report multiple actions.

Data source: SFA Manager Interview.

Exhibit G.6

SFA Managers' Suggestions for Changes in Current USDA Commodities
(SY 1989-90)

Suggestions	Exemplary SFAs (n=10) n	%	Typical SFAs (n=10) n	%	All SFAs (n=10) n	%
No suggestions or changes	0	0	1	10	1	5
Dietary Guidelines-related:						
Less fat in and on meats	4	40	2	20	6	30
Lower-fat cheeses	4	40	2	20	6	30
Lower sodium content in general	1	10	1	10	2	10
More whole grains, fiber	1	10	0	0	1	5
Less sugar	2	20	1	10	3	15
Less butter	1	10	2	20	3	15
Offer fewer foods that students don't like/won't eat:						
Dried fruits	3	30	3	30	6	30
Frozen fruits, berries	3	30	1	10	4	20
Grapefruit juice	2	20	0	0	2	10
Other	1	10	2	20	3	15
Offer more staples and fewer surplus and "exotic" items[1]	2	20	3	30	5	25
Shorter, more precise and more effective wording of specifications	2		2		4	20
Clear, more complete processing standards	1	10	4	40	5	25
Smaller containers/sacks	0	0	2	20	2	10
Smaller portions of meat	1	10	1	10	2	10

[1] Items described as exotic included salmon and blackberries.

Exhibit G.7

Commodities Refused by SFA Managers and Reasons for Refusal
(SY 1989-90)

Commodity/Reason	Exemplary SFAs (n=10)		Typical SFAs (n=10)		All SFAs (n=10)	
	n	%	n	%	n	%
None refused	2	20	1	10	3	15
Student preferences[1]:						
Dried fruits	5	50	6	60	11	55
Salmon	1	10	2	20	3	15
Sweet potatoes	1	10	2	20	3	15
Canned vegetables	3	30	0	0	3	15
Others	2	20	5	50	7	35
Poor quality:						
Pasta[2]	2	20	1	10	3	15
Hamburgers	0	0	1	10	1	5
Canned vegetables	0	0	2	20	2	10
Honey	1	10	0	0	1	5
Excessive quantity:						
Flour, corn meal	3	30	3	30	6	30
Butter	1	10	3	30	4	20
Nuts	1	10	1	10	2	10
Rice	1	10	1	10	2	10
Other	0	0	3	30	3	15
Form:						
Whole poultry	2	20	0	0	2	10
Dried beans	1	10	1	10	2	10
honey	1	10	0	0	1	5
Other	2	20	0	0	2	10

[1]SFA Managers reported that these foods are "difficult to market" to students.

[2]Pasta was reported to have inferior cooking and holding properties, and to frequently discolor.