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School Nutrition Dietary Assessment Study-II

Final Report

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July 2001

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Special Nutrition Programs
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School Nutrition Dietary Assessment Study-II Final Report

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Chapter One
Introduction

The National School Lunch Program (NSLP), administered by the Food and Nutrition Service (FNS) of the U.S. Department of Agriculture (USDA), has been providing meals to the Nation's school children since 1946. The School Breakfast Program (SBP) has been in full operation since the early 1970s. Over the years, research has shown that meals offered in both the NSLP and SBP have provided children with the calories, vitamins, and minerals needed to sustain health and promote normal growth. However, in the early 1990s, the first *School Nutrition Dietary Assessment Study* (SNDA-I) found that the amount of fat, saturated fat, and sodium provided in school lunches was not consistent with current public health recommendations.

Since the time the SNDA-I study revealed that school lunches were not consistent with the *Dietary Guidelines*, FNS and its State and local partners in the school meals programs have been working on many fronts to address this problem. These efforts have included changes in menu planning requirements, enhanced training and technical assistance for school food service managers and personnel, and changes in the types and amounts of commodity foods offered to schools. In school year (SY) 1998–99, FNS sponsored the second *School Nutrition Dietary Assessment Study* (SNDA-II) to provide an updated picture of the nutrient profile of NSLP and SBP meals. The study also provides current information about menu planning practices used in the school meals programs and about related program operations issues. The SNDA-II study was completed by Abt Associates Inc. under contract to FNS. This report summarizes study findings.

The National School Lunch and School Breakfast Programs

The National School Lunch Act of 1946 established the NSLP "to safeguard the health and well-being of the Nation's children and to encourage the domestic consumption of nutritious agricultural commodities and other foods" (P.L. 79-396). All public and private nonprofit schools are eligible to participate in both the NSLP and the SBP, as are public or licensed residential child care institutions. Currently, the NSLP operates in more than 84,000 public schools and 12,000 private nonprofit schools and residential child care institutions (USDA, FNS 2000).

Any child in a participating school is eligible to obtain a school lunch. Students from low-income families are eligible to purchase lunch at a reduced price or to receive a free lunch. In SY 1998–99, more than 4.5 billion school lunches were served (USDA, FNS 2000). On an average day, more than 27 million children received an NSLP lunch; more than half of these lunches were provided free or at a reduced price to children from low-income families.

The SBP began in the mid-1960s when the Child Nutrition Act of 1966 (P.L. 89-642) established a pilot project to support the provision of breakfast to children living in "poor areas and areas where children [had] to travel a great distance to school." The SBP was officially authorized as a permanent program in

1975, and the target population was expanded to include "all schools where [the program] is needed to provide adequate nutrition for all children in attendance" (P.L. 94-105).

Currently, the SBP operates in approximately three-quarters of the public schools that offer the NSLP, most commonly in schools that serve large numbers of economically disadvantaged children. In SY 1998–99, more than 1.2 billion breakfasts were served (USDA, FNS 2000). On any given day, roughly seven million children received an SBP breakfast. More than three-quarters of these meals were provided free of charge.

School Food Authorities (SFAs) that participate in the NSLP and SBP receive two types of Federal assistance: donated commodities (tied to the NSLP) and cash reimbursements (received for both the NSLP and SBP). Entitlement to commodities is based on an established per-meal flat rate applied to the number of reimbursable lunches served the previous year. Subject to availability, SFAs are also eligible to receive bonus commodities in amounts that can be used without waste. The type and amount of bonus commodities available vary from year to year depending on purchasing decisions made by USDA.

Cash reimbursements for NSLP and SBP meals are based on the number of meals served to students, established per-meal reimbursement rates, and the poverty level of participating students. SFAs receive a base payment for each meal served, with substantially higher rates paid for meals served free or at a reduced price to income-eligible students. Schools may receive additional reimbursements if more than 60 percent of the meals they serve are provided free or at a reduced price. Children's household size and income determine eligibility for free and reduced-price meal benefits. Currently, students eligible for free meals are those from families with incomes at or below 130 percent of poverty. Students from families with incomes between 130 and 185 percent of poverty are eligible for reduced-price meals. These students may be required to contribute an additional amount of their own money for school meals, but Federal regulations set a maximum price ($0.40 for lunch and $0.30 for breakfast in SY 1998–99) that is well below the rate paid by students who are not eligible for reduced-price meal benefits.

Nutrition Standards for School Meals

To be eligible for Federal subsidies, meals served in the NSLP and SBP must meet defined nutrition standards. For many years, the goal of the NSLP has been to provide approximately one-third of children's daily nutritional needs, as defined by the *Recommended Dietary Allowances* (RDAs) (National Research Council 1989b). To ensure that this goal is met, NSLP regulations have always included food-based menu planning guidelines. These guidelines, originally known as the "Type A meal pattern," define specific types of food that must be included in planned meals as well as minimum acceptable portion sizes. Specific nutrition standards for SBP breakfasts were defined only recently, although program regulations have always included a meal pattern. The meal pattern was designed to ensure that breakfasts would provide approximately 20 to 25 percent of children's daily nutritional needs.

Most prior research has shown that, with few exceptions, the NSLP and SBP have been successful in meeting these nutrition goals (Wellisch 1983; St. Pierre 1992; and Burghardt 1993). However, the most recent nationally representative study of school meals — the first *School Nutrition Dietary Assessment Study* (SNDA-I), which was published in 1993 — focused attention on another aspect of nutritional quality (Burghardt 1993). SNDA-I found that, in SY 1991-92, NSLP meals were not consistent with goals for fat and saturated fat intake specified in the *Dietary Guidelines for Americans* (U.S. Departments of Health and Human Services and Agriculture 1990).[1] At the time the SNDA-I study was conducted, schools were not required to offer meals that were consistent with the *Dietary Guidelines*.

The School Meals Initiative for Healthy Children

Shortly after SNDA-I revealed that school lunches were not consistent with the *Dietary Guidelines* for fat and saturated fat intake, USDA began developing an initiative to address this problem. A series of public hearings was held and interested parties were invited to submit written comments. In 1995, the Department launched the School Meals Initiative for Healthy Children (SMI). SMI is designed to improve the nutritional quality of school meals by providing schools with educational and technical resources that can be used to assist food service personnel in preparing nutritious and appealing meals and to encourage children to eat more healthful meals.

Key components of SMI include new nutrition standards for school meals and added flexibility in the procedures used to plan and monitor school menus. The new nutrition standards maintain the long-standing goals of providing, on average, one-third of students' daily nutrition needs at lunch and one-fourth at breakfast. In addition, the standards include goals for fat and saturated fat content that are consistent with *Dietary Guidelines* recommendations (Exhibit 1.1).

Exhibit 1.1

Nutrition Standards Defined in Current NSLP and SBP Regulations

Nutrient	Standard
Calories and nutrients with established Recommended Dietary Allowances (RDAs):[1]	
Calories, protein, vitamin A, vitamin C, calcium and iron	**Breakfast:** One-fourth of the RDA **Lunch:** One-third of the RDA
Nutrients included in the *Dietary Guidelines for Americans*:[2]	
	Breakfast and Lunch:
Total fat	$\leq$ 30% of total calories
Saturated fat	< 10% of total calories

[1] National Research Council (1989). *Recommended Dietary Allowances*, 10th edition. Washington, DC: National Academy Press.

[2] U.S. Departments of Health and Human Services and Agriculture (1990). *Nutrition and Your Health: Dietary Guidelines for Americans*, 3rd edition. Washington, DC: U.S. Government Printing Office. [Standards are based on the 1990 version of the *Dietary Guidelines*].

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1 FNS had previously examined the sodium and fat content of school meals using data from the *National Evaluation of School Nutrition Programs (NESNP)*, which was completed in 1980 (Fraker 1988). The analysis used data on students' dietary intake over a 24-hour period and compared NSLP participants with students who skipped lunch and students who ate alternative lunches.

The initial SMI proposal, issued in June 1994, replaced the traditional food-based menu planning guidelines (meal pattern) with an alternative computer-based menu planning system known as Nutrient Standard Menu Planning (NSMP) or Assisted Nutrient Standard Menu Planning (ANSMP). The proposal also required that school meals be consistent with the *Dietary Guidelines* no later than the beginning of SY 1998–99. An extended time line was built into the proposed regulation because comments received during public hearings and in response to an initial Federal Register notice indicated that some SFAs would need a considerable amount of time to implement NSMP or ANSMP and to develop menus consistent with the *Dietary Guidelines*.

In November 1994, as part of the reauthorization of the Child Nutrition programs, Congress enacted The Healthy Meals for Healthy Americans Act (P.L. 103-448). This law was important for two reasons. First, it was the first time that legislation required that school meals be consistent with the *Dietary Guidelines*. Second, the law precipitated two important changes in USDA's initial SMI proposal. It required that USDA develop a food-based menu planning system, similar to the traditional meal pattern, that schools could use in lieu of NSMP or ANSMP. The law also shortened the time line for incorporating the *Dietary Guidelines*, requiring that all SFAs be in compliance by the first day of SY 1996-97 (two years earlier than USDA had suggested), unless a waiver was granted by the cognizant State agency. Finally, the law permitted schools, under certain circumstances, to no longer offer whole milk (prior to this legislation, schools were required to offer whole milk).

Menu planning options were further expanded in May 1996, when The Healthy Meals for Children Act mandated that USDA allow SFAs to continue to use the traditional NSLP and SBP menu planning systems (i.e., the meal patterns that were in effect prior to the SMI rule), or to use "any reasonable approach" in planning menus that satisfy the nutrient standards defined under SMI.

The regulatory requirement that school meals be consistent with the *Dietary Guidelines* has been incorporated into FNS' strategic plan. The current goal is that all schools will satisfy these standards by 2005.

Current Menu Planning Options

As summarized in the preceding discussion, current program regulations provide schools with five different menu planning options: (1) the traditional food-based menu planning system; (2) an enhanced food-based menu planning system; (3) NSMP; (4) ANSMP; and (5) any other reasonable approach.

The traditional food-based menu planning system requires that lunches offered to students include five food items: fluid milk (as a beverage), one serving of meat or meat alternate, a minimum of one serving of a bread or grain product, and two servings of fruit and/or vegetables. The system also defines minimum required portion sizes for children in different grades. The enhanced food-based menu planning system is very similar to the traditional food-based system but requires more servings of bread and grain products over the course of a week and larger servings of fruits and vegetables.

NSMP and ANSMP require use of a computerized nutrient analysis system to plan menus. SFAs must select one of several USDA-approved NSMP software programs. ANSMP allows SFAs to arrange or contract for NSMP implementation (i.e., menu development and nutrient analysis) through an external source such as a State agency, a consortium of SFAs, or a consultant. The only food-based menu planning requirements imposed under NSMP or ANSMP, for lunch, are that milk be offered as a beverage and that at least one entree and one side dish be offered. Within these broad guidelines, menu planners are free to use whatever portions and combinations of food they wish to meet the nutrition standards. Thus, in theory, NSMP and ANSMP provide more flexibility in menu planning than the two food-based systems while, at the same time, providing a greater degree of assurance that meals served to students meet nutrition standards.

Finally, schools may use any other reasonable approach to menu planning, which may include specific modifications to the food-based menu planning guidelines (outlined in program regulations) as well as more major modifications to any of the available menu planning systems. State agencies may establish guidelines for using a modified approach to menu planning and may require that SFAs receive prior approval before implementing such a system.

SFAs that elect to use either of the food-based systems (the traditional food-based menu planning system or the enhanced food-besed system defined in the final SMI rule) or an alternative approach to menu planning are not required to analyze the nutrient content of planned menus. They are, however, expected to meet the nutrition standards defined under SMI. All school districts must undergo a mandatory SMI review every five years. As part of this process, State agency staff must analyze a representative weekly menu and compare results of the analysis to the nutrition standards.

Weighted and Unweighted Nutrient Analyses (Meals as Served versus Meals as Offered)

Current NSLP and SBP menu planning requirements and monitoring standards are built around use of a weighted nutrient analysis of meals served over the course of a week.[2] A *weighted* nutrient analysis incorporates information about student selection patterns and does not assume that every student takes one serving of every type of food offered. In the analysis, greater weight is given to the foods that are served/selected more frequently. This approach provides a picture of the *average meal served to* or *selected by* students. The nutrient analysis software systems approved by FNS for use in implementing NSMP or ANSMP (or for use by States in monitoring SFAs using other menu planning options) perform weighted nutrient analyses. To complete an analysis, users must specify not only the types of foods offered and the associated portion sizes, but the total number of reimbursable meals served and the number of servings of each food served in those meals.

In contrast, an *unweighted* nutrient analysis does not consider the relative frequency with which different types of food are served/selected. The analysis constitutes a simple average of all foods offered. An unweighted nutrient analysis provides a picture of the *average meal offered* to students. The principal difference between the two analytic approaches is that a weighted analysis reflects student choices, a factor which school food service programs may influence but can not control.

Prior to SMI, assessments of the nutrient content of school meals were typically based on an unweighted analysis. The SNDA-I study used an unweighted nutrient analysis. In this study, both weighted and unweighted analyses were conducted. To permit comparisons between the SNDA-I and SNDA-II

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2 The CN Reauthorization Act of 1998 (P.L. 105-336) waived the weighted analysis requirement through September 2003 for school districts that obtain a waiver from their State agency.

studies, the methodology used in this study for the unweighted analysis was modeled after the approach used in SNDA-I.

Overview of the SNDA-II Study

The primary goal of the SNDA-II study was to provide information on how schools are progressing, in the early stages of SMI, toward meeting SMI standards. The study also provides current information about menu planning practices used in school food service programs and about related program operations issues.

The study produced national cross-sectional estimates of the nutrient composition of USDA meals served in elementary and secondary schools in SY 1998-99. The study focused exclusively on public schools, which account for roughly 90 percent of all institutional NSLP participants. The study design included separate nationally representative probability samples of public SFAs, public elementary schools, public middle schools, and public high schools participating in the NSLP. Study results are generalizable to public SFAs and public schools nationwide but not to the entire NSLP. For ease of presentation, the unrestricted terms "school" and "SFA" are used throughout this report in exhibit titles and most text discussions. Chapter titles and selected section titles, exhibit footnotes and discussions remind the reader that the study focused on public schools.

FNS defined nine research objectives for the SNDA-II study:

- Determine the average nutrient composition of USDA meals currently served to students during a typical school week in elementary and secondary schools.
- Determine whether the average nutrient composition of meals differs depending on the menu planning option used.
- Determine the current availability and nutrient content of low-fat meals (meals that provide no more than 30 percent of calories from fat).
- Determine the major food sources of calories and key nutrients in breakfast and lunch meals.
- Examine the number of food choices offered to students participating in the NSLP and/or SBP on a daily basis.
- Examine the variety of foods offered in NSLP lunches and SBP breakfasts and identify foods that are offered most frequently.
- Determine the type of alternative food sources available to students who do not eat the NSLP lunch or SBP breakfast or bring food from home, and the types of food offered through these channels.
- Determine the changes in the nutrient composition of NSLP and SBP meals since SY 1991–92, when the SNDA-I study was conducted.

- Determine whether conclusions about the nutrient composition of school meals differs depending on whether the nutrient analysis is weighted or unweighted.

The data collection approach specified by FNS was a mail survey of cafeteria managers and a telephone survey of SFA directors. The mail survey of cafeteria managers was the primary data collection vehicle and is the source of most of the data included in this report. The telephone survey of SFA directors provided supplementary information on district characteristics and selected school-level characteristics (e.g., enrollment, number of students approved for free and reduced-price meals, and menu planning practices).

The following paragraphs provide a brief overview of the study's design and data collection approach. Appendix D provides detailed information on the design of the study sample, recruitment of SFAs and schools, data collection activities and the final disposition of the various samples.

Respondents and Data Collection Instruments

Data were collected from cafeteria managers in sampled schools (or other respondents designated by SFA directors) and from SFA directors. Cafeteria managers were asked to complete a written menu survey that provided information on the foods offered to students as well as the number of servings of each food that was actually served to students. Cafeteria managers also provided information on local school food service operations, including the availability of *a la carte* foods and other non-USDA meal options. SFA directors were interviewed by telephone and provided information on menu planning practices, enrollment, numbers of students approved for free and reduced-price meals and district-level food service operations.

A total of 1,075 cafeteria managers completed the menu survey and 430 SFA directors completed the telephone interview. Response rates among cafeteria managers and SFA directors who agreed to participate in the study were 87.8 percent for the menu survey and 90.1 percent for the SFA director interview. Detailed information on sample design, response rates and calculation of sample weights is provided in Appendix D.

Mail Survey of Cafeteria Managers

Cafeteria managers were asked to complete a menu survey which requested detailed information on all foods offered during a specified five-day period (referred to as the target week).[3] Target weeks were initially spread between late September and mid-December 1998. However, because some schools were unable to complete the survey during that time period, data collection was extended through May 1999 for schools that needed additional time. All respondents provided data for lunches served during a single week. Respondents whose schools participated in the SBP were also asked to provide information for breakfasts served during the same week.

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3 To obtain a reasonable assessment of nutrient content, it is necessary to examine meals offered over a period of time rather than a single meal. The National Research Council (NRC) recommends that group feeding programs plan menus so that nutrient standards are met over a five- to 10-day period. A sample five-day period, equivalent to a full week in most school districts, is routinely used in USDA-sponsored evaluations of Child Nutrition programs. SMI requirements specify that analyses be based on a typical school week, ranging from three to seven days.

Respondents were asked to list all *reimbursable* menu items offered and to provide a complete description of each item, including manufacturer and brand names and, where available, product codes. For items not included in the nutrient data base used in the analysis, respondents were asked to provide labels, summaries of product nutrition information and/or manufacturers' names and addresses. Complete recipes were requested for all items that were prepared by combining two or more foods or ingredients.

In addition to item descriptions and recipes, respondents were asked to describe the portions served including, if applicable, different portions for different grade/age groups. Finally, respondents were asked to report, for each menu item, the total number of portions served in *reimbursable meals* (i.e., exclusive of portions sold *a la carte* and portions sold to teachers or other adults).

Because SNDA-II data were to be compared to data from SNDA-I, every effort was made to make the data collection approach as comparable as possible to the approach used in SNDA-I. With the exception of meal production information (i.e., information on the number of portions served), the data elements collected in the two studies were identical. The format of menu survey materials was enhanced, however, to address difficulties encountered during SNDA-I.[4] The menu survey was presented in an easy-to-use booklet format with a separate section for each day of the week and separate sections for breakfast and lunch. Respondents also received a user-friendly instruction manual and several supporting response aids that offered guidance on describing foods and providing food package labels. Survey materials were designed with colored paper, colored ink, tabs and lamination so that materials were attractive, organized and easy to understand. In addition to response aids, a toll-free technical assistance number was provided and respondents were encouraged to call with any questions.

Survey materials were mailed to respondents at least two weeks prior to the start of the target week. SFA directors were encouraged to bring all school-level respondents together to review materials, plan for the data collection and avoid unnecessary duplication of effort. Each cafeteria manager received at least two follow-up contacts — one the week before the target week and one early in the target week — to ensure receipt and completion of survey materials and to provide technical assistance as needed.

In addition to the menu survey, respondents were asked to complete three other brief instruments, all of which were bound into the same data collection booklet as the menu survey and were addressed in the accompanying instruction manual. These instruments included:

- Daily Meal Counts Form: A form used to record the number of reimbursable meals served each day during the target week, by reimbursement category (free, reduced-price, paid).

- Meal Service Questionnaire: A brief survey that obtained information about local school food service operations, including prices charged for reduced- and full-price meals, types of meal service offered (e.g., hot meals, salad bars, etc.) and availability of vending machines and other alternative sources of food.

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4 In SNDA-I approximately 40 percent of participating schools provided information through a mail survey. Data for the remaining 60 percent of schools were collected by field staff using the same forms used in the mail survey.

- *A la Carte* Foods Checklist: A simple checklist of items potentially offered on an *a la carte* basis. Respondents were asked to complete the checklist one day (randomly assigned) during the target week. The form used was provided by FNS and was identical to the one used in SNDA-I.

Because some respondents completed only the menu survey or only some of these additional instruments, the number of respondents for each instrument varied and response rates were somewhat lower than for the menu survey (see Appendix D).

Telephone Interview of SFA Directors

SFA directors were interviewed by telephone between September 1998 and March 1999. A few directors who proved to be extremely difficult to reach completed the interview by mail during the summer or fall of 1999. The interview took approximately 20 minutes to complete and collected information for sampled schools in the SFA as well as for the district as a whole. Topics covered for the sampled schools included enrollment, number of students approved for free and reduced-price meals, menu planning practices, access to and use of a computer for nutrient analysis, use of USDA technical assistance materials, and use of foods from commercial vendors (e.g., McDonald's, Taco Bell, Pizza Hut and others). Topics addressed at the district level included use of food service management companies (FSMCs) and food purchasing cooperatives and methods used to set prices for reimbursable meals and *a la carte* foods.

Standards Used to Evaluate Nutrient Content

Two sets of standards were used to evaluate the nutrient content of NSLP and SBP meals (Exhibit 1.2). The first set is comprised of SMI nutrition standards, as defined in current NSLP and SBP regulations. These include standards for calories and target nutrients for which RDAs have been established (protein, vitamin A, vitamin C, calcium, and iron) as well as for the percentage of calories from fat and saturated fat.[5]

A second set of standards, based on recommendations in the National Research Council's (NRC) *Diet and Health* report, was defined for nutrients and food components that are analyzed by NSMP software but are not quantified in SMI nutrition standards (National Research Council 1989a). These include the percentage of calories from carbohydrate as well as total cholesterol and sodium content.[6] NRC recommendations for sodium and cholesterol define suggested maximums for daily intake. For this report, these daily standards were adapted to create meal-specific recommendations. Recommendations for lunch reflect one-third of the suggested daily maximum and recommendations for breakfast reflect one-fourth of the daily maximum. *It is important to recognize that schools are not required to meet these additional standards. They are used in this report solely to facilitate understanding of the data.*

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5 The RDAs are currently being replaced with new standards — Dietary Reference Intakes (DRIs). These standards were not used in this analysis because they have not yet been incorporated into NSLP or SBP regulations.

6 NSMP software also analyzes fiber. These data were not included in this report, however, because neither the *Dietary Guidelines* nor the NRC's *Diet and Health* report provide a quantitative recommendation for fiber intake.

Exhibit 1.2

Nutrition Standards Used in Evaluating School Meals

Nutrient	Standard
Nutrition Standards Defined in NSLP and SBP Regulations	
Calories and nutrients with established Recommended Dietary Allowances (RDAs)[1]:	
Calories, protein, vitamin A, vitamin C, calcium and iron	**Breakfast:** One-fourth of the RDA **Lunch:** One-third of the RDA
Nutrients included in the *Dietary Guidelines for Americans*[2]:	
	Breakfast and Lunch:
Total fat	≤ 30% of total calories
Saturated fat	< 10% of total calories
National Research Council *Diet and Health* Recommendations[3]	
Carbohydrate	**Breakfast and Lunch:** > 55% of total calories
Cholesterol	**Breakfast:** ≤ 75 mg **Lunch:** ≤ 100 mg
Sodium	**Breakfast:** ≤ 600 mg **Lunch:** ≤ 800 mg

[1] National Research Council (1989). *Recommended Dietary Allowances*, 10th edition. Washington, DC: National Academy Press.

[2] U.S. Departments of Health and Human Services and Agriculture (1990). *Nutrition and Your Health: Dietary Guidelines for Americans*, 3rd edition. Washington, DC: U.S. Government Printing Office.

[3] National Research Council (1989). *Diet and Health*. Washington, DC: National Academy Press. Standards used for cholesterol and sodium are adapted from recommendations for maximum daily intake.

Comparison with SNDA-I Data

The SNDA-I study collected data in SY 1991–92. SNDA-II provides an updated picture of the nutrient content of school meals offered in SY 1998–99. It was not possible, however, to directly compare SNDA-I and SNDA-II data for several reasons. First, SNDA-I was based on an *unweighted nutrient analysis* (reflecting the average meal offered to students) and SNDA-II used a *weighted analysis* (reflecting the average meal served to students). Second, SNDA-I included both public and private schools while SNDA-II was limited to public schools. Third, because recent changes in program regulations had to be incorporated into the SNDA-II analysis, SNDA-I and SNDA-II handled comparisons to RDA standards in different ways. SNDA-I compared mean nutrient values for meals offered in each school type to all age- and gender-appropriate RDAs. Current regulations define minimum nutrition standards for meals served to children in various grade groups and encourage schools to plan menus based on the ages/grades of the enrolled students. SNDA-II used RDA standards based on the grade configuration of each school.

To permit a comparison of SNDA-I and SNDA-II data, both data sets had to be reanalyzed. SNDA-I data were reanalyzed limiting the sample to public schools. SNDA-II data were reanalyzed using an unweighted nutrient analysis modeled after the analysis completed in SNDA-I. (Data that would be needed to complete a weighted analysis of the SNDA-I data are not available.) The methodology used in the unweighted analysis of SNDA-II data was comparable to the methodology used in SNDA-I, with the exception of slight modifications made to reflect current program emphasis on increased use of breads, grains, and fruits and vegetables. The methodology used in both weighted and unweighted nutrient analyses is described in detail in Appendix E.

Finally, to obtain a uniform basis of comparison for calories and RDA nutrients, both SNDA-I and SNDA-II data were compared to minimum standards defined for elementary schools (grades Kindergarten (K)-6) and secondary schools (grades 7-12) in current program regulations (Exhibit 1.3). Minimum standards for breakfast are defined for grades K-12 and cover all types of schools. An optional set of breakfast standards has also been defined for grades 7-12.[7]

Differences noted between SNDA-I (SY 1991–92) and SNDA-II (SY 1998–99) can not be attributed to any one factor. Factors that may contribute to observed differences include changes in the food supply over time (e.g., the introduction of new products and changes in product formulations in both USDA commodity foods and foods available in the quantity food service market), as well as changes in menu planning, food purchasing and food preparation practices of school food service personnel. Differences in data collection methodology (data for all schools in SNDA-II were collected via a mail survey while data for more than half of the SNDA-I schools were collected on site) and/or in the nutrient data bases used in the two studies may also contribute to observed differences.

Organization of this Report

The remaining chapters in this report present the following information:

- Chapter Two describes characteristics of school food service program operations.
- Chapters Three and Four describe, respectively, the average nutrient content of lunches and breakfasts served in school meals programs in SY 1998-99.
- Chapter Five compares results of weighted and unweighted analyses.
- Chapter Six compares results of the current study with findings from the SNDA-I study.

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7 Program regulations define slightly different grade groups for the traditional food-based menu planning system (K-3 and 4-12), based on the groupings used in that system's meal pattern. However, schools are permitted to use the nutrition standards defined for grades K-6 and 7-12.

Exhibit 1.3

Minimum Nutrition Standards Defined in Current NSLP and SBP Regulations

	Grade Groupings	
Lunch	**Grades K-6**	**Grades 7-12**
Calories	664	825
Protein (gm)	10	16
Vitamin A (mcg RE)	224	300
Vitamin C (mg)	15	18
Calcium (mg)	286	400
Iron (mg)	3.5	4.5
Breakfast	**Grades K-12 (minimum)**	**Grades 7-12 (optional)**
Calories	554	618
Protein (gm)	10	12
Vitamin A (mcg RE)	197	225
Vitamin C (mg)	13	14
Calcium (mg)	257	300
Iron (mg)	3.0	3.4

Note: Standards used for other nutrients are identical for both SNDA-I and SNDA-II and are based on NSLP/SBP standards (percent of calories from fat and saturated fat) and NRC recommendations (percent of calories from carbohydrate, total cholesterol and total sodium).

Appendices provide supplementary exhibits (Appendices A and B) as well as detailed information on study implementation (Appendix C); study design, response rates and sample weights (Appendix D); and methodologies used in analyzing the menu survey data (Appendix E).

Chapter Two
Characteristics of Food Service Programs in Public NSLP Schools

This chapter describes selected characteristics of school food service programs in public schools that offered the NSLP in SY 1998–99. Topics covered include the availability of the SBP and other breakfast programs, the percentage of students approved for free and reduced-price meal benefits, student participation rates, meal prices, menu planning practices, types of meals offered and alternative sources of food available to students who do not eat NSLP or SBP meals.

The data summarized in this chapter come from two different sources: the telephone interview of SFA directors — which provided information on both SFA- and school-level characteristics — and non-menu-survey portions of the mail survey of cafeteria managers (see Appendix C). A total of 430 SFA directors completed the telephone interview. These completed interviews provided information for a total of 1,109 schools. In addition, non-menu-survey portions of the mail survey were completed by 1,036 cafeteria managers. Both of these data sets were weighted to produce estimates that are nationally representative for public elementary schools, middle schools and high schools that participated in the NSLP in SY 1998–99 (see Appendix D). Unweighted sample sizes vary depending on the data source(s) used in the exhibit; footnotes at the bottom of each exhibit clearly identify the data source(s).

School-Level Participation in the SBP

According to FNS administrative data, approximately 54 percent of public NSLP schools offered the SBP in SY 1991–92 — the time at which data were collected for the first SNDA study (USDA, FNS 1992). In the intervening years, school participation in the SBP has increased dramatically. Data from the present study indicate that more than three-quarters of all public NSLP schools offered the SBP in SY 1998–99 (Exhibit 2.1). Participation was slightly higher among elementary schools than middle schools or high schools (78% versus 75% and 73%, respectively).

Ten percent of schools offered a non-USDA breakfast program or a morning snack program. These non-USDA programs were more common in high schools (19%) than in middle schools (11%) or elementary schools (7%). Overall, 20 percent of public NSLP schools offered neither the SBP nor any other breakfast or morning snack program.

Percentage of Students Approved for Meal Benefits

Participation in the NSLP and SBP is open to all students in participating schools. Students from low-income families are eligible to receive meals free of charge or at a reduced price. In SY 1998–99,

Exhibit 2.1

Types of Breakfast Programs Offered by Public NSLP Schools

Type of Breakfast Program	Elementary Schools	Middle Schools	High Schools	All Schools
	Percentage of Schools			
USDA School Breakfast Program	78%	75%	73%	76%
Non-USDA program[1]	7	11	19	10
No breakfast program	21	21	19	20
Number of Schools (Unweighted)	385	325	326	1,036

[1] Includes morning snack programs or any non-USDA programs that provide food to students in the morning after they arrive at school.

Note: Percentages do not sum to 100 because some schools reported offering both the SBP and a morning snack program.

Source: Weighted tabulations of data from a mail survey of public school cafeteria managers, Fall 1998 - Spring 1999.

one-third of students enrolled in public NSLP schools were approved for free meal benefits (Exhibit 2.2). Another eight percent were approved for reduced-price meals. The percentage of students approved for free and reduced-price meal benefits was higher in elementary schools (45%) than in middle schools (38%) or high schools (30%).

Among schools that offered the SBP, the percentage of students approved for free meal benefits was consistently greater than for NSLP schools overall. In SBP schools, 38 percent of students were approved for free meal benefits. The percentage of students approved for reduced-price benefits — nine percent — was comparable to the rate for all NSLP schools. As noted for all NSLP schools, the relative rate of approval for free or reduced-price meal benefits in SBP schools was greater in elementary schools (50%) than in middle schools (43%) or high schools (35%).

Participation in the NSLP and SBP

On an average day during the target week for the study, approximately 60 percent of all students in NSLP schools received an NSLP lunch (Exhibit 2.3). Participation varied by type of school, with participation being highest in elementary schools — 67 percent, on average — and lowest in high schools (39%). Participation also varied by receipt of meal benefits. Students approved to receive free lunches participated at a higher rate (80% overall) than either students approved to receive reduced-price lunches (69%) or students who paid full price (48%). Within each meal benefit category, elementary school students participated at higher rates than middle school or high school students.

Overall rates of student participation were notably lower for the SBP; however, the patterns of participation — the highest rates being in elementary schools and among students approved for free meal benefits and lowest rates being in high schools and among students who pay full price — were similar to the NSLP. In schools offering the SBP, 22 percent of all students received an SBP breakfast on an average day during the target week. Participation was considerably higher (39%) among students approved for free meals. This was especially true in elementary schools where, on average, 44 percent of students approved for free meals received an SBP breakfast.

Distribution of Free, Reduced-Price and Paid Meals

During a typical week in SY 1998–99, 42 percent of reimbursable lunches served in public NSLP schools were served free of charge (Exhibit 2.4). Nine percent were served to students approved for reduced-price meals and the remaining 49 percent were served to students who paid full price. The distribution of meals served in the SBP was substantially different. The vast majority of breakfasts (71% overall) were served free of charge and only one in five breakfasts was served at full price.

Exhibit 2.2

Approval for NSLP and SBP Meal Benefits

Program/Type of Meal Benefit	Elementary Schools	Middle Schools	High Schools	All Schools
	Average Percentage of Students			
NSLP				
Approved for free meals	36%	30%	24%	33%
Approved for reduced-price meals	9	8	6	8
Not approved for meal benefits[1]	55	62	70	59
Number of Schools (Unweighted)	409	349	351	1,109
SBP				
Approved for free meals	41%	35%	29%	38%
Approved for reduced-price meals	9	8	6	9
Not approved for meal benefits[1]	49	57	65	53
Number of Schools (Unweighted)	332	258	263	853

[1] Students pay full price for NSLP or SBP meals.

Source: Weighted tabulations of data from a telephone interview with public SFA directors, Fall 1998 - Spring 1999.

Exhibit 2.3

Student Participation in the NSLP and SBP During the Target Week

Program/Benefit Eligibility Category	Elementary Schools	Middle Schools	High Schools	All Schools
	Average Student Participation Rates			
NSLP				
All students	67%	52%	39%	60%
Students approved for free lunches	86	75	62	80
Students approved for reduced-price lunches	76	63	52	69
Students not approved for meal benefits[1]	56	39	31	48
Number of Schools (Unweighted)	375	316	319	1,010
SBP				
All students	26%	16%	11%	22%
Students approved for free breakfasts	44	32	25	39
Students approved for reduced-price breakfasts	24	14	12	20
Students not approved for meal benefits[1]	10	5	4	8
Number of Schools (Unweighted)	309	236	241	786

[1] Students pay full price for NSLP or SBP meals.

Notes: Student participation rates reflect the average percentage of students in each category who actually received an NSLP or SBP meal during the target week. Calculations are based on the average number of meals served during the target week, enrollment, and the number of students approved for free or reduced-price meals.

Source: Weighted tabulations of data from telephone interviews with public SFA directors (enrollment and number of students approved for meal benefits) and a mail survey of public school cafeteria managers (number and type of meals served during the target week), Fall 1998 - Spring 1999. Exhibit includes only schools that appeared in both data sets.

Exhibit 2.4

Distribution of Free, Reduced-Price and Full-Price Meals During the Target Week

Program/Type of Meal	Elementary Schools	Middle Schools	High Schools	All Schools
	Average Percentage of Daily Meals			
NSLP				
Free lunches	42%	44%	39%	42%
Reduced-price lunches	10	10	7	9
Full-price lunches	49	47	53	49
Number of Schools (Unweighted)	385	325	326	1,036
SBP				
Free breakfasts	71%	74%	68%	71%
Reduced-price breakfasts	9	8	8	9
Full-price breakfasts	20	17	25	20
Number of Schools (Unweighted)	317	245	246	808

Note: Due to rounding, percentages may not sum to 100.

Source: Weighted tabulations of data from a mail survey of public school cafeteria managers, Fall 1998 - Spring 1999.

Meal Prices

SFA directors were asked about strategies used to set prices for USDA-reimbursable meals. Two specific strategies — actual pricing method and food cost percentage markup — were asked about directly. SFA directors were also asked to describe any other pricing methods they used. Sixty percent of SFA directors reported using an actual pricing method to determine prices charged for reimbursable meals (Exhibit 2.5). Actual pricing involves determination of all costs incurred in preparing meals, including both food costs and labor costs. Use of a food cost percentage markup was much less common, reported by only 16 percent of SFA directors.

Five percent of SFA directors reported using other pricing methods. The only single method reported by more than one percent of respondents (2%), however, was a market comparison, or setting prices based on what schools in surrounding districts are charging. Roughly 15 percent of SFA directors were unable to answer questions about meal pricing strategies.[1] Reasons for lack of knowledge included lack of involvement (e.g., prices are set by school board or food service management company) and being new to the job.

SFA directors were also asked whether meal price adjustments were implemented only when needed to offset financial losses. Responses indicate that about half of the SFAs offering the NSLP followed such a policy in SY 1998–99. Another 40 percent of SFAs did not limit price adjustments in this way. The policy for resetting meal prices was unclear in 10 percent of SFAs.

NSLP Meal Prices

Federal regulations stipulate that schools may charge no more than $0.40 for a reduced-price lunch. No limitations are set on prices for full-price meals. In SY 1998–99, the average price for a reduced-price lunch was $0.38, with no variation by type of school (Exhibit 2.6). A small number of schools (a total of 18 in the unweighted sample) served lunches free of charge to students approved for reduced-price meals.[2] Among schools that charged for reduced-price lunches, the minimum price was $0.18 and the maximum was the federally set maximum of $0.40.[3] Because the federally set maximum for a reduced-price lunch has not changed over the years, the average price charged for a reduced-price lunch has remained essentially constant since the SNDA-I study.

The average price charged for a standard full-price lunch in SY 1998–99, across all school types, was $1.35. Average prices were $0.14 higher in middle schools and high schools than in elementary schools ($1.44 versus $1.30). A few schools (three in the unweighted sample) served lunches free of charge to all

1 A small number of SFA directors were able to definitively answer no to the question about use of a percentage markup, but were not sure about use of an actual pricing method.

2 Under a special assistance certification and reimbursement provision (provision 2) (7CFR245.9), schools serve meals free of charge to all students provided that non-Federal resources are used to cover the difference between the cost of meals served and the Federal reimbursement earned. Schools operating under this provision are not required to certify students for meal benefits for up to three years after an initial assessment and claim reimbursement based on approved claiming percentages.

3 When zeros are excluded from calculation of average prices, means are roughly $0.01 higher.

Exhibit 2.5

Methods Used to Set Prices for USDA-Reimbursable Meals

Methods	Percentage of SFAs
Actual pricing method[1]	
Yes	60%
No	26
Don't know	15
Food cost percentage markup[2]	
Yes	16
No	70
Don't know	13
Reset prices only to offset financial loss	
Yes	51
No	40
Don't know	10
Number of SFAs (Unweighted)	430

[1] Prices are determined by considering all costs of buying, producing, and serving meals.

[2] Prices are determined by adding the same percentage markup to every food item.

Notes: One percent of SFAs provide all meals free of charge.

Sections may not sum to 100 percent because of rounding.

Source: Weighted tabulations of data from a telephone interview with public SFA directors, Fall 1998 - Spring 1999.

Exhibit 2.6

Average Prices for Reduced-Price and Full-Price Lunches

Type of Lunch	Elementary Schools	Middle Schools	High Schools	All Schools
Price for Reduced-Price Lunches				
Mean	$0.38	$0.38	$0.38	$0.38
Minimum (excluding zeroes)	0.18	0.20	0.18	0.18
Maximum	0.40	0.40	0.40	0.40
Price for Standard Full-Price Lunch				
Mean	$1.30	$1.44	$1.44	$1.35
Minimum (excluding zeroes)	0.50	0.65	0.50	0.50
Maximum	2.10	2.35	2.35	2.35
Number of Schools (Unweighted)	369	317	320	1,006

Notes: Date based on schools that reported serving reduced-price or paid lunches (some schools served only free lunches) and provided information on meal prices.

Two percent of schools served lunches free of charge to students who were approved for reduced-price meal benefits. Less than one percent of schools served lunches free of charge to all students. Such meals were reported as reduced-price or full-price, in keeping with program regulations, but the price charged to students was reported as zero.

Source: Weighted tabulations of data from a mail survey of public school cafeteria managers, Fall 1998 - Spring 1999.

students, including students who were not eligible for free or reduced-price meal benefits.[4] Excluding these schools, the minimum price for a standard full-price lunch was $0.50 and the maximum was $2.35.[5] Overall, prices charged for full-price lunches have increased about 18 percent since SY 1991–92 ($1.35 versus $1.14).

A large majority of cafeteria managers (87%) reported use of a single price for full-price lunches (Exhibit 2.7). However, eight percent of cafeteria managers reported offering some full-price lunches at a price *higher* than the standard price and six percent reported offering some full-price lunches at a price *lower* than the standard price. Use of alternative prices for full-price lunches was most common in high schools.

Among schools that reported use of higher prices for some full-price lunches, the most common reason was use of a higher price for older students; however, this policy was largely limited to elementary schools. Among high schools, higher prices were most commonly used for special entrees, special sandwiches or pizza. In addition, some high schools and middle schools charged higher prices for salad bars or other food bars and for larger portions. Relative to the basic or standard full-price lunch, the average price increment for higher-priced lunches was $0.17 for elementary schools, $0.39 for middle schools and $0.56 for high schools.

The principal reason for use of a lower price for some full-price lunches was, in all types of schools, use of weekly or monthly discounts. On average, lower-priced lunches cost $0.13 less than a standard full-price lunch. The size of the price differential varied by school type and ranged from -$0.11 for elementary schools to -$0.18 for high schools.

Relationship Between Meal Price and Participation Rates Among Full-Price Students

Exhibit 2.8 shows NSLP participation rates among students not approved for free or reduced-price meal benefits (i.e., students who pay full price) based on the standard price charged for a full-price lunch. As shown, participation rates in all types of schools were inversely related to meal price. The decrease in participation with increase in meal price was most pronounced in elementary schools, where there was a 23-percentage-point difference in average full-price participation in schools with the lowest and highest meal prices. The differences for middle schools and high schools were 14 and 18 percentage points, respectively.

While these data document a negative relationship between meal price and student participation, they do not prove that higher meal prices, in and of themselves, *cause* lower rates of participation among students who pay full price for NSLP meals. Many other factors, including the type of community (rural, urban, suburban), geographic location, the relative wealth of the community, student acceptance of NSLP meals and the availability of *a la carte* foods may affect both student participation rates and meal prices.

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4 Under a special assistance certification and reimbursement provision (provision 2) (7CFR245.9), schools serve meals free of charge to all students provided that non-Federal resources are used to cover the difference between the cost of meals served and the Federal reimbursement earned. Schools operating under this provision are not required to certify students for meal benefits for up to three years after an initial assessment and claim reimbursement based on approved claiming percentages.

5 When zeros are excluded from calculation of average prices, means are roughly $0.01 higher.

Exhibit 2.7

Use of Multiple Prices for Full-Price Lunches

	Elementary Schools	Middle Schools	High Schools	All Schools
	Percentage of Schools			
Use of Multiple Prices for Full-Price Lunches				
Use one price for all full-price lunches	87%	91%	81%	87%
Use one or more higher prices	8	5	10	8
Use one or more lower prices	5	4	9	6
Reasons for Higher Prices[1]				
Special entree, sandwich, or pizza	1	29	42	14
Salad bar or other food bar	7	31	26	14
Larger portions	13	34	21	17
Higher prices for higher grades	59	21	0	40
Other	21	5	23	19
Mean difference in price	+$0.17	+$0.39	+$0.56	+$0.29
Reasons for Lower Prices[1]				
Monthly/weekly discounts	75	93	63	74
Lower prices for lower grades	9	2	19	11
Other	16	5	25	17
Mean difference in price	-$0.11	-$0.08	-$0.18	-$0.13
Number of Schools (Unweighted)	369	317	320	1,006

[1] Base sample includes only schools that reported using higher (or lower) meal prices. Due to small sample sizes, results must be interpreted with caution.

Notes: Exhibit includes only schools that reported serving full-price meals and provided information on meal prices.

Column sections may not sum to 100 percent because of rounding and because respondents could provide more than one reason for higher/lower prices.

Source: Weighted tabulations of data from a mail survey of public school cafeteria managers, Fall 1998 - Spring 1999.

Exhibit 2.8

Relationship Between Meal Price and Student Participation Rates for Full-Price Lunches

School Level/Price of Full-Price Lunch	Average Full-Price Student Participation Rate
Elementary Schools	
$1.05 or less	65%
$1.10 - $1.25	64
$1.30 - $1.45	57
$1.50 - $2.10	42
Number of Schools (Unweighted)	343
Middle Schools	
$1.20 or less	46%
$1.25 - $1.45	48
$1.50 - $1.55	33
$1.60 - $2.35	32
Number of Schools (Unweighted)	288
High Schools	
$1.20 or less	39%
$1.25 - $1.45	34
$1.50 - $1.55	30
$1.60 - $2.35	21
Number of Schools (Unweighted)	300
All Schools	
$1.20 or less	61%
$1.25 - $1.45	53
$1.50 - $1.55	40
$1.60 - $2.35	32
Number of Schools (Unweighted)	931

Source: Weighted tabulations of data from a telephone interview with public SFA directors (participation rates) and a mail survey of public school cafeteria managers (meal prices), Fall 1998 - Spring 1999. Exhibit includes only schools that appeared in both data sets.

SBP Meal Prices

Federal regulations set the maximum price for a reduced-price breakfast at $0.30. In SY 1998–99, the average price charged for a reduced-price breakfast was $0.28, with little variation across school types (Exhibit 2.9). Four percent of SBP schools (24 schools in the unweighted sample) reportedly served breakfasts free of charge to students approved for reduced-price meals.[6] Among schools that charged for reduced-price breakfasts, the minimum price was $0.05 and the maximum was $0.30. The average price charged for a reduced-price breakfast has remained virtually unchanged since SY 1991–92.

The average price charged for a full-price breakfast was $0.72 overall, with the average for elementary schools being somewhat lower ($0.70) and the average for middle and high schools somewhat higher ($0.75-$0.76). One percent of SBP schools (eight schools in the unweighted sample) served breakfasts free of charge to all students, including those not eligible for meal benefits.[6] Excluding these schools, the minimum charge for a full-price breakfast was $0.25 and the maximum was $1.55.

In comparison to prices charged in SY 1991–92, the average price for a full-price breakfast in SY 1998–99 was about 20 percent higher ($0.72 versus $0.60). The relative size of the increase was greatest for middle schools and high schools (27%-32%) and lowest for elementary schools (15%).

Use of multiple prices for full-price breakfasts was rare, reported by less than one percent of all schools.

Menu Planning Practices

As discussed in Chapter One, USDA has focused considerable attention in recent years on the nutritional quality of meals served in the NSLP and SBP. The Department's commitment to incorporating the *Dietary Guidelines for Americans* has been accompanied by a concerted effort to expand menu planning options and to provide schools with technical assistance and needed resources. The SNDA-II study included a series of questions designed to provide Department officials with an up-to-date picture (SY 1998–99) of menu planning practices in NSLP schools. This section summarizes findings from these questions.

Responsibility for Menu Planning

In almost two-thirds (64%) of all NSLP schools, lunch menus were planned entirely at the district level (Exhibit 2.10). In another 20 percent of schools, school-level staff members were solely responsible for planning their own lunch menus. Lunch menus for the remaining 16 percent of schools were planned at an associated off-site kitchen (i.e., a base or central kitchen that services the school [6%]; a combination of SFA, school and/or off-site kitchen staff [7%]; or some other source, including, but not limited to, food service management companies [FSMCs] [3%]).

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6 Under a special assistance certification and reimbursement provision (provision 2) (7CFR245.9), schools may elect to serve meals free of charge to all students provided that non-Federal resources are used to cover the cost of meals served to ineligible children. Schools operating under this provision are not required to certify students for meal benefits for up to three years after an initial assessment and claim reimbursement based on approved claiming percentages.

Exhibit 2.9

SBP Meal Prices

Type of Breakfast	Elementary Schools	Middle Schools	High Schools	All Schools
Price for Reduced-Price Breakfast				
Mean	$0.28	$0.27	$0.27	$0.28
Minimum (excluding zeros)	0.05	0.05	0.05	0.05
Maximum	0.30	0.30	0.30	0.30
Price for Full-Price Breakfast				
Mean	$0.70	$0.76	$0.75	$0.72
Minimum (excluding zeros)	0.25	0.25	0.25	0.25
Maximum	1.54	1.55	1.55	1.55
Number of Schools (Unweighted)	293	232	234	759

Notes: Exhibit includes only schools that reported serving reduced-price or full-price breakfasts (some schools served only free breakfasts) and that provided data on meal prices.

Four percent of schools served breakfasts free of charge to students who are certified for reduced-price meal benefits. One percent served breakfasts free of charge to all students, including those who are not certified for free meal benefits. Such meals were reported as reduced-price or full-price, in keeping with program regulations, but the price charged to students was zero.

Approximately one percent of schools reported using more than one price for full-price breakfasts.

Source: Weighted tabulations of data from a mail survey of public school cafeteria managers, Fall 1998 - Spring 1999.

The prevalence of fully centralized district-level menu planning varied slightly by type of school. Specifically, the proportion of high schools in which lunch menus were planned entirely at the district level was somewhat lower than for middle schools or elementary schools (60% versus 64% and 69%, respectively). In more than a quarter of NSLP high schools (29%), lunch menus were planned entirely at the school level. The same was true for only 19 percent of elementary schools and 14 percent of middle schools. The general pattern of menu planning responsibility was similar for breakfast menus.

Availability and Use of Menu Planning Resources

SFA directors were asked about the use of specific menu planning resources available from USDA and about the availability and use of other resources at the State and local level. USDA has provided all SFAs with two sets of recipes that are specifically designed to promote consistency with the *Dietary Guidelines for Americans*. This includes an updated version of a long-standing resource — *USDA's Quantity Recipes for School Food Service* — as well as *USDA's New School Lunch and Breakfast Recipes . . . A Tool Kit for Healthy School Meals*, a resource developed under USDA's Team Nutrition initiative. The data indicate that schools are using both of these resources (Exhibit 2.11). According to SFA directors, SY 1998–99 menus planned for roughly nine out of 10 NSLP schools used the updated *Quantity Recipes for School Food Service*. In addition, menus for more than three-quarters of all schools were planned using the *Tool Kit for Healthy School Meals*. There was little variation in reported use of these resources across school types.

Menus planned in more than 90 percent of all schools used nutrition information provided by State Child Nutrition (CN) agencies (Exhibit 2.11). SFA directors for the six percent of schools where such information was not utilized indicated that the State CN office had not provided nutrition information.

Menu planners in two-thirds of all schools had access to a computer-based system for menu planning (Exhibit 2.11). Menu planners in about half of all schools actually used a computerized system to analyze the nutrient content of menus. As discussed in a subsequent section, use of a computerized system to analyze nutrient content of planned menus was not limited to schools where NSMP or ANSMP were in use. Menu planners for non-NSMP/ANSMP schools may be using nutrient analysis software to monitor the nutrient content of menus planned using one of the food-based menu planning options (menu planning options used in NSLP schools are discussed in the next section).

Finally, 58 percent of all NSLP schools used a nutrition specialist to plan menus in SY 1998–99. Thirty-one percent of schools reported using a nutritionist who was not a registered dietitian; 15 percent used a registered dietitian; and 12 percent reported using both a nutritionist and a registered dietitian.

Menu Planning Options Selected by Schools

As described in Chapter One, five different menu planning options are available to schools participating in the NSLP: the traditional food-based menu planning system, the enhanced food-based system, NSMP, ANSMP and "any reasonable approach."

Exhibit 2.10

Responsibility for Menu Planning

	Elementary Schools	Middle Schools	High Schools	All Schools
Menu Type/Locus of Responsibility	**Percentage of Schools**			
Lunch Menus				
SFA	64%	69%	60%	64%
School	19	14	29	20
Off-site kitchen	8	6	1	6
Combination of above	6	10	8	7
Other/food service management company	3	2	2	3
Number of Schools (Unweighted)	409	349	351	1,109
Breakfast Menus				
SFA	65%	71%	58%	65%
School	20	13	31	21
Off-site kitchen	6	4	1	5
Combination of above	8	10	8	8
Other/food service management company	2	2	1	2
Number of Schools (Unweighted)	332	258	263	853

Note: Columns may not sum to 100 percent because of rounding.

Source: Weighted tabulations of data from a telephone interview with public SFA directors, Fall 1998 - Spring 1999.

Exhibit 2.11

Availability and Use of Menu Planning Resources

Menu Planning Resource	Elementary Schools	Middle Schools	High Schools	All Schools
	Percentage of Schools			
USDA Recipes				
Updated *Quantity Recipes for School Food Service*	89%	89%	91%	89%
New School Lunch and Breakfast Recipes from *A Tool Kit for Healthy School Meals*	76	77	79	77
Nutrition Information Provided by State Child Nutrition Agency				
Available and used for menu planning	95	93	92	94
Not available	5	7	8	6
Computer-Based Menu Planning System				
Available	65	69	68	66
Used for nutrient analysis	51	52	48	51
Nutrition Specialist Employed to Plan Menus				
None	43	41	43	42
Nutritionist (not R.D.)	30	32	31	31
Registered dietitian (R.D.)	15	15	17	15
Both nutritionist and R.D.	13	12	9	12
Number of Schools (Unweighted)	409	349	351	1,109

Note: Column sections may not sum to 100 percent because of rounding.

Source: Weighted tabulations of data from a telephone interview with public SFA directors, Fall 1998 - Spring 1999.

In SY 1998–99, the food-based menu planning systems were, by far, more common than any of the other menu planning options. Of these, the traditional food-based system — used by 41 percent of all schools — was the leading choice (Exhibit 2.12). Another 28 percent of schools used the enhanced food-based system, bringing the total percentage of schools that used a food-based menu planning approach to 69 percent.

The nutrient-based menu planning options were used by 27 percent of all schools. Most of these schools used NSMP. Use of ANSMP was rare — only three percent of all schools reported this option. A small proportion of schools (4%) reported using some other approach to menu planning. These included state-designed systems (Mississippi, West Virginia, California) or some variation on one of the food-based meal patterns.

It is important to note that reported use of NSMP or ANSMP does not necessarily imply that the computer-based menu planning system was fully implemented at the time data were collected. Previous research has indicated that implementation of NSMP can be a lengthy and challenging process. In a USDA-sponsored demonstration of NSMP, 16 SFAs took anywhere from three to 33 months to implement NSMP, with an average time line of 19 months (Fox 1998).[7]

To gain some insight into characteristics that might influence the choice of menu planning system, data on menu planning options were cross-tabulated with data on selected school characteristics (Exhibit 2.13). In reviewing these data, it is important to recognize several limitations. First, unweighted sample sizes for some cells are small (less than 50 cases). Because of the extremely small sample of ANSMP schools (23 schools in the entire sample), NSMP and ANSMP schools were combined for this analysis. Data for the schools that used "other reasonable approaches" are reported separately, for the sake of completeness, but should be interpreted with extreme caution because of the small sample size (38 schools). Second, several of the tabulated characteristics are highly correlated with one another. For example, urban schools tend to have a higher percentage of low-income students than either rural or suburban schools. Thus, the available data do not permit an analysis of causal relationships.

Despite these limitations, the data reveal some interesting patterns regarding use of the various menu planning options, as summarized below.

- Choice of menu planning system varied by region. Compared to the national distribution of menu planning systems, use of NSMP/ANSMP was disproportionately higher and use of the traditional food-based menu planning system was disproportionately lower in the Mountain Plains and Western regions. In contrast, schools in the Southwest region overwhelmingly used the traditional food-based system. These trends were noted in a majority of states in each region.

- Use of alternative menu planning approaches was most common in the Western region. Many of these schools were in California and may have been using the state-developed *SHAPE* program, an early version of NSMP.

7 Because another USDA-sponsored study was collecting data on SMI implementation at the time the SNDA-II data were being collected, SNDA-II instruments did not include detailed questions about the process of NSMP/ANSMP implementation.

Exhibit 2.12

Menu Planning Options Used for NSLP Menus

Menu Planning Option	Elementary Schools	Middle Schools	High Schools	All Schools
	Percentage of Schools			
Traditional food-based meal pattern	41%	41%	40%	41%
Enhanced food-based menu system	28	30	29	28
Nutrient Standard Menu Planning (NSMP)	25	24	24	24
Assisted Nutrient Standard Menu Planning (ANSMP)	3	2	3	3
Other approach	4	3	5	4
Number of Schools (Unweighted)	409	349	351	1,109

Note: Columns may not sum to 100 percent because of rounding.

Source: Weighted tabulations of data from a telephone interview with public SFA directors, Fall 1998 - Spring 1999.

Exhibit 2.13

Menu Planning Options by Selected School Characteristics

Characteristic	NSMP/ ANSMP	Enhanced Food-Based	Traditional Food-Based	Other	All Options
	Percentage of Schools				
All Schools	27%	28%	41%	4%	100%
FNS Region					
Mid-Atlantic	17	34	49	<1	100
Mountain Plains	49	35	14	2	100
Midwest	20	35	41	4	100
Northeast	35	20	44	1	100
Southeast	19	34	41	6	100
Southwest	20	6	74	0	100
Western	37	29	23	11	100
Community Type					
Urban	33	26	40	2	100
Suburban	23	32	41	4	100
Rural	30	23	41	6	100
Percent of Students Approved for Free Meals					
25 percent or less	29	34	36	1	100
26-50 percent	28	20	45	7	100
51-74 percent	22	28	44	7	100
75 percent or more	20	25	50	5	100
Mean percentage	30	30	36	42	33
Menu Planner Has Access to a Computer-Based System					
Yes	37	25	34	4	100
No[1]	9	34	53	4	100
Registered Dietitian or Nutritionist Plans Menus					
Yes	27	29	40	4	100
No	27	27	41	4	100

Exhibit 2.13
(continued)

Characteristic	NSMP/ ANSMP	Enhanced Food-Based	Traditional Food-Based	Other	All Options
	Percentage of Schools				
Uses Food Service Management Company					
Yes	51	15	34	1	100
No	24	30	42	5	100
Number of Schools (Unweighted)	294	333	444	38	1,109

[1] The nine percent of NSMP/ANSMP schools that reported that menu planners did not have access to a computer were either using ANSMP or were schools in districts that use decentralized menu planning and centralized nutrient analysis. SFA directors who provided information indicated that these menu planners did not have access to a computer at the local level and that nutrient analysis was done at the district level.

Note: No statistical tests were performed to assess the significance of observed differences.

Rows may not sum to exactly 100 percent because of rounding.

Source: Weighted tabulations of data from a telephone interview with public SFA directors and a mail survey of public school cafeteria managers (data on meal counts needed to calculate participation rates), Fall 1998 - Spring 1999.

- Choice of menu planning system varied somewhat by type of community. Among urban schools, use of NSMP and ANSMP was notably higher than the national average. The same is true for the enhanced food-based system among suburban schools. Use of the enhanced food-based system was disproportionately lower among rural schools.

- Choice of menu planning system varied by relative level of affluence. Use of the traditional menu planning system was disproportionately higher and use of NSMP/ANSMP was disproportionately lower among the lowest-income schools — those with 75 percent or more of students approved for free or reduced-price meals. The most affluent schools — those with no more than 25 percent of students approved for free-meal benefits — used the enhanced food-based menu system more frequently than schools with greater concentrations of low-income students.

- Use of NSMP/ANSMP was notably greater among schools that had access to a computer system (at the time data were collected) than among schools that did not have such access. However, access to a computer system did not guarantee use of NSMP/ANSMP. More than 60 percent of schools with reported access to a computerized menu planning system were *not* using NSMP/ANSMP.

- The use of a registered dietitian or nutritionist to plan menus had no apparent association with menu planning option.

- Schools that used FSMCs (12 percent of all schools) used NSMP/ANSMP more often than schools that did not use FSMCs.

Nutrient Analysis Procedures in Schools Using NSMP and ANSMP

For schools in which menus were planned using NSMP or ANSMP, SFA directors provided additional information on selected aspects of the procedures used in conducting nutrient analyses. Information was obtained on the use of combined analyses for breakfast and lunch menus, use of weighted nutrient analyses, the source of data for weighted nutrient analyses and the age/grade groupings used in defining reference nutrient standards.

Analysis of Breakfast and Lunch Menus

Federal regulations permit schools implementing NSMP or ANSMP to analyze the nutrient content of lunch and breakfast menus separately or to combine them. The rationale for allowing a combined analysis is that the *Dietary Guidelines* are intended to apply to total daily consumption rather than to individual meals. Regardless, schools are required to weight the nutrient contribution from each meal according to levels of participation in each program.

In SY 1998–99, schools that conducted analyses of both breakfast and lunch menus were more likely to analyze each meal separately than to complete a combined analysis (Exhibit 2.14). Among schools using NSMP or ANSMP, 44 percent completed separate analyses for breakfast and lunch menus and 28 percent completed a combined analysis (Exhibit 2.14). The combined analysis was most common in middle schools (42%) and least common in elementary schools (25%).

Exhibit 2.14

Menu Analysis Procedures Adopted by Schools Using NSMP or ANSMP

Menu Analysis Procedure	Elementary Schools	Middle Schools	High Schools	All Schools
	Percentage of NSMP/ANSMP Schools			
Analysis of Breakfast and Lunch Menus				
Analyze breakfast and lunch separately	43%	44%	50%	44%
Complete one combined analysis for breakfast and lunch	25	42	30	28
Analyze lunch only	25	13	18	22
Analyze breakfast only	7	1	1	5
Use Weighted Nutrient Analysis				
Yes	72%	75%	78%	74%
No	28	25	22	26
Source of Data Used for Weighted Nutrient Analysis[1]				
Projected servings	67%	64%	69%	67%
Both actual and projected servings	31	21	19	27
Actual servings	3	15	11	6
Number of Schools (Unweighted)	113	92	89	294

[1] Base sample includes only schools that perform a weighted nutrient analysis.

Notes: Exhibit includes only schools that use NSMP or ANSMP.
Column sections may not sum to 100 percent because of rounding.

Source: Weighted tabulations of data from telephone interviews with public SFA directors, Fall 1998 - Spring 1999.

Use of Weighted Nutrient Analysis
NSMP and ANSMP are designed around use of a weighted nutrient analysis. A *weighted analysis* takes into account the number and types of foods actually served to students, giving greater weight to the foods that are served more frequently. As such, results of a weighted nutrient analysis provide a picture of the *average meal served* to or *selected* by students. Regulations require that all schools maintain meal production records to provide the information on food selection patterns needed for a weighted analysis.

An *unweighted analysis* does not consider student selection patterns. The analysis constitutes a simple average of all foods offered to students. An unweighted nutrient analysis provides an assessment of the *average meal offered* to students. Prior to SMI, assessments of the nutrient content of school meals were typically based on unweighted analyses.

During the time data were being collected for this study, regulations were changed to permit use of an unweighted analysis, through SY 2003, for SFAs or schools that obtain a waiver from their State agency (P.L. 105-336). Because this change was implemented after the study was underway, data on the use of waivers were not collected.

In SY 1998–99, roughly three-quarters of the schools reporting use of NSMP or ANSMP were using weighted analyses (Exhibit 2.14). The remainder were conducting unweighted analyses, presumably under a waiver from their State agency. Schools may have been using unweighted rather than weighted analyses because they were still in early stages of NSMP/ANSMP implementation.

Schools reported using a variety of approaches to incorporate information on student food selection patterns into their weighted nutrient analyses. Two-thirds of the NSMP/ANSMP schools that performed weighted analysis reported that their analyses were based on projections of the numbers of servings of each food to be served. Another 27 percent of schools reported using projections as well as actual production information (i.e., records of the number of portions actually served). This practice was more common in elementary schools (31%) than in either middle schools (21%) or high schools (19%). Finally, a relatively small percentage of schools (6% overall) indicated that their weighted analyses were based entirely on actual meal production data. This approach was largely used by middle schools and high schools and was rarely used in elementary schools.

Age/Grade Grouping Used in Nutrient Analysis
Schools using NSMP or ANSMP are afforded several options for developing lunch and breakfast menus that meet nutrient requirements for students of different ages. The nutrition standards against which planned menus are compared (nutrient content averaged over a week) may be based on one of the following:

- **USDA-defined *age* groups:** 3-6 years; 7-10 years; 11-13 years; and 14 years and older.

- **USDA-defined *grade* groups:** preschool; kindergarten (K) to grade 6; and grades 7-12.

- **Customized age or grade groups that match the configuration of the school.** USDA guidance suggests that elementary schools with large age/grade spans perform more than one analysis, breaking the analysis at or around grade 6.

The age or grade group defined by a school dictates the calorie and nutrition standards for meals served in that school (Appendix E describes how NSMP software calculates customized RDAs).

Based on SFA director reports, more than three-quarters of all schools using NSMP or ANSMP in SY 1998–99 used grade groups rather than age groups to define nutrition standards (Exhibit 2.15). Moreover, most schools used customized grade or age groups rather than one of the USDA-defined groups. This was true for elementary schools, middle schools, and high schools.

Among elementary schools using NSMP or ANSMP, one-fifth used the USDA-defined grade group of grades K-6 to define nutrition standards. Another seven percent used the USDA-defined age group of ages 7-10. The remaining elementary schools used a customized grade or age group. The most common was the slightly narrower grade group of K-5 (29%). Twenty percent of elementary schools used some other grade span that more closely matched their own grade configuration and nine percent used a customized age span. A total of three percent of elementary schools reported analyzing menus using more than one age or grade group to accurately reflect differing nutritional needs of older and younger students.

The most common age/grade grouping used in analyzing middle school menus was the customized grouping of grades 6-8 (52%). This is consistent with the most common middle school grade configuration. The customized grouping of grades 7 and 8 was a distant second, reported by 16 percent of all middle schools using NSMP or ANSMP. None of the middle schools in the sample reported using the USDA-defined grade grouping of grades 7-12. Eleven percent of middle schools used the USDA-defined age group of ages 11-13.

Finally, among high schools using NSMP or ANSMP, the most common age/grade group used in analyzing menus was the customized grouping of grades 9-12. This grouping, used by roughly six out of 10 NSMP/ANSMP high schools, is consistent with the most common grade configuration for high schools. The USDA-defined group of grades 7-12 was used in 15 percent of high schools. Twelve percent of high schools used the USDA-defined age group of 14 years and older.

Incorporating the *Dietary Guidelines for Americans* into School Meals and Perceived Effects on Acceptability and Food Waste

Since 1995 and the launch of SMI, all SFAs have been expected to make changes, as needed, in menu planning, food purchasing and food preparation practices to promote consistency with the *Dietary Guidelines*. Cafeteria managers have varying levels of responsibility for designing and implementing these changes, depending on how an SFA is organized, i.e., the level of local versus centralized planning and decision making. Regardless of their level of direct involvement in planning, cafeteria managers are on the front lines in implementing change and thereby have a unique perspective on how well any given change is accepted by students.

According to cafeteria managers, 87 percent of all NSLP schools had made some changes in lunch menus prior to or during SY 1998–99 in order to incorporate the *Dietary Guidelines for Americans* (Exhibit

Exhibit 2.15

Grade/Age Groupings Used by NSMP and ANSMP Schools in Conducting Nutrient Analyses

School Level/Groupings Used	Percentage of NSMP/ANSMP Schools
Elementary Schools	
Type of Grouping Used	
Grade groups	82%
Age groups	18
Specific Grade/Age Groups Used	
Grades K - 5	29
Grades K - 6[1]	20
Other grade span	20
Other age span	9
Ages 7 - 10[1]	7
Grades 1 - 6	6
Two different age groups[2]	2
Two different grade groups[2]	1
One analysis for grades K-8, K-12, or other large grade span	8
Number of Schools (Unweighted)	113
Middle Schools	
Type of Grouping Used	
Grade groups	76%
Age groups	24
Specific Grade/Age Groups Used	
Grades 6 - 8	52
Grades 7 - 8	16
Ages 11 - 13[1]	11
Other grade span	8

Exhibit 2.15
(continued)

School Level/Groupings Used	Percentage of NSMP/ANSMP Schools
Middle Schools (con't)	
Ages 11 - 14	6
Other age span	5
Ages 14 and above[1]	2
Grades 7 - 12[1]	0
Number of Schools (Unweighted)	92
High Schools	
Type of Grouping Used	
Grade groups	84%
Age groups	16
Specific Grade/Age Groups Used	
Grades 9 - 12	59
Grades 7 - 12[1]	15
Ages 14 and above[1]	12
Other grade span	5
Grades 10 - 12	4
Other age span	4
Number of Schools (Unweighted)	89

[1] USDA-defined grade/age grouping.

[2] School completes two separate analyses for younger and older elementary school children.

Notes: Exhibit includes only schools that used NSMP or ANSMP to plan menus.
Column sections may not sum to 100 percent because of rounding.

Source: Weighted tabulations of data from telephone interviews with public SFA directors, Fall 1998 - Spring 1999.

2.16). Managers in schools where such changes had been made were asked whether the changes had influenced the acceptability of school lunches.

Results indicate that, in more than eight out of 10 schools, attempts to incorporate the *Dietary Guidelines* into lunch menus had neutral or positive effects on meal acceptability. Forty-three percent of managers in schools where changes had been made to incorporate the *Dietary Guidelines* reported that students liked the new lunches *about the same as* the old lunches. A roughly equivalent proportion (38%) indicated that students liked the new lunches *somewhat better* or *much better* than the old lunches. A much smaller percentage of managers (14%) believed that incorporation of the *Dietary Guidelines* reduced meal acceptability.

The general pattern of responses was comparable across school types. However, compared to elementary school and middle school managers, fewer high school managers reported a positive effect (35% versus 39-40%) and a greater percentage reported no effect or a negative effect (61% versus 55-56%).

Exhibit 2.17 tabulates responses by menu planning option. Results were generally comparable to those reported above and indicate a neutral to positive effect in most schools regardless of the menu planning method used. However, managers in schools using the traditional food-based menu planning system were more likely than other managers to report that the *Dietary Guidelines* had reduced the acceptability of school lunches. Twenty percent of managers in schools using the traditional food-based system believed that students liked the new lunches *somewhat less* or *much less* than the old lunches, compared to 11 percent of managers in schools using the enhanced food-based system or one of the two nutrient-based menu planning options. This result may indicate that it is more difficult to incorporate the *Dietary Guidelines* successfully using the traditional food-based menu planning system. It may also reflect a somewhat more negative attitude toward change among managers who are continuing to use the traditional system.

Cafeteria managers were also asked specifically about the impact of *Dietary Guidelines* changes on the amount of food wasted at lunch. With the exception of cooked vegetables (other than French fries), neutral or *positive* effects (i.e., that students were wasting less food than they had before menus were changed to incorporate the *Dietary Guidelines*) were reported by roughly 85 to 90 percent of managers (Exhibit 2.18). Moreover, for every food group queried, 25 to 40 percent of cafeteria managers, overall, reported reduced food waste.

In general, fewer than 10 percent of cafeteria managers reported that students were wasting more food than they had wasted prior to implementation of *Dietary Guidelines* changes. An exception to this rule was noted for cooked vegetables (other than French fries). Nineteen percent of managers reported increased waste of cooked vegetables.

For some food groups, perceptions about the impact of *Dietary Guidelines* changes on food waste at lunch varied by type of school. Middle school and high school managers reported an increase in the amount of milk wasted more often than elementary school managers. In contrast, elementary school managers reported increased waste of main dishes and breads and decreased waste of desserts more often than middle school managers or high school managers.

Exhibit 2.16

Percentage of Schools Reporting Changes in Lunch Menus to Incorporate the *Dietary Guidelines for Americans* and Perceived Effect on Meal Acceptability

	Elementary Schools	Middle Schools	High Schools	All Schools
	Percentage of Schools			
Changes Made in Lunch Menus to Incorporate the *Dietary Guidelines for Americans*				
Yes	86%	87%	87%	87%
No	14	13	13	14
Number of Schools (Unweighted)	385	325	326	1,036
Perceived Effect of Changes on Acceptability of Lunches[1]				
Students like new lunches *much better* than old lunches	16%	14%	13%	15%
Students like new lunches *somewhat better* than old lunches	23	26	22	23
Students like new lunches *about the same* as old lunches	42	42	44	43
Students like new lunches *somewhat less* than old lunches	13	11	14	13
Students like new lunches *much less* than old lunches	1	2	3	1
Don't know	5	5	4	5
Number of Schools (Unweighted)	330	280	285	895

[1] Base sample includes only schools where the respondent indicated that changes had been made in lunch menus to incorporate the *Dietary Guidelines for Americans.*

Note: Columns may not sum to 100 percent because of rounding.

Source: Weighted tabulations of data from a mail survey of public school cafeteria managers, Fall 1998 - Spring 1999.

Exhibit 2.17

Percentage of Schools Reporting Changes in Lunch Menus to Incorporate the *Dietary Guidelines for Americans*, by Menu Planning Option, and Perceived Effect on Meal Acceptability

	NSMP/ ANSMP	Enhanced Food-Based	Traditional Food-Based	All Schools
	Percentage of Schools			
Changes Made in Lunch Menus to Incorporate the *Dietary Guidelines for Americans*				
Yes	86%	90%	83%	87%
No	14	10	17	14
Number of Schools (Unweighted)	268	314	418	1,036
Perceived Effect of Changes on Acceptability of Lunches[1]				
Students like new lunches *much better* than old lunches	19%	18%	7%	15%
Students like new lunches *somewhat better* than old lunches	24	22	26	24
Students like new lunches *about the same* as old lunches	42	45	40	43
Students like new lunches *somewhat less* than old lunches	10	9	18	13
Students like new lunches *much less* than old lunches	1	2	2	1
Don't know	4	4	7	5
Number of Schools (Unweighted)	238	279	345	895

[1] Base sample includes only schools in which changes had been made in lunch menus to incorporate the *Dietary Guidelines for Americans.*

Note: Columns may not sum to 100 percent because of rounding.

Source: Weighted tabulations of data from a mail survey of public school cafeteria managers, Fall 1998 - Spring 1999.

Exhibit 2.18

Perceived Effect of Changes in Lunch Menus on Levels of Food Waste

Food/Perception of Change in Waste	Elementary Schools	Middle Schools	High Schools	All Schools
	Percentage of Schools			
Milk				
Students waste more	2%	7%	5%	3%
Students waste less	24	28	24	25
No change	68	58	66	66
Don't know	6	7	5	6
Main Dish/Entree				
Students waste more	10	6	5	8
Students waste less	37	39	33	36
No change	50	48	57	51
Don't know	4	8	6	5
Bread or Bread Alternate				
Students waste more	9	5	5	7
Students waste less	38	40	31	37
No change	51	49	53	52
Don't know	3	6	5	4
Salad/Raw Vegetables				
Students waste more	12	11	7	11
Students waste less	36	36	35	36
No change	48	46	54	49
Don't know	5	7	4	5
Cooked Vegetables (other than French fries)				
Students waste more	18	19	20	19
Students waste less	25	28	23	25
No change	53	47	52	52
Don't know	4	6	4	4
Fruit				
Students waste more	6	7	7	7
Students waste less	42	41	32	40
No change	49	46	58	50
Don't know	2	7	4	3
Desserts				
Students waste more	3	2	1	2
Students waste less	38	30	34	36
No change	54	55	56	54
Don't know	6	13	9	8
Number of Schools (Unweighted)	330	280	285	895

Notes: Exhibit includes only schools in which changes had been made in lunch menus to incorporate the *Dietary Guidelines for Americans*.
Column sections may not sum to 100 percent because of rounding.
Source: Weighted tabulations of data from a mail survey of public school cafeteria managers, Fall 1998 - Spring 1999.

Breakfast Menus

A comparable series of questions was asked in relation to breakfast menus. Two-thirds of cafeteria managers in SBP schools reported that changes had been made in breakfast menus to incorporate the *Dietary Guidelines* (Exhibit 2.19). The fact that the prevalence of menu change was lower for breakfast menus than for lunch menus (66% versus 87% [Exhibit 2.17]) is not surprising. The first SNDA study found that breakfasts offered in SY 1991–92 were substantially more consistent with *Dietary Guidelines* recommendations than lunches.

According to cafeteria managers, *Dietary Guidelines* changes in breakfast menus were even less likely to have a negative effect on meal acceptability than changes in lunch menus (Exhibit 2.19). Fewer than six percent of managers in schools with revised breakfast menus reported a negative effect, compared to 14 percent of managers in schools with revised lunch menus. The perception that modified breakfasts were *somewhat less* acceptable or *much less* acceptable than previous breakfasts was largely concentrated among high school managers (12% versus 3-4%).

In addition, a marked positive effect (i.e., the perception that students liked new breakfasts *much better* than old breakfasts) was more commonly reported for modified breakfast menus (25%) than for modified lunch menus (15%). This response was most common among elementary school managers.

Cafeteria managers' perceptions about the impact of changes in breakfast menus on levels of food waste are tabulated in Exhibit 2.20. Results are consistent with findings reported in the previous discussion of changes in lunch menus. For every food group queried, 31 to 45 percent of cafeteria managers reported that students were wasting less food than they had before menus were changed to incorporate the *Dietary Guidelines*. Reports of increased waste were rare.

There were some variations in perceptions about the effect of *Dietary Guidelines* changes on food waste at breakfast across school types. These were largely consistent with those described in the preceding discussion of perceived effects on food waste at lunch.

Types of Meal Service Offered

Schools participating in the NSLP offered students a variety of different types of lunch meals in SY 1998–99 (Exhibit 2.21). Virtually all schools offered a hot meal at least once per week and 88 percent of schools offered a hot meal every day. Cold meals, such as sandwiches and salad plates, were offered at least once per week in more than two-thirds of all schools. Almost half of all schools (47%) offered a cold meal every day of the week. More than three-quarters of all schools offered hot sandwiches, such as hamburgers or hot dogs, or pizza at least once per week. Roughly one-third of all schools offered a hot sandwich or pizza every day of the week. Salad bars and other food bars were notably less common, offered in only 27 percent of all schools. Schools that did offer such bars tended to offer one every day of the week. Finally, more than half of all schools (59%) offered at least some items that were *not part of the USDA reimbursable meal* on an *a la carte* basis. Again, schools that offered such *a la carte* foods almost always offered them every day of the week.

Exhibit 2.19

Percentage of Schools Reporting Changes in Breakfast Menus to Incorporate the *Dietary Guidelines for Americans* and Perceived Effect on Meal Acceptability

	Elementary Schools	Middle Schools	High Schools	All Schools
	Percentage of Schools			
Changes Made in Breakfast Menus to Incorporate the *Dietary Guidelines for Americans*				
Yes	67%	71%	60%	66%
No	34	30	41	34
Number of Schools (Unweighted)	317	245	246	808
Perceived Effect of Changes on Acceptability of Breakfasts[1]				
Students like new breakfasts *much better* than old breakfasts	27%	21%	19%	25%
Students like new breakfasts *somewhat better* than old breakfasts	13	26	20	16
Students like new breakfasts *about the same* as old breakfasts	49	48	47	49
Students like new breakfasts *somewhat less* than old breakfasts	4	3	10	5
Students like new breakfasts *much less* than old breakfasts	0	<1	2	<1
Don't know	7	2	2	5
Number of Schools (Unweighted)	199	160	151	510

[1] Base sample includes only schools where the SBP is offered and the respondent indicated that changes had been made in breakfast menus to incorporate the *Dietary Guidelines for Americans*.

Note: Columns may not sum to 100 percent because of rounding.

Source: Weighted tabulations of data from a mail survey of public school cafeteria managers, Fall 1998 - Spring 1999.

Exhibit 2.20

Perceived Effect of Changes in Breakfast Menus on Levels of Food Waste

Food/Perception of Change in Waste	Elementary Schools	Middle Schools	High Schools	All Schools
	Percentage of Schools			
Milk				
Students waste more	3%	12%	8%	5%
Students waste less	29	32	35	31
No change	66	53	52	61
Don't know	2	4	5	3
Main Dish/Entree				
Students waste more	3	3	3	3
Students waste less	43	52	43	45
No change	52	41	48	49
Don't know	2	4	6	3
Bread or Bread Alternate				
Students waste more	5	3	4	5
Students waste less	43	46	34	42
No change	50	47	57	50
Don't know	2	4	5	3
Fruit				
Students waste more	8	5	4	7
Students waste less	36	29	30	34
No change	50	52	60	52
Don't know	6	14	6	7
Juice				
Students waste more	3	2	3	3
Students waste less	42	47	33	41
No change	54	47	60	54
Don't know	2	4	5	3
Number of Schools (Unweighted)	199	160	151	510

Notes: Exhibit includes only schools where the SBP is offered and changes were made in breakfast menus to comply with the *Dietary Guidelines for Americans.*

Column sections may not sum to 100 percent because of rounding.

Source: Weighted tabulations of a mail survey of public school cafeteria managers, Fall 1998 - Spring 1999.

Exhibit 2.21

Types of Meal Service Offered at Lunch

Type of Meal Service/Frequency	Elementary Schools	Middle Schools	High Schools	All Schools
	Percentage of Schools			
Hot Meal				
Every day	87%	92%	89%	88%
3-4 times per week	8	2	8	7
1-2 times per week	4	2	2	3
Not offered	1	4	1	1
Cold Meal, Such as Sandwich or Salad Plate				
Every day	39	52	68	47
3-4 times per week	4	9	5	5
1-2 times per week	20	17	9	17
Not offered	38	21	17	31
Hot Sandwich, Such as Hamburger, Hot Dog, or Pizza				
Every day	20	53	63	34
3-4 times per week	17	16	13	16
1-2 times per week	32	17	12	26
Not offered	31	14	12	24
Salad Bar or Other Food Bar				
Every day	12	27	49	21
3-4 times per week	3	2	4	3
1-2 times per week	2	5	5	3
Not offered	83	66	42	73
***A la Carte* Items Not Part of USDA Reimbursable Lunch**[1]				
Every day	41	77	73	53
3-4 times per week	1	0	2	1
1-2 times per week	5	1	1	4
Not offered	52	22	23	41
Number of Schools (Unweighted)	385	325	326	1,036

[1] Percentages reported for *a la carte* sales in this exhibit are not consistent with those reported in Exhibit 2.23 because this exhibit reports only availability of *a la carte* items that are *not part of USDA-reimbursable lunch*. Exhibit 2.23 reports on all *a la carte* sales (i. e., sales associated with the purchase of foods that are offered strictly *a la carte* as well as the purchase of one or more foods offered in USDA-reimbursable meals *a la carte*.

Note: Column sections may not sum to 100 percent because of rounding.

Source: Weighted tabulations of a mail survey of public school cafeteria managers, Fall 1998 - Spring 1999.

The availability and frequency of various meal service options varied across school types.[8] Options other than a traditional hot meal were notably more common in middle schools and high schools than in elementary schools. In addition, middle schools and high schools were more likely to offer these alternative meal options every day of the week. This was especially true for *a la carte* items not included in reimbursable meals. In more than half of all elementary schools, such items were never offered. In contrast, roughly three-quarters of middle schools and high schools offered some items on a strictly *a la carte* basis every day of the week.

Breakfast Menus

Almost all schools participating in the SBP offered both hot and cold breakfasts (Exhibit 2.22). Ninety-one percent of SBP schools offered a cold breakfast one or more days per week and the same percentage offered a hot breakfast one or more days per week. More than half of all schools (56%) offered a cold breakfast every day. A somewhat lower percentage (50%) offered a hot breakfast every day, such as hot cereal, pancakes or waffles, eggs or a breakfast sandwich.

A la carte foods were much less common at breakfast than at lunch. Only about a quarter of all schools offered breakfast foods on a strictly *a la carte* basis (i.e., foods that were not offered as part of the reimbursable breakfast and had to be purchased separately). (Roughly 60 percent of all schools offered items on a strictly *a la carte* basis at lunch.)

There were some differences in breakfast offerings in different types of schools. Middle schools and high schools offered hot breakfasts more often than elementary schools and were also more likely to offer hot and cold breakfasts every day of the week. Middle schools and high schools were also more likely to offer *a la carte* breakfast items. *A la carte* breakfast items were most commonly offered in high schools.[9]

Alternatives to NSLP and SBP Meals

Students who do not purchase or receive NSLP or SBP meals have several alternatives for obtaining a lunch or breakfast from other sources. In addition to bringing food from home or, in the case of breakfast, eating a meal before coming to school, possible options include:

- purchasing components of the USDA-reimbursable meal (but not enough to qualify as a meal) or *a la carte* items from the cafeteria;

- buying food from a school store, snack bar or vending machine; and

- leaving school to buy food or go home for lunch.

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8 Chapter Three provides detailed information on the number and types of food offered in NSLP meals during a typical school week.

9 Chapter Four provides detailed information on the number and types of food offered in SBP meals during a typical school week.

Exhibit 2.22

Types of Meal Service Available at Breakfast

Type of Meal Service/Frequency	Elementary Schools	Middle Schools	High Schools	All Schools
	Percentage of Schools			
Cold Breakfast				
Every day	52%	62%	67%	56%
3-4 times per week	14	9	6	11
1-2 times per week	29	18	12	24
Not offered	6	12	15	9
Hot Breakfast				
Every day	43	64	65	50
3-4 times per week	31	20	18	27
1-2 times per week	15	12	10	14
Not offered	11	5	7	9
***A la Carte* Items not Part of USDA Reimbursable Breakfasts**[1]				
Every day	14	34	58	25
3-4 times per week	0	0	2	0
1-2 times per week	1	1	2	1
Not offered	85	64	39	74
Number of Schools (Unweighted)	317	245	246	808

[1] Percentages reported for *a la carte* sales in this exhibit are not consistent with those reported in Exhibit 2.23 because this exhibit reports only availability of *a la carte* items that are *not part of USDA-reimbursable breakfast*. Exhibit 2.23 reports on all *a la carte* sales (i. e., sales associated with the purchase of foods that are offered strictly *a la carte* as well as the purchase of one or more foods offered in USDA-reimbursable meals *a la carte*).

Note: Column sections may not sum to 100 percent because of rounding.

Source: Weighted tabulations of data from a mail survey of public school cafeteria managers, Fall 1998 - Spring 1999.

This section presents data on the incidence of these alternatives at schools participating in the NSLP. It also describes the types of foods available *a la carte* and the specific items offered. Finally, it describes the weekly *a la carte* revenue generated by NSLP schools.

Options Other than USDA-Reimbursable Meals

The most common option available for students who do not purchase a USDA-reimbursable meal is purchase of items *a la carte*.[10] This option, which includes items offered strictly *a la carte* as well as *a la carte* purchase of individual components of the USDA-reimbursable meal, was available at lunch in more than nine out of 10 NSLP schools (Exhibit 2.23). As discussed in a subsequent section, this option is sometimes limited to *a la carte* purchase of milk, juice and/or dessert to accompany a meal brought from home.

Students were much less likely to have the option to purchase *a la carte* foods at breakfast. This is especially true at the elementary school level, where only 27 percent of schools offered foods *a la carte* at breakfast. Availability of *a la carte* breakfast foods was greater at the middle and high school levels — 48 percent and 60 percent, respectively — but was still substantially lower than lunch.

Vending machines that were available to students during school hours provided an alternative source of food or beverages in one-third of all NSLP schools. Roughly a quarter of all schools reported vending machines located in or near the cafeteria. Nineteen percent of schools offered food or beverages through school stores, snack bars or canteens, and student fundraisers provided an alternative source of food in a small percentage (3%) of schools. Eleven percent of NSLP schools provided maximum access to alternative sources of food by permitting students to leave school grounds for lunch.

Vending machines were much more common in middle schools (55%) and high schools (76%) than in elementary schools (15%). The same is true of school stores and canteens. Vending machines were most prevalent at the high school level. In addition, the ability to leave school for lunch was largely limited to high schools (29% versus 6% (middle schools) - 8% (elementary schools)).

Foods Offered *a la Carte*

As noted above, more than nine out of 10 NSLP schools offered *a la carte* foods at lunch and 36 percent of schools offered *a la carte* foods at breakfast. Beverages, most often milk, were sold in all schools that offered *a la carte* foods (Exhibit 2.24).[11] With the exception of milk, virtually all *a la carte* items were more commonly offered at the middle and high school levels. This reflects the fact that *a la carte* sales in some elementary schools were limited to milk or other items (juice, dessert items) to accompany a meal brought from home. Thirty-nine percent of elementary schools reported *a la carte* programs that were limited to these items. The same was true for only eight percent of middle schools and six percent of high schools.

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10 Students always have the option to bring food from home. This study did not collect information on food from home; however, the SNDA-I study found that 18% of students brought food from home.

11 The checklist used to gather information on *a la carte* offerings (see Appendix C) did not differentiate between foods offered at breakfast and foods offered at lunch.

Exhibit 2.23

Non-USDA Food Options Available During School Hours

Non-USDA Food Option	Elementary Schools	Middle Schools	High Schools	All Schools
	Percentage of Schools			
A la carte foods at lunch	90%	98%	94%	92%
A la carte foods at breakfast[1]	27	48	60	36
Vending machines anywhere in school	15	55	76	33
Vending machines in or near cafeteria[2]	7	38	63	23
Vending machines in different part of school	11	37	54	23
School store, snack bar, or canteen	9	35	41	19
Morning snack program/other non-USDA breakfast	7	11	19	10
Opportunity to leave school grounds for lunch	8	6	29	11
Student sales/fundraisers	2	5	7	3
Number of Schools (Unweighted)	385	325	326	1,036

[1] Base sample includes only schools that offer the SBP.

[2] Among schools that have vending machines anywhere in the school, 49 percent of elementary schools, 69 percent of middle schools, and 83 percent of high schools have machines that are located in or near the cafeteria.

Notes: Schools may have vending machines in both locations.

Percentages reported for *a la carte* foods at breakfast and lunch include all *a la carte* sales (i. e., the option to purchase one or more foods offered in USDA-reimbursable meals *a la carte* as well as foods that are offered strictly *a la carte*).

Percentages are not consistent with those shown in Exhibits 2.21 and 2.22 because those exhibits report only availability of *a la carte* items that are *not part of USDA-reimbursable meals.*

Source: Weighted tabulations of a mail survey of public school cafeteria managers, Fall 1998 - Spring 1999.

Exhibit 2.24

Availability of *a la Carte* Food Items at Breakfast and/or Lunch

Food Group/Food	Elementary Schools	Middle Schools	High Schools	All Schools
	Percentage of Schools			
Any *a la carte* Food	**90%**	**98%**	**94%**	**92%**
Limited *a la carte* Offerings:				
Milk only	28	6	4	20
Milk and juice and/or dessert only	11	2	2	8
Beverages	**90**	**98**	**94**	**92**
Milk	90	98	94	92
Juice (50-100%)	34	59	67	44
Juice drinks	16	53	61	30
Mineral water or other bottled water	12	38	51	23
Tea	9	19	37	16
Milkshake or malt	1	15	13	6
Carbonated soft drinks	1	8	16	5
Coffee	3	3	15	5
Hot chocolate	2	5	19	5
Non-carbonated soft drinks	2	8	4	3
Baked Goods/Desserts	**35**	**72**	**76**	**49**
Cookies	28	62	68	41
Cakes, cupcakes, brownies	15	42	58	27
Pastries (pies, turnovers)	3	14	25	9
Other baked goods/desserts	11	30	38	19
Bread or Grain Products	**29**	**65**	**77**	**44**
Crackers, granola bars, pretzels, and similar grain products	21	48	64	33
Bread, rolls, bagels	15	42	58	27
Biscuits, croissants, hot pretzels	9	25	39	17
Muffins	2	16	25	8
Tortillas	4	7	14	6
Cereal (ready-to-eat)	1	1	1	1
Rice or pasta	1	<1	2	1
Candy	**2**	**15**	**24**	**8**
Frozen Desserts	**30**	**58**	**62**	**41**
Ice cream bars, scoops, sundaes	26	53	57	36
Frozen fruit juice bars, popsicles	8	23	24	13
Lowfat frozen yogurt, ice milk, sherbet	10	18	19	13
Fruit	**25**	**53**	**70**	**38**
Fresh fruit	20	45	63	32
Canned/cooked fruit	14	28	40	21
Fruit salad	1	4	8	3

Exhibit 2.24
(continued)

Food Group/Food	Elementary Schools	Middle Schools	High Schools	All Schools
	Percentage of Schools			
Meat and Meat Alternates/Entrees	**34**	**78**	**80**	**50**
Beef	11	42	59	25
Hamburgers or cheeseburgers	4	28	42	15
Other beef	6	14	25	11
Chili or burritos	3	17	25	9
Poultry	8	34	52	20
Chicken patty	3	17	33	11
Other chicken	2	17	27	9
Turkey	3	13	20	8
Other Meat	13	35	50	23
Cold cuts	7	21	35	14
Sausage or pork	3	13	21	8
Hot dog, corn dog, franks and beans	3	13	17	7
Meat Alternates	14	42	50	26
Cheese (not in sandwich)	4	24	28	12
Peanut butter, peanuts, sunflower seeds, other nuts	7	17	21	11
Eggs	4	7	15	7
Fish	5	7	11	6
Cheese sandwich	2	8	16	6
Beans or peas (legumes)	1	4	13	4
Mixed Dishes	22	67	73	39
Pizza (with meat)	7	45	46	20
Chef salad or other salad plate	10	21	32	15
Pizza (without meat)	4	24	35	13
Mexican food	2	17	28	9
Soup with meat or beans	5	12	20	9
Macaroni and cheese	3	8	4	4
Spaghetti, lasagna, ravioli, stuffed shells	3	11	11	5
Other sandwiches	1	4	7	3
Chinese food	<1	2	5	1
Other mixed dishes	1	<1	1	1
Vegetables	**23**	**60**	**72**	**38**
Fried potatoes (pre-fried, oven baked, French fries)	13	40	61	27
Salads	11	35	50	22
Vegetables, other cooked	11	26	36	18
Vegetable soup	4	6	14	6
Pickles	1	3	1	1

Exhibit 2.24
(continued)

Food Group/Food	Elementary Schools	Middle Schools	High Schools	All Schools
	Percentage of Schools			
Snacks	**24**	**63**	**71**	**39**
Chips	16	57	69	32
Other snacks	15	37	42	24
Popcorn	9	20	29	14
Nuts and seeds, trail mix	3	10	14	6
Yogurt	**9**	**24**	**40**	**17**
Number of Schools (Unweighted)	385	325	326	1,036

Note: Some foods, such as carbonated drinks, certain candies and water ices, are considered foods of "Minimal Nutritional Value" and regulations prohibit their sale in food service areas during meals unless they are specifically excepted because of naturally occurring nutritional value.

Source: Weighted tabulations of data from a mail survey of public school cafeteria managers, Fall 1998 - Spring 1999. Based on *A la Carte* Checklist; see Appendix C.

Aside from milk, the most common *a la carte* offerings were juice (44% of schools); cookies (41%); mixed dishes (including pizza) (39%); ice cream (36%); grain products such as crackers, granola bars, and pretzels (33%); fresh fruit and snack chips (32% each); juice drinks (30%); bread, rolls, and bagels (27%); baked desserts such as cakes, cupcakes and brownies (27%); and French fries and other potato products (27%).

Average Weekly *a la Carte* Revenue

On average, *a la carte* sales in NSLP schools generated $913 per 1,000 students during a typical week in SY 1998–99 (Exhibit 2.25).[12] There was considerable variation in *a la carte* revenue across school types. Average weekly sales for elementary schools ($375) was roughly one-fifth that of middle schools ($1,760) and high schools ($1,985).

A la carte revenue was also affected by the nature of the *a la carte* sales in the school. Schools that sold non-USDA foods strictly *a la carte* took in roughly four times more *a la carte* revenue per week than schools in which *a la carte* sales were limited to purchase of individual components of the USDA-reimbursable meal ($1,276 per 1,000 students versus $325 per 1,000 students).

In addition, the relative poverty level of the student population, measured by the percentage of students approved for free and reduced-price meals, was inversely related to weekly *a la carte* revenue. Weekly *a la carte* revenue in schools with relatively few low-income students (25 percent or less) was more than four times that of schools with high concentrations (75 percent or more) of low-income students ($1,282 versus $300). This pattern is also reflected in the variation in *a la carte* revenue seen in schools that did and did not offer the SBP and, to a lesser extent, in schools that did and did not serve suburban populations. Schools that offered the SBP and urban and rural schools tended to have higher concentrations of low-income students than schools that did not offer the SBP and suburban schools.

Weekly *a la carte* revenue was inversely related to overall NSLP participation rates (Exhibit 2.26). A comparison of average weekly *a la carte* sales for quartiles of overall NSLP participation shows that revenue ranged from a low of $383 among schools where mean daily NSLP participation was 73 percent or more to $2,135 among schools where participation rates were less than 36 percent. This negative relationship was consistent across all school types.

Pricing Methods Used for *a la Carte* Foods

SFA directors were asked about strategies used to set prices for *a la carte* foods. Three specific strategies — group pricing, actual pricing, and food cost percentage markup — were asked about directly. According to SFA directors, the method most often used to price *a la carte* foods was group pricing or the practice of assigning a standard price to all similar foods (e.g., all snack chips, all beverages or all cookies). (See Exhibit 2.27.) Almost three-quarters of directors in SFAs where *a la carte* sales were reported indicated that this pricing method was used. A roughly equivalent percentage of SFA directors (71%) reported use of an actual pricing method. Actual pricing may be used to

12 Cafeteria managers reported their total *a la carte* food sales for a typical week (the target week for the menu survey). Responses were standardized per 1,000 students based on SFA directors' reports of total student enrollment in the sampled schools.

Exhibit 2.25

Average *a la Carte* Sales by Selected School Characteristics

Characteristic	Elementary Schools	Middle Schools	High Schools	All Schools
	Weekly *a la Carte* Sales per 1,000 Students			
All Schools	$375	$1,760	$1,985	$913
Type of *a la Carte* Program				
Non-USDA items available	$554	$1,939	$2,164	$1,276
USDA-reimbursable items only	217	861	922	325
Percent of Students Approved for Free Lunches				
25 percent or less	$475	$2,150	$2,387	$1,282
26-50 percent	297	1,123	1,422	612
51-74 percent	371	2,547	818	682
75 percent or more	234	655	444	300
USDA Programs Offered				
NSLP only	$521	$2,094	$2,503	$1,261
NSLP and SBP	338	1,663	$1,789	815
Community Type				
Urban	$225	$1,933	$1,895	$822
Suburban	437	1,832	2,139	1,036
Rural	404	1,187	1,760	756
Number of Schools (Unweighted)	323	288	290	901

Note: Exhibit includes only schools for which the cafeteria manager provided information on weekly *a la carte* revenue and the SFA director completed his/her interview.

Source: Weighted tabulations of data from a mail survey of public school cafeteria managers (weekly *a la carte* revenue) and a telephone interview with public SFA directors, Fall 1998 - Spring 1999.

Exhibit 2.26

NSLP Student Participation Rate and Weekly *a la Carte* Sales

Overall NSLP Participation Rate	Average Weekly *a la Carte* Sales per 1,000 Students
Elementary Schools	
Less than 57%	$456
57 - 70%	491
71 - 81%	280
82 - 100%	367
Number of Schools (Unweighted)	305
Middle Schools	
Less than 38%	$2,894
38 - 55%	1,929
56 - 71%	1,150
72 - 100%	826
Number of Schools (Unweighted)	285
High Schools	
Less than 21%	$2,422
21 - 35%	2,346
36 - 54%	2,218
55 - 100%	1,031
Number of Schools (Unweighted)	284
All Schools	
Less than 36%	$2,135
36 - 55%	1,141
56 - 72%	682
73 - 100%	383
Number of Schools (Unweighted)	874

Notes: Based on distribution of participation rates, by quartile, for each school type.

Exhibit includes only schools that offered *a la carte* foods and for which information on both participation rates and weekly *a la carte* revenue was available.

Source: Weighted tabulations of data from a mail survey of public school cafeteria managers (weekly *a la carte* revenue and meal counts needed to calculate participation rates) and telephone interviews with public SFA directors (enrollment and numbers of students approved for free and reduced-price meal benefits), Fall 1998 - Spring 1999.

Exhibit 2.27

Methods Used to Set Prices for *a la Carte* Foods

Methods	Percentage of SFAs
Group pricing[1]	73%
Actual pricing method[2]	71
Food cost percentage markup[3]	44
Other	8
Number of SFAs (Unweighted)	370

[1] The same price is assigned to all similar foods, for example, all vegetables are sold at the same price per portion and all similar-sized cookies are sold at the same price.

[2] Prices are determined by considering all costs of buying, producing and serving the food.

[3] Prices are determined by adding the same percentage markup to every food item.

Notes: Exhibit includes only SFAs that reported use of *a la carte* foods in one or more schools.

SFAs may use more than one pricing method for *a la carte* foods.

Source: Weighted tabulations of data from a telephone interview with public SFA directors, Fall 1998 - Spring 1999.

determine the most appropriate group price. Use of a standard markup was much less common, used in fewer than half of the SFAs in which *a la carte* sales were reported.

Use of Foods from Commercial Vendors

NSLP schools may offer foods from national fast-food vendors such as McDonald's, Pizza Hut, Domino's, Subway and Taco Bell, or from similar local vendors. These commercial or "branded" foods may be served as part of a USDA-reimbursable meal, as an *a la carte* item or both. Foods are generally delivered to schools prepared and ready to serve.

In SY 1998–99, fewer than two of every 10 NSLP schools used foods from commercial vendors at lunch (Exhibit 2.28).[13] Middle schools and high schools used branded foods more often than elementary schools (30-31% of middle schools and high schools versus 13% of elementary schools). Schools that did use branded foods were somewhat more likely to include these foods in reimbursable meals than to restrict them to *a la carte* purchases. The general pattern of use of commercially vended foods was similar for breakfast and lunch. No differences were detected in the use of branded foods among schools using different menu planning options or between schools that did and did not use FSMCs.

SFA directors for almost half of the schools that served branded foods as part of a reimbursable lunch reported that one or more of the food items required a modification or reformulation to meet USDA's requirements for reimbursement (data not shown).

Use of Food Service Management Companies

In SY 1998–99, school food service programs in most SFAs (88 percent) were managed by the local school district (data not shown). The remaining 12 percent of SFAs contracted with a food service management company (FSMC) to operate one or more aspects of the food service program in one or more schools.

Functions contracted to FSMCs may be performed solely by the FSMC or be shared between the FSMC and the SFA. In addition, SFAs may retain sole responsibility for selected aspects of the food service operation. Directors in SFAs where FSMCs were used were asked to delineate the division of labor between SFA and FSMC staff for a variety of food service tasks. Results are tabulated in Exhibit 2.29.

In SY 1998–99, FSMCs were most often assigned full responsibility for menu planning and food purchasing. Approximately 70 percent of SFAs that contracted with FSMCs fully delegated these

13 This percentage is somewhat higher than but consistent with results obtained in a nationally representative survey of cafeteria managers conducted by the GAO in SY 1995-96. That study found that 13 percent of schools offered branded foods. The recent School Food Purchase Study reported that 40 percent of *school districts* used branded foods in SY 1996-97. Because SNDA-II data were collected at the *school level* and SFPS data were collected at the *district level*, direct comparisons of the two studies cannot be made.

Exhibit 2.28

Use of Foods from Commercial Vendors[1]

Meal/Use of Food From Commercial Vendors	Elementary Schools	Middle Schools	High Schools	All Schools
	Percentage of Schools			
Lunch				
Not used	87%	70%	69%	81%
Used for both reimbursable and *a la carte* lunches	2	11	14	6
Used for *a la carte* lunches only	1	13	12	5
Used for reimbursable lunches; *a la carte* lunches not offered	5	2	3	4
Used for reimbursable lunches but not for *a la carte* lunches	3	4	1	3
Number of Schools (Unweighted)	409	349	351	1,109
Breakfast				
Not used	88%	71%	71%	83%
Used for both reimbursable and *a la carte* breakfasts	1	11	11	5
Used for *a la carte* breakfasts only	1	15	13	5
Used for reimbursable breakfasts; *a la carte* breakfasts not offered	6	2	3	5
Used for reimbursable breakfasts but not for *a la carte* breakfasts	2	2	1	2
Number of Schools (Unweighted)	332	258	263	853

[1] Includes vendors such as McDonald's, Pizza Hut, Domino's, Subway, Taco Bell, and similar local vendors.

Note: Columns may not sum to 100 percent because of rounding.

Source: Weighted tabulations of data from telephone interviews with public SFA directors, Fall 1998 - Spring 1999.

Exhibit 2.29

Division of Responsibility in SFAs that Use Food Service Management Companies

Locus of Responsibility for Major Food Service Tasks	Percentage of SFAs
Preparing reimbursement claims	
SFA	35%
FSMC	21
Shared	44
Accounting and financial recordkeeping	
SFA	18
FSMC	22
Shared	59
Planning menus	
SFA	21
FSMC	71
Shared	8
Preparing USDA-reimbursable breakfasts	
SFA	22
FSMC	39
Shared	6
Not applicable[2]	33
Serving USDA-reimbursable breakfasts	
SFA	29
FSMC	32
Shared	7
Not applicable[1]	33
Preparing USDA-reimbursable lunches	
SFA	39
FSMC	47
Shared	14
Serving USDA-reimbursable lunches	
SFA	52
FSMC	36
Shared	12
Providing a la carte service	
SFA	35
FSMC	40
Shared	20
Not applicable[2]	5

Exhibit 2.29
(continued)

Locus of Responsibility for Major Food Service Tasks	Percentage of SFAs
Providing equipment for food preparation	
SFA	55%
FSMC	9
Shared	36
Cafeteria cleanup	
SFA	63
FSMC	10
Shared	27
Purchasing food	
SFA	22
FSMC	69
Shared	9
Making arrangements for using donated commodities	
SFA	20
FSMC	54
Shared	26
Selling lunch tickets and collecting lunch money	
SFA	47
FSMC	37
Shared	16
Number of SFAs (Unweighted)	51

[1] Includes SFAs that use a food service management company but do not serve USDA-reimbursable breakfasts.

[2] Includes SFAs that use a food service management company but do not offer *a la carte* meal service.

Note: Exhibit includes only SFAs that use a food service management company—12 percent of all SFAs. Column sections may not sum to 100 percent because of rounding.

Source: Weighted tabulations of data from a telephone interview with public SFA directors, Fall 1998 - Spring 1999.

functions. A related function that was commonly contracted to FSMCs was dealing with the commodity donation program. In more than half of SFAs with FSMCs, contractors were solely responsible for making arrangements for using donated commodity foods in NSLP and SBP meals.

Functions over which SFAs were most likely to retain full responsibility included after-meal cafeteria cleanup and providing the equipment required for food preparation. FSMCs were involved in accounting and financial recordkeeping; however, in close to 60 percent of SFAs that used a management company, this function was shared. Most SFAs also remained involved in the preparation of reimbursement claims for the NSLP and SBP. Forty-four percent of SFAs that used FSMCs shared responsibility for this task and 35 percent maintained sole responsibility.

Chapter Three
Characteristics of Lunches Served in Public NSLP Schools

This chapter presents information on the average nutrient content of lunches served in public NSLP schools during SY 1998–99. Information is also provided on the types of food offered, the number of options available to students selecting a lunch, and the characteristics of meals served to students. Data are presented seperately for elementary schools and secondary schools.[1] In addition, information is provided on differences in the average nutrient content of lunches — by menu planning option and by relative fat content of meals served.

It is important to note that the data presented in this chapter are not directly comparable to data from the SNDA-I study. As described below, the results presented in this chapter are based on a weighted nutrient analysis. The SNDA-I study used an unweighted analysis. A comparison of SNDA-I and SNDA-II data, incorporating comparable analysis of SNDA-II data, is presented in Chapter Six.

Overview of the Analysis

The data presented in this chapter are based on a *weighted* nutrient analysis of lunch menus and meal production data. A weighted analysis differs from an unweighted analysis in that it takes into consideration not only the foods offered to students but the number and types of foods that students actually include in the meals they select. As such, a weighted analysis provides a picture of the *average meal served to* or *selected by* participating students and, short of tracking food waste and actual food consumption, the best available measure of the nutritional quality of actual school meals. Program regulations require use of a weighted nutrient analysis in monitoring lunch menus and, for schools using a computer-based menu planning system, in planning lunch menus.[2]

All analyses were completed using a customized version of NUTRIKIDS software (LunchByte Systems Inc.) and the third release of USDA's Child Nutrition nutrient database (CN-3).[3] For each daily menu, a weighted average was computed for calories and all target nutrients. Daily averages were then totaled

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1 Results for middle schools and high schools were comparable, so data were combined to facilitate presentation and discussion. Major exhibits summarizing information on nutrient content of meals are presented separately for middle schools and high schools in Appendix A.

2 The CN Reauthorization Act of 1998 waived this requirement through September 2003, for school districts that obtain a waiver from their State agency.

3 Errors identified in the CN-3 database after its release were corrected in the version of the database used in this analysis.

and the weekly average was determined.[4] Weekly averages were compared to two sets of nutrition standards (see Chapter One):

- **Nutrient standards defined in NSLP regulations:** the percentage of the RDA provided for calories, protein, vitamins A and C, calcium, iron and the percentage of calories from total fat and saturated fat.

- **National Research Council (NRC) recommendations:** nutrients for which NSLP standards have not been defined — the percentage of calories from carbohydrate and total cholesterol and sodium content.

Number and Types of Food Offered and Served to Students

Nutrient content of NSLP meals is driven by the mix of foods offered and served to students. Therefore, before considering data on the average nutrient content of school lunches, it is useful to have some background information on the characteristics of the menus offered to students as well as on students' general food selection patterns.

Number of Options Offered Within NSLP Meal Component Categories

Exhibit 3.1 provides information on the relative level of choice offered to students electing to eat an NSLP meal. The exhibit shows the percentage of *daily NSLP menus* that offered various numbers of options within major menu item categories.[5] As shown, nearly all NSLP menus provided students with the opportunity to select a specific type of milk: more than 95 percent of all daily NSLP menus included two or more types of milk. The median number of milk options, both on a daily basis and across a week, was three. This pattern was generally consistent for elementary and secondary schools, however, secondary schools offered somewhat more choice than elementary schools.

With regard to entrees, including combination entrees as well as meats/meat alternates offered separately, there was a notable difference between menus offered in elementary schools and those offered in secondary schools. More than one-third of elementary school menus included only one entree. Such fixed menus were much less common in secondary schools: only 15 percent of secondary school menus were limited to one entree. At the other end of the spectrum, only five percent of elementary school menus included six or more entree choices, compared to 32 percent of secondary school menus.

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4 Nutrient standards set forth in program regulations are defined as benchmarks for average nutrient content figured across a week, rather than for each daily menu. Eleven percent of schools provided fewer than five days of menu data, primarily because of scheduled or unscheduled closings. Ten percent provided data for four days, and one percent provided data for three days. The denominator used in determining the weekly average for a given school was the number of days of data provided.

5 The menu item categories used to describe NSLP menus throughout this chapter are built around the meal component categories used in the food-based menu planning systems. Although schools using NSMP and ANSMP are not required to offer the same meal components specified in food-based menu planning systems, menus offered in these schools are generally consistent with the basic elements of the food-based meal patterns. Thus, the basic meal components still provide a useful framework for describing NSLP menus.

Exhibit 3.1

Choice and Variety in Lunch Menus

	Elementary Schools	Secondary Schools	All Schools
	Percentage of Daily Lunch Menus		
Number of Types of Milk Offered per Day			
1	4%	2%	4%
2	35	30	34
3	36	38	36
4 or more	25	30	27
Median items per day	3	3	3
Median number of different items per week[1]	3	3	3
Number of Entrees Offered per Day[2]			
1	35%	15%	28%
2-3	44	34	40
4-5	17	19	18
6 or more	5	32	14
Median items per day	2	4	3
Median number of different items per week[1]	8	10	10
Number of Fruits/Juices/Vegetables Offered per Day[3]			
No more than 2	43%	25%	37%
3-4	38	36	37
5-7	17	26	21
8 or more	2	13	6
Median items per day	3	4	3
Median number of different items per week[1]	12	12	12
Number of Separate Grains/Breads Offered per Day[4]			
None	45%	41%	44%
1	42	40	41
2	11	15	13
3 or more	1	5	3
Median items per day	1	1	1
Median number of different items per week[1]	3	3	3

Exhibit 3.1
(continued)

	Elementary Schools	Secondary Schools	All Schools
	Percentage of Daily Lunch Menus		
Number of Desserts Offered per Day			
None	66%	62%	64%
1	30	33	31
2 or more	4	5	5
Median items per day	0	0	0
Median number of different items per week[1]	2	2	2
Number of Daily Menus (Unweighted)	1,948	3,304	5,252
Number of Schools (Unweighted)	398	677	1,075

[1] Includes only schools that provided menu information for five days.

[2] Includes meats and meat alternates as well as combination entrees.

[3] Fruits and vegetables not included in combination entrees.

[4] Grains or breads not included in combination entrees.

Note: Column sections may not sum to 100 percent because of rounding.

Source: Weighted tabulations of menu data for one week between September 1998 and May 1999.

The median number of daily entree choices in elementary school menus was two, compared to four for secondary schools. The median number of different entrees offered over the course of a week was eight for elementary schools and 10 for secondary schools. These data indicate that schools tended to repeat some entrees during the week.

A similar pattern was noted for fruit and vegetable choices. Roughly two-thirds of all NSLP menus offered more than the two fruit and/or vegetable choices required under the food-based menu planning systems. More than one-quarter of all menus included five or more fruit and/or vegetable choices. The availability of choice among fruits and vegetables and the number of options offered were both greater in secondary school menus than in elementary school menus.

Overall, the median number of different fruit and vegetable choices offered was three per day and 12 per week, indicating that both elementary schools and secondary schools offered some fruits and vegetables more than once during a typical school week.

In both elementary schools and secondary schools, roughly forty percent of daily menus offered breads or grains only in combination entrees (e.g., bread in sandwiches, crusts on pizza, pasta in spaghetti or lasagna). Roughly the same percentage of schools offered one separate bread/grain item. A more extensive array of choices in this group was relatively rare. Only 16 percent of all daily menus included two or more separate bread/grain choices.

Finally, desserts were offered in 36 percent of all daily menus. Desserts were offered with about the same frequency in elementary and secondary school menus.

Foods Most Frequently Included in NSLP Menus

To obtain more detailed information on the types of food offered in NSLP meals, menu items were classified into one of seven major food groups — milk; fruit and juice; vegetables; combination entrees; separate meats/meat alternates (not part of a combination entree); separate grains/breads (not part of a combination entree); and other menu items (foods not "counted" toward any of the requirements in the food-based meal patterns). Foods were further classified into one of 81 different minor food groups. (The full food classification scheme is shown in Exhibit E.6.) Exhibit 3.2 shows the percentage of daily menus in which each minor food group appeared. For ease of presentation, the exhibit is limited to minor food groups that were offered in at least five percent of daily menus, overall, or for either type of school.

Noteworthy findings are summarized below:

- The type of milk most frequently offered in NSLP menus was flavored 1% milk. More than two-thirds of all daily lunch menus included flavored 1% milk. The next most commonly offered milks were 1%, whole and 2%, all unflavored.

- Almost ninety percent of all NSLP menus included at least one fruit or juice. Canned fruit was offered more often than either fresh fruit or juice. Canned fruit was offered in more than half of all daily menus in both elementary and secondary schools. Fresh fruit was offered in 41 percent of all menus. Secondary school menus included fresh fruit more often than elementary school menus (50% versus 36%).

Exhibit 3.2

Foods Most Commonly Offered in Lunch Menus

	Elementary Schools	Secondary Schools	All Schools
	Percentage of Daily Menus in Which Item Was Offered		
Milk	**100%**	**100%**	**100%**
1% flavored	65	71	67
1% unflavored	52	54	53
Whole unflavored	50	50	50
2% unflavored	49	50	49
Skim unflavored[1]	35	42	37
Skim flavored[1]	16	20	17
2% flavored	14	7	11
Fruits and Juices	**87%**	**88%**	**88%**
Canned fruit	56	54	56
Fresh fruit	36	50	41
Full-strength citrus juice	13	17	14
Full-strength non-citrus juice	13	15	14
Frozen fruit or juice	7	5	6
Vegetables	**94%**	**98%**	**95%**
Cooked vegetables (other than potatoes and French fries)	41	49	44
Green salads (other than entree salads)	28	44	33
Oven-fried French fries/potato products	18	30	22
Potatoes other than French fries or similar potato products	21	26	22
Raw vegetables other than green salads or lettuce and/or tomato	14	18	16
Lettuce and/or tomato[2]	7	13	9
Legumes	8	9	8
Deep-fried French fries/potato products	3	15	7
Other (non-green) salads	6	8	7
Other vegetable items (soups, mixed casseroles)	4	8	5
Combination Entrees	**90%**	**96%**	**92%**
Sandwiches made with cheese and/or cold cuts	20	38	26
Hamburgers and similar beef/pork sandwiches	16	32	22
Peanut butter sandwiches	25	14	21
Mexican-style entrees	15	26	19

Exhibit 3.2
(continued)

	Elementary Schools	Secondary Schools	All Schools
	Percentage of Daily Menus in Which Item Was Offered		
Combination Entrees (continued)			
Pizza with meat	11%	33%	19%
Chef's salad and other salad plates	16	24	19
Pizza without meat	12	24	16
Hot dogs/corn dogs/similar sausage products	15	18	16
Cheeseburgers and similar beef/pork sandwiches	8	29	15
Pasta-based dishes	13	16	14
Sandwiches made with lean meat or poultry (no cheese)	8	22	13
Sandwiches made with breaded and/or fried meat/poultry/fish (no cheese)	8	21	12
Salad bars	5	21	11
Other mixed dishes/combinations	9	12	10
Sandwiches made with mayonnaise-based salads (no cheese)	7	11	8
Other food bars/bag lunches	6	10	8
Meats/Meat Alternates (not part of a combination entree)	**31%**	**37%**	**33%**
Breaded chicken nuggets/patties/similar products	11	16	13
Other breaded or fried meat/poultry/fish	8	10	9
Plain (not breaded or fried) meat/poultry/fish	7	9	8
Grains/Breads (not part of a combination entree)	**55%**	**60%**	**56%**
Bread, rolls, bagels, other plain breads	29	35	31
Crackers/hard pretzels	11	14	12
Rice	6	9	7
Biscuits, cornbread, croissants, other higher-fat breads/bread alternates	8	10	9
Pasta	4	5	4

Exhibit 3.2
(continued)

	Elementary Schools	Secondary Schools	All Schools
	Percentage of Daily Menus in Which Item Was Offered		
Other Menu Items[3]	42%	48%	44%
Baked desserts	19	19	19
Other desserts (non-fruited gelatin, pudding, ice cream)	12	13	12
Fruit drinks/ades	7	10	8
Dessert items that include fruit or juice	5	9	7
Snack chips	5	5	5
Number of Daily Menus (Unweighted)	1,948	3,304	5,252
Number of Schools (Unweighted)	398	677	1,075

[1] Includes ½ percent milk.

[2] Lettuce and/or tomato offered as a vegetable choice for all students. Excludes lettuce and tomato included in prepared sandwiches or offered with other prepared entrees.

[3] Foods that do not contribute to satisfying the meal patterns for the traditional or enhanced food-based menu planning systems.

Notes: Exhibit is limited to items that appeared in at least five percent of menus for at least one type of school. See Exhibit B.6 for a detailed listing of items included in each group.

Source: Weighted tabulations of menu data for one week between September 1998 and May 1999.

- Almost all NSLP menus included one or more vegetables. The most common offerings were cooked vegetables, excluding French fries and other types of potatoes (44% of all daily menus); followed by green salads (33%); oven-fried French fries (22%); potatoes other than French fries or similar potato products (22%); and raw vegetables (excluding green salads and lettuce and tomato) (16%). Green salads were offered more often in secondary school menus than in elementary school menus (44% versus 28%).

- Deep-fried French fries were rare, overall, appearing in only seven percent of all daily menus. Use of deep-fried French fries was concentrated in secondary schools (15% versus 3%).

- There were notable differences between elementary and secondary school menus in the frequency with which various entrees were offered. In elementary schools, the most frequently offered entrees were peanut butter sandwiches (25%); sandwiches made with cheese and/or cold cuts (20%); hamburgers and similar beef/pork sandwiches (excluding cheeseburgers) (16%); Chef's salad and other salad plates (16%); Mexican-style entrees such as tacos, burritos and nachos (15%); and hot dogs, corn dogs and similar sausage products (15%). In secondary schools, the leading entree offerings were sandwiches made with cheese and/or cold cuts (38%); pizza with meat (33%); hamburgers and similar beef/pork sandwiches (32%); cheeseburgers and similar sandwiches with cheese (29%); and Mexican-style entrees (26%).

- About one in every four elementary school lunch menus included a peanut butter sandwich and about one in every three secondary school lunch menus included a sandwich made with cheese and/or cold cuts, pizza with meat or a hamburger or similar beef/pork sandwich (without cheese).

- Menus in both elementary and secondary schools most often offered combination entrees as opposed to separate meats/meat alternates. Only a third of all daily NSLP menus included separate meats or meat alternates. The most common items in this group were breaded chicken nuggets, patties and similar products and other types of breaded or fried meat, poultry or fish.

- More than half of all daily NSLP menus offered grains or bread that were not included in a combination entree. These were most often plain bread or rolls.

- More than 40 percent of all daily lunch menus offered items other than those included in the basic meal component categories. Roughly one in five lunch menus included a baked dessert such as cookies, cake or brownies. Twelve percent included other desserts such as ice cream, gelatin (without fruit) or pudding. Eight percent of daily lunch menus included fruit drinks (not 100% juice) and five percent included snack chips.

Characteristics of Lunches Actually Served to Students

In addition to having the ability to select specific foods within a general menu item category, students participating in the NSLP have varying levels of flexibility regarding the minimum number of foods or items they are required to take when selecting a meal. A program rule known as "Offer versus Serve" (OVS) is mandated for students in senior high schools and optional, at the discretion of the local school district, for students below the senior high level. Under OVS, students in schools that are using either the traditional or enhanced food-based systems to plan menus have the option to refuse up to two of the five food items that must be offered for lunch — milk, meat/meat alternate, bread or grain, and two servings of fruit, vegetables or full-strength juice. Students in schools operating under NSMP or ANSMP must select an entree and may decline additional item(s), depending on the total number of items offered.

The fact that students have more than a little latitude in determining what is included in their NSLP meals is a key driver in the recent movement toward use of weighted nutrient analyses. As Exhibit 3.3 illustrates, students do employ these freedoms. While milk was offered in every NSLP menu, nine percent of the lunches served to students did not include a milk. Milk was more commonly omitted in lunches served in secondary schools (16%) than in lunches served in elementary schools (6%).

More than 20 percent of NSLP meals served to students did not include the minimum two servings of fruit, vegetables or full-strength juice suggested in both the traditional and enhanced food-based menu planning systems. Selection of lunches that included two or more servings of fruit, vegetables or juice occurred with somewhat greater frequency in elementary schools than in secondary schools (80% versus 74%). Finally, when an additional grain or bread product was available (other than those included in combination entrees or served with specific menu items), these items were omitted in about a quarter of the lunches served in elementary schools and more than a third of the lunches served in secondary schools.

Average Nutrient Content of Lunches Served to Students

This section presents data on the average nutrient content of lunches served to students in SY 1998–99. The nutrient content of the average lunch, as served, is compared to the NSLP nutrition standards and NRC recommendations described in Chapter One:

- **Nutrient Content Relative to RDAs.** Mean contribution to RDAs for calories, protein, vitamin A, vitamin C, calcium and iron is evaluated in light of the standard defined for lunch (33% of the RDA).

- **Percentage of Calories from Total Fat and Saturated Fat.** The mean percentage of calories provided by each type of fat is compared to defined NSLP standards for total fat (≤ 30%) and saturated fat (< 10%).

- **Cholesterol, Sodium and Carbohydrate Content.** Mean cholesterol and sodium content are compared to NRC recommendations. The standards used reflect one-third of the NRC's recommended maximum daily intake. The mean percentage of calories from carbohydrate is compared to the NRC recommendation (> 55%).

Exhibit 3.3

Characteristics of Lunches Served to Students

Characteristic	Elementary Schools	Secondary Schools	All Schools
	Average Percentage of Lunches Served to Students		
All Lunches			
Included milk	94%	84%	91%
Included combination entree or meat alternate	100	100	100
Included two or more fruits and/or vegetables[1]	80	74	78
Included separate grain/bread (when offered)[2]	76	65	72
Included dessert (when offered)	83	63	76
Number of Daily Menus (Unweighted)	1,948	3,304	5,252
Number of Schools (Unweighted)	398	677	1,075

[1] Fruits and vegetables not included in combination entrees.

[2] Grains or breads not included in combination entrees or offered with specific menu item.

Source: Weighted tabulations of menu and meal production data for one week between September 1998 and May 1999.

Mean Nutrient Content Relative to RDAs

With the exception of calories in secondary school lunches, NSLP lunches served to students in SY 1998–99 met or exceeded the standard of one-third of the RDA for calories and all target nutrients (Exhibit 3.4).[6]

On average, lunches served to students were nutrient-dense. Elementary school lunches, for example, provided an average of 35 percent of the RDA for calories while providing more than 100 percent of the RDA for protein, more than 50 percent of the RDAs for vitamin A, vitamin C, and calcium and 44 percent of the RDA for iron.

The pattern was similar for secondary school lunches; however, the relative contribution to students' daily nutrient needs — always above the 33 percent RDA benchmark — was consistently lower. The only RDA standard that the average secondary school lunch did not satisfy was the standard for calories. Lunches served to students in secondary schools provided, on average, 30 percent of the RDA for calories, compared to the standard of 33 percent.

Percentage of Schools Meeting RDA Standards

In addition to examining the mean nutrient content of lunches served to students, in comparison to the one-third RDA standard, the analysis assessed the percentage of individual schools that met standards for calories and key nutrients. The data indicate that satisfying the calorie standard, for secondary schools especially, poses the greatest challenge to schools. More than two-thirds (68%) of elementary schools met the one-third RDA standard for calories; however, the same was true for only 20 percent of secondary schools (Exhibit 3.5). The dramatic difference between elementary schools and secondary schools is likely attributable to both the greater calorie needs of older students and the fact, as discussed above, that secondary school students were more likely than elementary school students to omit components of the offered NSLP meal (see Exhibit 3.3).

Lunches served to students in all schools met the one-third RDA benchmark for protein, which, as shown in Exhibit 3.4, was provided at levels above 100 percent of the full RDA in the average elementary school lunch and close to two-thirds of the RDA in the average secondary school lunch.[7] Lunches served in all or nearly all elementary schools satisfied the RDA standards for vitamin A, calcium and iron. The only nutrient for which an appreciable number of elementary schools fell short of the one-third RDA benchmark was vitamin C. The average lunch served in about 15 percent of elementary schools provided less than one-third of the RDA for vitamin C.

With the exception of protein, secondary schools were less likely than elementary schools to serve lunches that, on average, provided one-third or more of the RDA (Exhibit 3.5). As noted above, factors that may contribute to this pattern include greater nutrient needs of older students coupled with an increased tendency to omit components of the offered NSLP lunch. The average lunch served in roughly 15 to 20 percent of secondary schools provided less than one-third of the RDAs for vitamin C and/or

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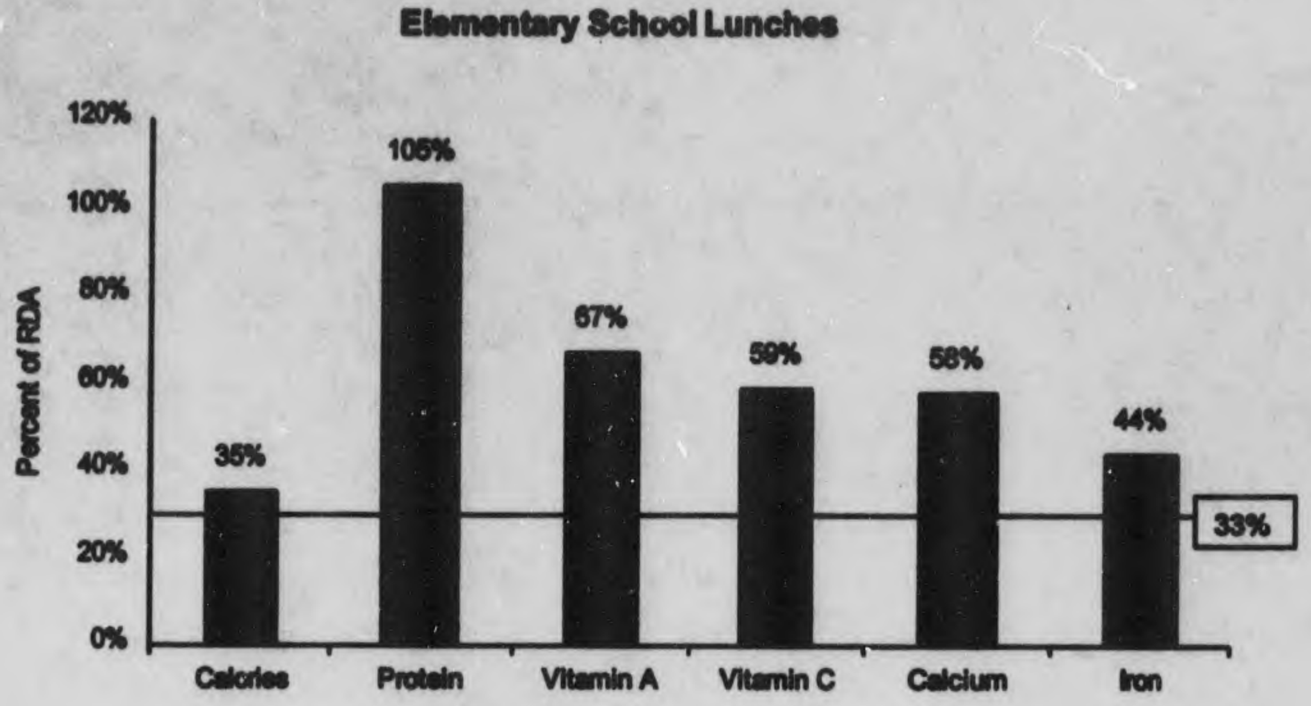
6 Data on actual mean calorie and nutrient content of lunches, as served, are presented in Exhibit A.1.

7 This is in keeping with characteristics of the American diet, which typically provides several times the RDA for protein.

Exhibit 3.4 **Lunches Served to Students in SY 1998-99 Provided More than One-Third of the RDA, With the Exception of Calories in Secondary Schools**



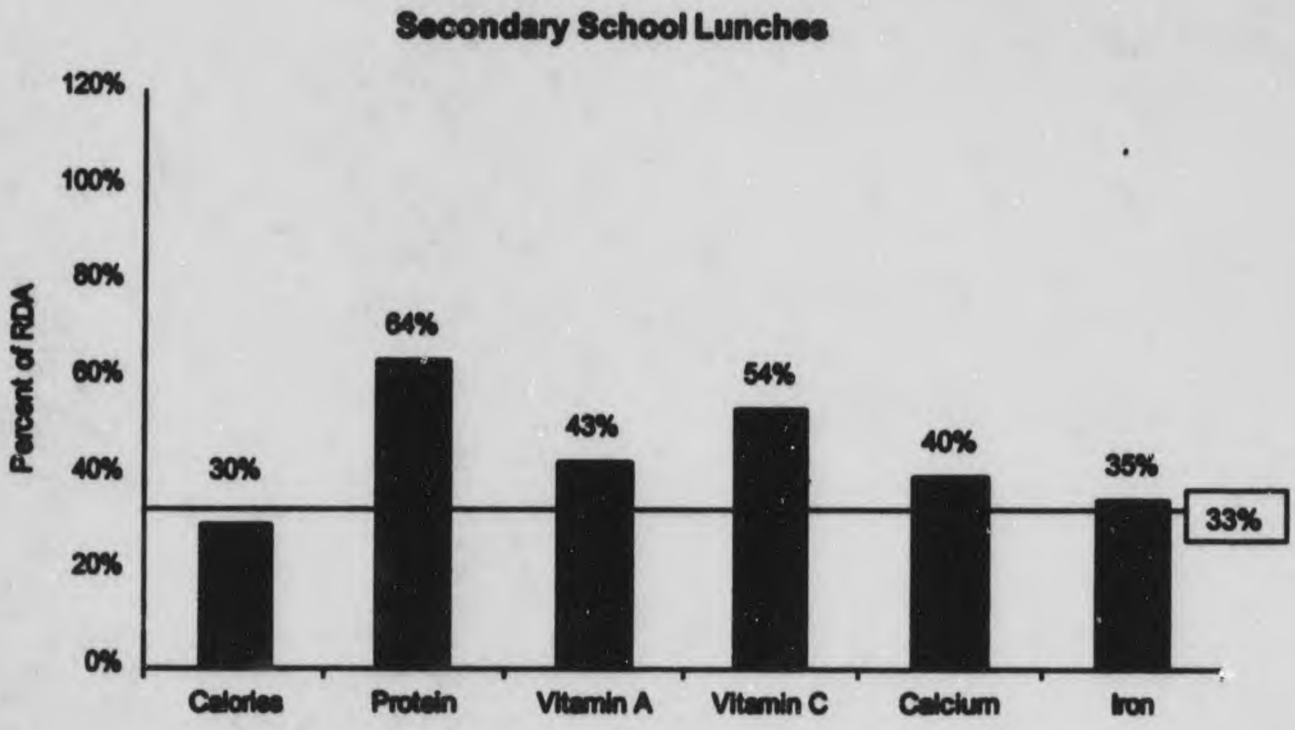


Exhibit 3.5

Percentage of Schools in Which the Average Lunch Served to Students Provided One-Third or More of the RDA

	Elementary Schools	Secondary Schools	All Schools
	Percentage of Schools		
Calories	68%	20%	51%
Protein	100	100	100
Vitamin A	98	65	87
Vitamin C	86	79	84
Calcium	100	86	95
Iron	93	60	82
Number of Schools (Unweighted)	398	677	1,075

Source: Weighted nutrient analysis of menu and meal production data for one week between September 1998 and May 1999.

calcium. The most limited nutrients in secondary school lunches were vitamin A and iron. On average, lunches served in about a third of all secondary schools fell short of the NSLP standard for vitamin A. Lunches served in 40 percent of secondary schools fell short of the standard for iron.

Percentage of Calories from Total Fat and Saturated Fat

On average, lunches served to students in SY 1998–99 did not meet defined NSLP standards for the percentage of calories from total fat or saturated fat (Exhibit 3.6). Lunches served in elementary schools came somewhat closer to meeting the standard for calories from total fat than lunches served in secondary schools. On average, lunches served in elementary schools provided 33 percent of calories from fat (compared to the standard of no more than 30%). Lunches served in secondary schools provided approximately 35 percent of calories from fat.

Lunches served in both elementary and secondary schools exceeded the NSLP standard for calories from saturated fat. The average lunch served in both types of schools provided about 12 percent of calories from saturated fat, compared to the standard of less than 10 percent.

Percentage of Schools Meeting Standards for Fat and Saturated Fat
Although overall means for calories from fat and saturated fat exceeded established NSLP standards, the lunches served in some individual schools did meet these standards. Lunches served in 21 percent of all elementary schools provided no more than 30 percent of calories from fat (Exhibit 3.7). The percentage was 33 percent lower for secondary schools, at 14 percent. Lunches served in 15 percent of elementary schools and 13 percent of secondary schools met the standard for calories from saturated fat (less than 10%).

Cholesterol, Sodium and Carbohydrate Content

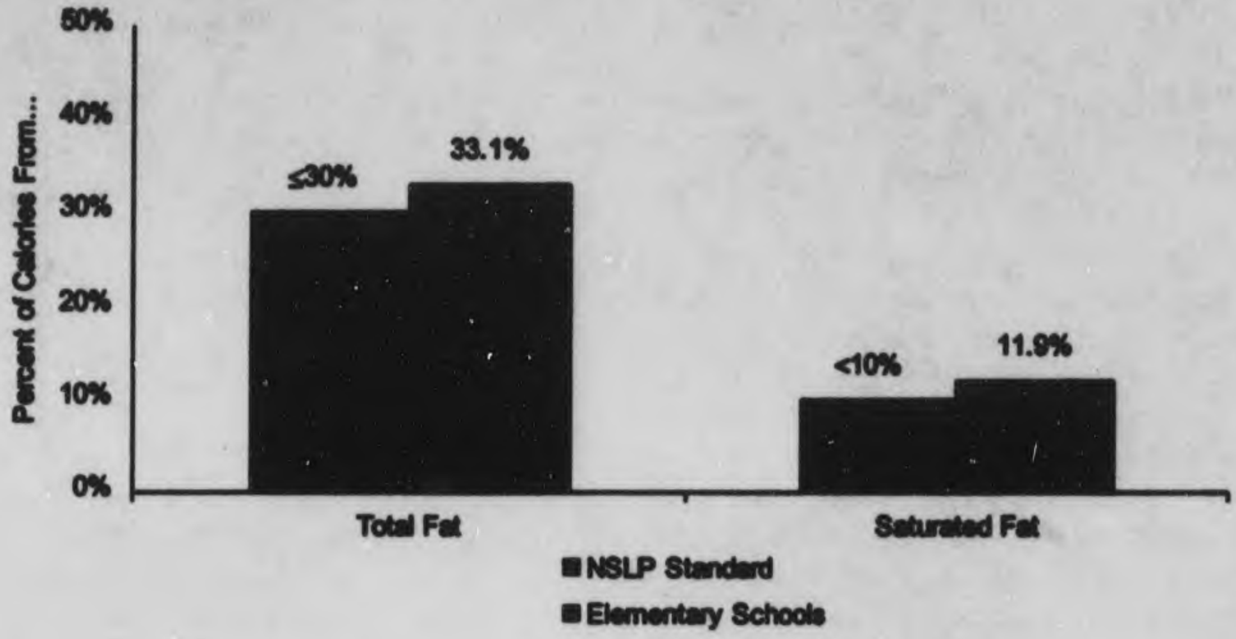
On average, lunches served in SY 1998–99 in both elementary schools and secondary schools satisfied the NRC recommendation of no more than 100 mg of cholesterol (equivalent to one-third of the NRC's recommended daily maximum). (See Exhibit 3.8.) Indeed, lunches served in 98 percent of all schools met this standard (Exhibit A.4).

In contrast, the mean sodium content of lunches served in both elementary schools and secondary schools exceeded the NRC recommendation (no more than 800 mg) by a substantial margin. The mean sodium content of lunches served in elementary schools was approximately 57 percent higher than the recommended level (1,259 mg versus ≤ 800 mg). Lunches served in secondary schools exceeded the recommended level by 73 percent (1,382 mg versus ≤ 800 mg). As the mean values suggest, lack of conformity with the NRC recommendation for sodium content was widespread. Overall, lunches served in only about one percent of all schools were consistent with this recommendation (Exhibit A.4). Almost all of the schools that met this recommendation were elementary schools.

In comparison to the NRC recommendation that more than 55 percent of all calories come from carbohydrate, lunches served in both elementary schools and secondary schools were low in carbohydrate calories (Exhibit 3.8). Lunches served in both types of schools provided, on average, roughly 50 percent of calories from carbohydrate. This is not unexpected, given the percentage of calories from fat — it is difficult to meet the recommendation for calories from carbohydrate without meeting the standard for

Exhibit 3.6 **Lunches Served to Students in SY1998-99 Did Not Meet NSLP Standards for Calories From Fat and Saturated Fat**

Elementary School Lunches



Secondary School Lunches

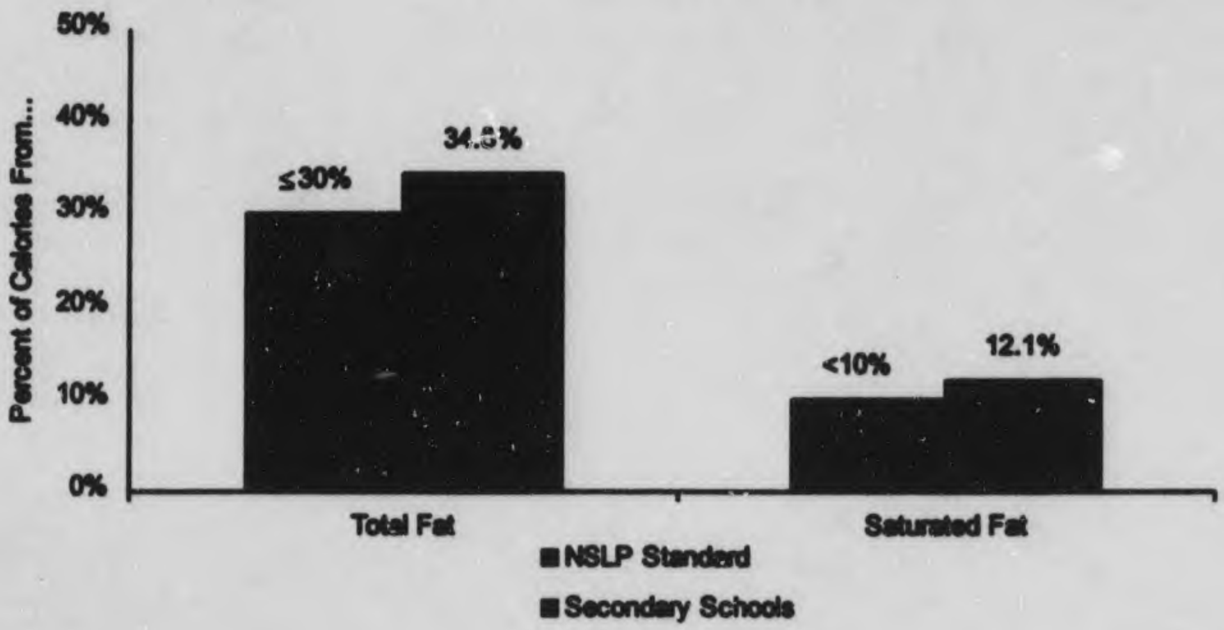


Exhibit 3.7

Distribution of the Percentage of Calories from Total Fat, Saturated Fat and Carbohydrate in Average Lunches Served to Students

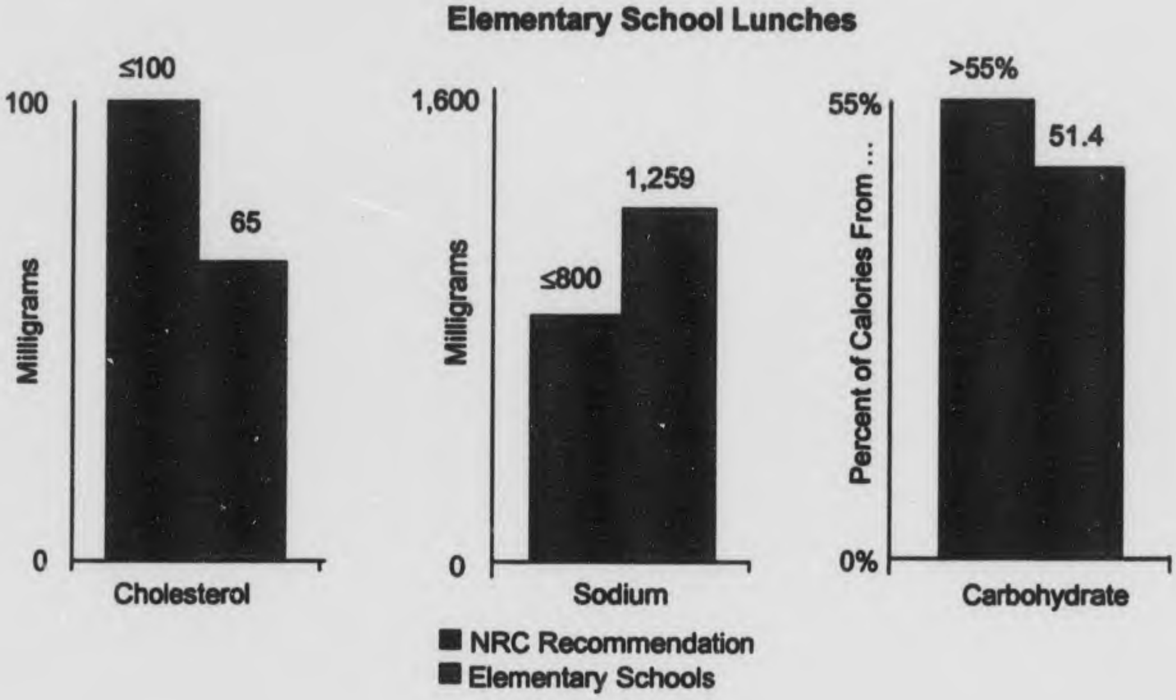
	Elementary Schools	Secondary Schools	All Schools
	Percentage of Schools		
Percentage of Calories from Fat			
[redacted]			
30.1-34.0%	41	34	39
34.1-36.0%	16	18	16
36.1-38.0%	12	15	13
38.1-40.0%	6	10	7
More than 40.0%	5	9	6
Percentage of Calories from Saturated Fat			
[redacted]			
10.1-12.0%	38	36	37
12.1-14.0%	31	36	33
14.1-16.0%	13	13	13
More than 16.0%	2	2	2
Percentage of Calories from Carbohydrate			
Less than 45%	7%	12%	9%
45-55%	76	74	75
[redacted]			
Number of Schools (Unweighted)	398	677	1,075

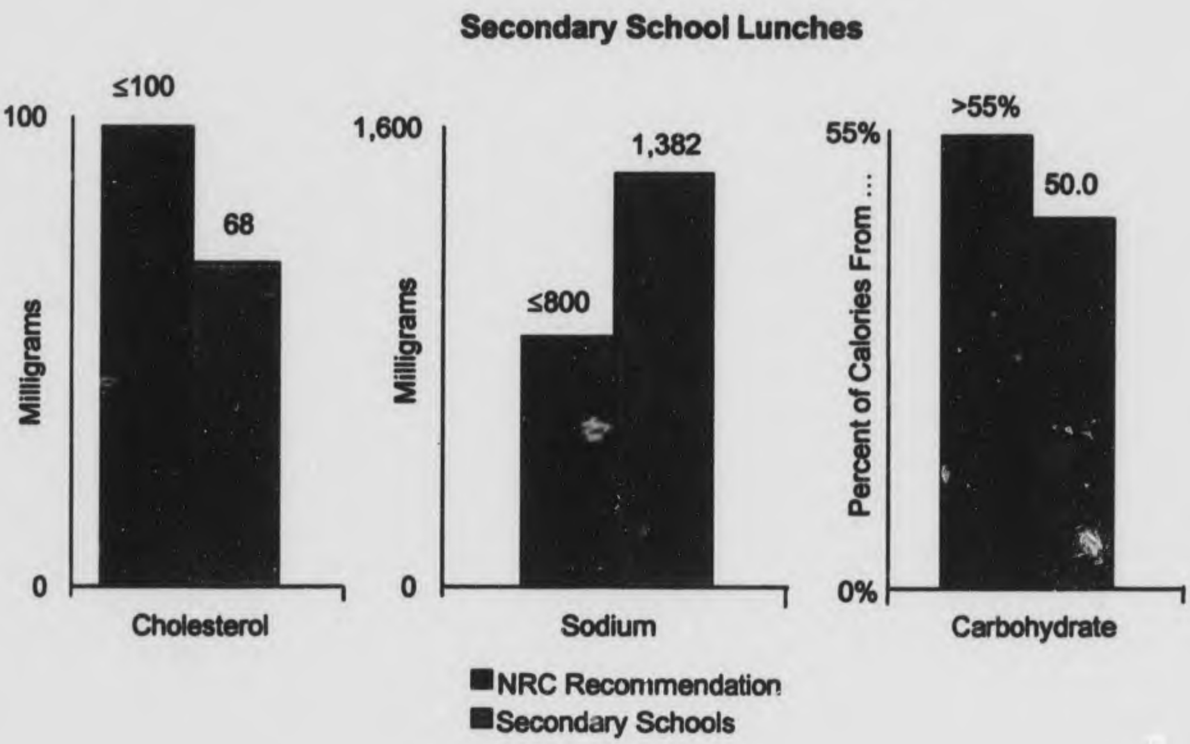
Notes: Highlighted rows show NSLP standard (fat and saturated fat) or NRC recommendation (carbohydrate).

Column sections may not sum to 100 percent due to rounding.

Source: Weighted nutrient analysis of menu and meal production data for one week between September 1998 and May 1999.

Exhibit 3.8 **Lunches Served to Students Met the NRC Recommendation for Cholesterol but Did Not Meet Recommendations for Sodium or Calories From Carbohydrate**





calories from fat. Only 18 percent of elementary schools and 14 percent of secondary schools served lunches that were consistent with this recommendation (Exhibit 3.7).

Average Nutrient Content of Lunches Served to Students, by Menu Planning Method

As described in previous chapters, schools have a variety of menu planning options from which to choose: the traditional food-based menu planning system, the enhanced food-based menu planning system, NSMP, ANSMP and "any reasonable approach." To determine whether the choice of menu planning system influenced the nutrient content of lunches served to students, the mean nutrient content of lunches served in SY 1998–99 were compared on the basis of the menu planning system used. Because ANSMP was used in very few schools (a total of 20 schools in the unweighted sample), NSMP and ANSMP schools were combined for purposes of this analysis. Schools that reported using an alternative menu planning system (i.e., "any reasonable approach" — 36 schools in the unweighted sample) were not included in the comparisons.

Statistical significance of differences between menu planning systems was tested using two-tailed *t*-tests. Two comparisons were made: lunches served in schools using the traditional food-based menu planning system were compared to lunches served in schools using NSMP or ANSMP and to lunches served in schools using the enhanced food-based menu planning system. Because of the large number of *t*-tests that were conducted simultaneously, a conservative cutoff was used to define statistical significance, thereby decreasing the likelihood of reporting chance findings. Only differences that were statistically significant at the one percent level ($p < .01$) or better are reported.

With regard to meals served in schools that reported using NSMP or ANSMP, it is important to recognize that these computer-based menu planning systems may not have been fully implemented at the time data were collected. Previous research has indicated that implementation of NSMP can be a lengthy and challenging process. In a USDA-sponsored demonstration of NSMP, 16 SFAs took anywhere from three to 33 months to implement NSMP, with an average time line of 19 months (Fox 1998). Because no information is available on the status of NSMP/ANSMP implementation at the time data were collected, the comparisons discussed in the following paragraphs should be interpreted as lower-bound estimates of differences between NSMP/ANSMP and the traditional food-based menu planning system. Moreover, the absence of differences cannot be interpreted as indicative of no effect in fully implemented NSMP/ANSMP schools.

The data revealed relatively few differences in the average nutrient content of meals served in schools using the various menu planning options.[8] Among elementary schools, lunches served in NSMP/ANSMP schools provided 34 percent of the RDA for calories compared to 36 percent of the RDA for schools that used the traditional food-based menu planning system (Exhibit 3.9). Lunches served in both types of schools satisfied the one-third RDA standard for calories. In addition, lunches served in elementary schools that used the enhanced food-based menu planning system provided, on a percentage

8 Results for all schools combined and for middle schools and high schools separately are shown in Appendix A.

Exhibit 3.9

Mean Nutrient Profile of Lunches Served, by Menu Planning System, Compared to Nutrition Standards for NSLP Lunches and NRC Recommendations
Elementary Schools

		Menu Planning System			
	Standard/ Recommendation	**Traditional Food-Based**	**NSMP/ ANSMP**	**Enhanced Food-Based**	**All Systems**
Mean Percentage of RDA					
Total Calories	33%	36%	34%*	36%	35%
Protein	33%	107	102	106	105
Vitamin A	33%	67	63	72	67
Vitamin C	33%	61	56	60	59
Calcium	33%	58	57	58	58
Iron	33%	45	42	44	44
Mean Percentage of Calories					
Total Fat	≤30%	33.8%	32.5%	32.6%	33.1%
Saturated Fat	<10%	12.4	11.7	11.5†	11.9
Carbohydrate	>55%[1]	50.8	51.9	51.8	51.4
Mean Amount					
Cholesterol (mg)	≤100[1]	67	63	63	65
Sodium (mg)	≤800[1]	1,294	1,228	1,255	1,259
Number of Schools (Unweighted)		155	108	122	398

[1] NRC recommendation, not NSLP standard.

Notes: Data for NSMP and ANSMP were combined because of small sample size for ANSMP (7 schools).

Data for 13 schools that reported use of some other menu-planning system are not presented separately because of small sample size. These schools are included in the "All Systems" column.

* Difference between means for traditional food-based system and NSMP/ANSMP is statistically significant at the .01 level.

† Difference between means for traditional and enhanced food-based systems is statistically significant at the .01 level.

Source: Weighted nutrient analysis of meal and menu production data for one week between September 1998 and May 1999.

basis, fewer calories from saturated fat than lunches served in schools that used the traditional food-based system. However, because both estimates rounded to 12 percent, lunches served in both types of schools failed to meet the NSLP standard of less than 10 percent of calories from saturated fat.

Among secondary schools, lunches served in schools that used the traditional food-based menu planning system provided, on a percentage basis, more calories from fat (35% versus 34%) and saturated fat (13% versus 12%) and fewer calories from carbohydrate (49% versus 51%), than lunches served in schools that used the enhanced food-based system (Exhibit 3.10). Although none of these differences affect conclusions about whether the average lunch met specific standards, the differences in means for the percentage of calories from fat, saturated fat and carbohydrate are worth noting because they moved schools in the enhanced food-based system group closer to each of the respective standards.

The percentage of schools deemed to have met the various NSLP standards and NRC recommendations used in this analysis was also compared on the basis of menu planning method (Exhibits A.5 and A.6). The only significant difference detected was for calories among elementary schools. Elementary schools that used the traditional food-based menu planning system were more likely than elementary schools that used NSMP/ANSMP to meet the one-third RDA standard for calories (78% versus 55%). None of the differences for other nutrition standards were significant for elementary schools and no significant differences were noted for secondary schools. Thus, the type of menu planning system used did not significantly affect the likelihood that an individual school would meet the various nutrition standards.

Characteristics of Low-Fat and Higher-Fat Lunches

USDA is committed to lowering the fat content of school meals without reducing the amounts of other key nutrients provided to students. To address this concern, an analysis was undertaken to examine the impact of lower levels of fat on the overall nutrient profile of lunches served to students. The analysis also examined, in a general way, variations in menu offerings among schools in which the lunches served to students provided different levels of fat.

Schools were stratified into one of four groups based on the average percentage of calories from fat in lunches served to students:

- **Schools with low-fat lunches:** Mean percentage of calories from fat was less than or equal to 30 percent (the NSLP standard);
- **Schools with moderate-fat lunches:** Mean percentage of calories from fat ranged from more than 30 percent to 34 percent;
- **Schools with high-fat lunches:** Mean percentage of calories from fat ranged from more than 34 percent to 38 percent;
- **Schools with highest-fat lunches:** Mean percentage of calories from fat was more than 38 percent.

Exhibit 3.10

Mean Nutrient Profile of Lunches Served, by Menu Planning System, Compared to Nutrition Standards for NSLP Lunches and NRC Recommendations
Secondary Schools

		Menu Planning System			
	Standard/ Recommendation	Traditional Food-Based	NSMP/ ANSMP	Enhanced Food-Based	All Systems
Mean Percentage of RDA					
Total Calories	33%	30%	30%	30%	30%
Protein	33%	64	63	64	64
Vitamin A	33%	42	41	48	43
Vitamin C	33%	52	56	55	54
Calcium	33%	40	40	40	40
Iron	33%	35	35	34	35
Mean Percentage of Calories					
Total Fat	≤30%	35.3%	34.2%	33.5%†	34.5%
Saturated Fat	<10%	12.5	12.0	11.7 †	12.1
Carbohydrate	>55%[1]	49.0	50.3	51.1 ††	50.0
Mean Amount					
Cholesterol (mg)	≤100[1]	71	65	67	68
Sodium (mg)	≤800[1]	1,374	1,392	1,392	1,382
Number of Schools (Unweighted)		282	175	197	677

[1] NRC recommendation, not NSLP standard.

Notes: Data for NSMP and ANSMP were combined because of small sample size for ANSMP (13 schools).

Data for 23 schools that reported use of some other menu planning system are not presented separately because of small sample size. These schools are included in the "All Systems" column.

† Difference between the traditional and enhanced food-based systems is statistically significant at the .01 level.

†† Difference between the traditional and enhanced food-based systems is statistically significant at the .001 level.

Source: Weighted nutrient analysis of menu and meal production data for one week between September 1998 and May 1999.

Nineteen percent of all schools satisfied the NSLP standard of providing no more than 30 percent of calories from fat (Exhibit 3.7) and were thus included in the low-fat group. The largest group, the moderate-fat group, included 39 percent of all schools. Another 29 percent of schools fell into the high-fat group and 13 percent of schools were in the highest-fat group.

Average Nutrient Content of Lunches by Relative Fat Content

With regard to calories and the key RDA nutrients, nutrient profiles for the average lunch offered in each type of school were very consistent. In virtually all cases, means for calories and key nutrients met or exceeded the one-third RDA standard defined for NSLP meals (Exhibit 3.11). The mean calorie level for schools in the high-fat group (32.4%) fell just short of this standard. These data indicate that decreased levels of fat in school lunches was not associated with notable decreases in the availability of calories or key nutrients.

In fact, decreased levels of fat appear to be associated with other positive changes in school meals, namely, a smaller percentage of calories from saturated fat and a greater percentage of calories from carbohydrate. Among schools in the low-fat group, the overall mean for the percentage of calories from saturated fat (10%) was very close to the NSLP standard of less than 10 percent.

Foods Most Commonly Offered

Exhibit 3.12 shows the relative frequency with which various food items were included in the menus offered by schools in the four relative-fat-content groups. The tabulations reflect the percentage of schools that offered the specific food or food group *at least once per week*. This analysis is meant to be descriptive — no statistical tests have been performed on the data. Because of small sample sizes for some of the individual cells, readers should be cautious not to over-interpret the data. Patterns observed in the data provide some insight into menu planning practices that may influence the level of fat in school lunches but should not be interpreted as fully predictive. The percentage of calories from fat in the average meal served to students is influenced by the full array of menu offerings, and by students' food selection patterns, rather than by the availability of a single item or group of items.

Below, notable differences between menu offerings in schools in the low-fat and highest-fat groups are summarized. Patterns observed for the moderate- and high-fat groups may or may not follow suit. Disparities reflect the fact that the relationship between menu offerings and relative fat content is not a simple linear relationship. The more consistent the relationship between a specific menu characteristic and relative fat content, the more important the characteristic is likely to be in determining the ultimate percentage of calories provided by fat.

- **Milk:** Schools in the low-fat group offered flavored milk that was made from 1% milk more often than schools in the highest-fat group. In addition, schools in the low-fat group offered whole milk and flavored milk made from 2% milk less often than schools in the highest-fat group. Schools in the low-fat group also offered flavored milk made with skim milk more often than schools in the highest-fat group.

- **Fruit and Juice:** Schools in the low-fat group offered fresh fruit more often than schools in the highest-fat group.

Exhibit 3.11

In Comparison to Higher-Fat Lunches, Low-Fat Lunches Provided Comparable Amounts of Calories and Key Nutrients

	Standard/ Recommendation	Relative Amount of Fat in Average Lunch, as Served[1]			
		Low	**Moderate**	**High**	**Highest**
Mean Percentage of RDA					
Total Calories	33%	34%	34%	32%	33%
Protein	33%	94	93	86	83
Vitamin A	33%	65	60	56	52
Vitamin C	33%	70	57	54	48
Calcium	33%	53	52	50	49
Iron	33%	43	42	38	36
Mean Percentage of Calories from...					
Total Fat	≤ 30%	28.2%	32.7%	36.4%	40.5%
Saturated Fat	< 10%	10.0	11.8	13.0	14.4
Carbohydrate	> 55%[2]	56.4	51.7	47.9	44.4
Mean Amount					
Cholesterol (mg)	≤ 100[2]	57	66	68	76
Sodium (mg)	≤ 800[2]	1,275	1,300	1,293	1,363
Number of Schools (Unweighted)		206	527	200	142

[1] Low-fat is defined as no more than 30 percent of calories from fat; moderate-fat as more than 30 percent up to 34 percent; high-fat as more than 34 percent up to 38 percent; and highest-fat as more than 38 percent. Schools in the low-fat group met the NSLP standard for the percentage of calories from fat.

[2] NRC recommendation, not NSLP standard.

Source: Weighted nutrient analysis of menu and meal production data for one week between September 1998 and May 1999.

Exhibit 3.12

Schools that Served Low-Fat Lunches Tended to Offer Certain Foods More Often than Schools that Served the Highest-Fat Lunches

	Relative Amount of Fat in Average Lunch, as Served[1]			
	Low	Moderate	High	Highest
	Percentage of Schools Offering Item at Least Once per Week			
Milk				
1% flavored	77%	70%	62%	65%
1% unflavored	55	49	59	58
2% unflavored	47	56	40	45
Whole unflavored	37	52	53	61
Skim unflavored[2]	32	39	47	26
Skim flavored[2]	24	19	17	14
2% flavored	<1	12	21	14
Fruits and Juices				
Canned fruit	94	92	89	88
Fresh fruit	80	76	76	55
Full-strength citrus juice	24	23	18	22
Full-strength non-citrus juice	21	24	21	25
Frozen fruit or juice	20	23	21	19
Vegetables				
Cooked vegetables (other than potatoes and French fries)	96	89	84	83
Potatoes other than French fries or similar potato products	71	67	71	70
Oven-fried French fries/potato products	63	58	63	63
Green salads (other than entree salads)	54	75	75	75
Raw vegetables other than green salads or lettuce and/or tomato	44	47	45	41
Legumes	21	38	25	37
Other vegetable items (soups, mixed casseroles)	21	17	21	18
Lettuce and/or tomato[3]	14	23	22	29
Other (non-green) salads	14	25	27	22
Deep-fried French fries/potato products	8	12	20	28
Combination Entrees				
Sandwiches made with cheese and/or cold cuts	60	55	77	59
Pasta-based dishes	59	60	46	45
Hamburgers and similar beef/pork sandwiches	55	57	61	50

Exhibit 3.12
(continued)

	Relative Amount of Fat in Average Lunch, as Served[1]			
	Low	**Moderate**	**High**	**Highest**
Combination Entrees (continued)				
Mexican-style entrees	52%	53%	58%	71%
Pizza without meat	46	47	44	28
Pizza with meat	43	47	53	61
Hot dogs/corn dogs/similar sausage products	42	51	53	72
Sandwiches made with breaded and/or fried meat/poultry/fish (no cheese)	38	40	49	28
Sandwiches made with lean meat or poultry (no cheese)	35	32	36	26
Other mixed dishes/combinations	31	35	34	29
Peanut butter sandwiches	30	25	47	24
Food bars (other than salad bars)/bag lunches	22	9	11	9
Cheeseburgers and similar beef/pork sandwiches	21	32	56	46
Chef's salad or other salad plate	19	27	36	19
Sandwiches made with mayonnaise-based salads (no cheese)	12	17	27	14
Salad bars	7	10	21	18
Breakfast sandwiches	6	5	3	6
Meats/Meat Alternates (not part of a combination entree)				
Breaded chicken nuggets/patties/similar products	43	43	49	55
Other breaded or fried meat/poultry/fish	24	31	47	43
Plain (not breaded or fried) meat/poultry/fish	36	29	25	32
Meat/poultry/fish with mayonnaise or gravy	13	11	15	11
Yogurt	3	5	4	4
Sausage	1	3	5	10
Grains/Breads (not part of a combination entree)				
Bread, rolls, bagels, other plain breads	75	71	67	65
Crackers/hard pretzels	41	32	24	27
Pre-buttered bread/rolls	13	20	11	10
Rice	25	28	26	25
Biscuits, cornbread, croissants, other higher-fat breads/bread alternates	30	37	23	33
Pastries/muffins	14	15	9	4
Pasta	9	17	16	22
Pancakes/waffles/French toast	7	2	0	1

Exhibit 3.12
(continued)

	Relative Amount of Fat in Average Lunch, as Served[1]			
	Low	**Moderate**	**High**	**Highest**
Desserts				
Baked desserts	57%	61%	49%	52%
Other desserts (non-fruited gelatin, pudding, ice cream)	45	45	22*	26
Dessert items that include fruit or juice	30	26	15	21
Other Menu Items[4]				
Snack chips	14	9	16	14
Soups	13	10	4	7
Fruit drinks/ades	11	6	14	7
Condiments, Salad Dressings, and Spreads[4]				
Nonfat/lowfat condiments	92	93	98	94
Nonfat/lowfat salad dressings	38	38	36	17
Higher-fat condiments	33	50	62	53
Higher-fat spreads	31	24	37	24
Nonfat/lowfat spreads	29	16	14	5
Regular salad dressings	26	58	61	68
Number of Daily Menus (Unweighted)	1,010	2,585	966	691
Number of Schools (Unweighted)	206	527	200	142

[1] Low-fat is defined as 30 percent or less of total calories from fat; moderate-fat as more than 30 percent up to 34 percent; high-fat as more than 34 percent up to 38 percent; and highest-fat as more than 38 percent. Schools in the low-fat group met the NSLP standard for the percentage of calories from fat.

[2] Includes 1/2 percent milk.

[3] Lettuce and/or tomato offered as a vegetable choice for all students. Excludes lettuce and tomato included in prepared sandwiches or offered with other prepared entrees.

[4] Foods that do not contribute to satisfying the meal patterns for the traditional or enhanced food-based menu planning systems.

Note: See Exhibit E.6 for a detailed listing of items included in each group.

Source: Weighted tabulations of menu and meal production data for one week between September 1998 and May 1999.

- **Vegetables:** Schools in the highest-fat group offered cooked vegetables other than potatoes and French fries less often than schools in the low-fat group. Schools in the highest-fat group also offered deep-fried French fries much more often than schools in the low-fat group. Schools in the low-fat group offered legumes (most often baked beans or refried beans) and green salads (most often accompanied by dressings) less often than schools in the highest-fat group.

- **Combination Entrees and Separate Meats/Meat Alternates:** In comparison to schools in the highest-fat group, schools in the low-fat group offered the following items less often — Mexican-style entrees; pizza with meat; hot dogs, corn dogs and similar sausage products; cheeseburgers; salad bars; and all types of breaded or fried meat, fish and poultry. At the same time, schools in the low-fat group offered pasta-based dishes; pizza without meat; and food bars and bag lunches more often than schools in the highest-fat group.

- **Separate Breads/Grains:** In comparison to the highest-fat group, schools in the low-fat group tended to offer bread/bread alternates outside of combination entrees more often. These items may have been available to all students or offered with a particular combination entree or meat/meat alternate and were most often lower-fat bread options, e.g., plain bread and rolls and crackers or hard pretzels. Schools in the highest-fat group offered pasta-based side dishes (most often macaroni and cheese) more often than schools in the low-fat group.

- **Desserts:** Schools in the low-fat group offered all types of dessert more often than schools in the highest-fat group. This finding may seem counterintuitive but, depending on the characteristics of the menu and the dessert, desserts can decrease the percentage of calories provided by fat by increasing carbohydrate calories.

- **Condiments, Salad Dressings and Spreads:** Schools in the low-fat group offered nonfat and lowfat salad dressings and spreads more often than schools in the highest-fat group. At the same time, schools in the highest-fat group offered regular salad dressings and higher-fat condiments more often than schools in the low-fat group.

Sources of Calories and Nutrients in NSLP Lunches as Served

To provide information on the food sources of calories and key nutrients in NSLP lunches, menu items were classified into one of six major food groups — milk; fruit, juice and vegetables; combination entrees; separate meats/meat alternates (not part of a combination entree); separate grains/breads (not part of a combination entree); and other menu items. These major food groups were expanded to 26 minor food groups. The percentage contribution of each major and minor food group to the calorie and nutrient content of the average lunch (as served) was then computed. Results are shown in Exhibit 3.13 and major findings are summarized below.

Exhibit 3.13

Sources of Calories and Nutrients in NSLP Lunches as Served

Food Group/Food(s)	Calories	Protein	Carbohydrate	Fat	Saturated Fat	Sodium
	Percentage Contribution to Average Amount Served					
Milk	**17.8%**	**24.0%**	**20.7%**	**10.4%**	**18.2%**	**9.1%**
Whole milk	1.6	2.0	1.0	2.3	4.0	0.7
Lowfat/nonfat milks	16.2	22.0	19.7	8.1	14.1	8.5
Fruits, Juices, Vegetables	**16.6**	**7.2**	**25.0**	**10.5**	**8.0**	**11.8**
Fruit/juice	6.0	1.1	11.9	0.7	0.5	0.3
Vegetables	10.6	6.1	13.1	9.8	7.5	11.5
Combination Entrees	**39.8**	**50.5**	**29.4**	**48.4**	**51.5**	**48.7**
Hamburgers, cheeseburgers, similar sandwiches	7.2	10.2	4.6	9.3	10.6	6.9
Hot dogs, corn dogs, sausage products	2.7	2.5	1.9	4.0	3.7	4.3
Pizza	9.6	11.7	7.6	11.3	13.2	12.2
Other sandwiches	8.8	11.2	6.7	10.4	10.1	12.5
Chef's salad, salad bars, other food bars	2.6	3.2	1.9	3.3	3.3	3.4
Mixed dishes[1]	8.8	11.7	6.7	10.2	10.7	9.5
Meat/Meat Alternates (not part of a combination entree)	**5.4**	**8.9**	**1.9**	**8.5**	**6.6**	**6.2**
Breaded/fried meat, poultry, fish[2]	4.2	6.2	1.6	6.7	5.0	4.4
Other meats/meat alternates	1.2	2.7	0.3	1.7	1.6	1.9
Grains/Breads (not part of a combination entree)	**8.2**	**5.1**	**10.6**	**5.8**	**3.9**	**7.7**
Bread, rolls, bagels, other plain breads	3.9	2.7	5.4	2.1	1.2	3.3
Biscuits, cornbread, croissants, other higher-fat breads	1.9	1.1	2.1	1.9	1.2	2.0
Crackers/hard pretzels	0.6	0.3	0.8	0.4	0.2	0.8
Pastries/muffins	0.6	0.3	0.8	0.5	0.3	0.4
Pasta/rice	1.1	0.7	1.3	0.9	0.8	1.3
Pancakes, waffles, French toast	0.1	0.1	0.1	0.1	0.0	0.1

Exhibit 3.13
(continued)

Food Group/Food(s)	Calories	Protein	Carbohydrate	Fat	Saturated Fat	Sodium
	Percentage Contribution to Average Amount Served					
Other Menu Items[3]	**12.3**	**4.3**	**12.5**	**16.4**	**11.8**	**16.4**
Desserts	5.8	2.0	7.4	5.4	5.0	2.7
Snack Chips	0.4	0.1	0.3	0.6	0.4	0.3
Fruit drinks/ades	0.5	0.0	1.0	0.0	0.0	0.1
Miscellaneous	1.1	1.2	0.7	1.5	2.1	2.8
Nonfat/lowfat condiments and spreads	1.5	0.6	2.5	0.9	0.3	7.9
Nonfat/lowfat salad dressings	0.4	0.1	0.3	0.6	0.3	1.0
Higher-fat condiments and spreads	1.5	0.2	0.1	4.4	2.2	0.7
Regular salad dressings	1.1	0.0	0.2	2.9	1.4	1.0

Exhibit 3.13
(continued)

Food Group/Food(s)	Cholesterol	Vitamin A	Vitamin C	Calcium	Iron
	Percentage Contribution to Average Amount Served				
Milk	**14.6%**	**30.0%**	**7.2%**	**53.9%**	**8.6%**
Whole milk	3.7	1.4	0.6	4.6	0.2
Lowfat/nonfat milk	10.8	28.6	6.6	49.3	8.4
Fruits, Juices, Vegetables	**2.1**	**41.4**	**66.8**	**5.6**	**16.8**
Fruit/juice	0.1	2.6	37.4	1.6	4.3
Vegetables	2.0	38.8	29.5	4.0	12.5
Combination Entrees	**57.6**	**20.0**	**13.1**	**31.9**	**49.5**
Hamburgers, cheeseburgers, similar sandwiches	12.1	1.5	0.8	4.2	10.4
Hot dogs, corn dogs, sausage products	4.2	0.2	0.2	0.9	3.2
Pizza	8.8	5.6	1.4	13.0	11.1
Other sandwiches	13.4	2.5	0.7	6.1	10.1
Chef's salad, salad bars, other food bars	5.2	4.9	3.4	2.1	2.9
Mixed dishes[1]	13.9	5.2	6.4	5.6	11.9
Meat/Meat Alternates (not part of a combination entree)	**14.2**	**0.8**	**0.4**	**1.0**	**4.9**
Breaded/fried meat, poultry, fish[2]	10.2	0.5	0.2	0.7	3.6
Other meats/meat alternates	4.0	0.3	0.3	0.3	1.4
Grains/Breads (not part of a combination entree)	**2.3**	**1.4**	**0.9**	**3.4**	**12.1**
Bread, rolls, bagels, other plain breads	0.2	0.1	0.0	1.6	6.6
Biscuits, cornbread, croissants, other higher-fat breads	0.9	0.5	0.1	0.9	2.4
Crackers/hard pretzels	0.0	0.0	0.0	0.1	1.0
Pastries/muffins	0.4	0.1	0.0	0.2	0.8
Pasta/rice	0.6	0.7	0.7	0.6	1.3
Pancakes, waffles, French toast	0.1	0.0	0.0	0.0	0.1

Exhibit 3.13
(continued)

Food Group/Food(s)	Cholesterol	Vitamin A	Vitamin C	Calcium	Iron
	Percentage Contribution to Average Amount Served				
Other Menu Items[3]	**9.2**	**6.4**	**11.6**	**4.3**	**8.1**
Desserts	4.2	2.5	2.2	1.9	4.0
Snack chips	0.0	0.0	0.3	0.1	0.2
Fruit drinks/ades	0.0	0.1	4.8	0.2	0.2
Miscellaneous	1.8	1.1	1.1	1.3	1.1
Nonfat/lowfat condiments and spreads	0.2	1.5	3.0	0.6	2.2
Nonfat/lowfat salad dressings	0.2	0.1	0.0	0.1	0.0
Higher-fat condiments and spreads	1.4	0.9	0.0	0.1	0.2
Regular salad dressings	1.3	0.2	0.0	0.1	0.1

[1] Includes Mexican-style entrees, pasta-based entrees and other mixtures (e.g., Shepherd's pie, chili, quiche).

[2] Includes meat/fish/poultry that is breaded, fried and/or prepared with gravy or mayonnaise.

[3] Foods that do not contribute to satisfying the meal patterns for the traditional or enhanced food-based menu planning systems.

Notes: See Exhibit E.6 for a detailed listing of items included in each group.

Columns may not sum to 100 percent because of rounding.

Calories

The major source of calories in NSLP lunches served in SY1998-99 was combination entrees, which provided about 40 percent of total calories. Major contributors included pizza; sandwiches; mixed dishes; and hamburgers, cheeseburgers and similar beef/pork sandwiches. Milk, primarily in the form of lowfat milks, made the second largest contribution to total calories (18%). Fruit, juice and vegetables contributed 17 percent of total calories; and other menu items, including desserts, salad dressings, condiments, spreads and other extras contributed more than 10 percent of total calories. Most of the calories in the latter group came from desserts (6%) and high-fat salad dressings, condiments and spreads (3%).

Carbohydrate

Combination entrees were also the leading source of carbohydrate in school lunches (29%). Leading carbohydrate contributors in this group included pizza, sandwiches and mixed dishes. Fruit, juice and vegetables were the second leading source of carbohydrate in school lunches (25%). Roughly equivalent proportions of the total were contributed by fruit and juice and by vegetables. The third major contributor of carbohydrate in school lunches was milk (21%).

Total Fat

Almost half of the fat in school lunches served in SY1998-99 came from combination entrees. Major contributors included pizza, sandwiches and mixed dishes. Other menu items (items that don't contribute to meeting meal pattern requirements) contributed roughly 16 percent of the fat in the average school lunch. Most of this fat was concentrated in high-fat salad dressings, condiments and spreads (7%) and in desserts (5%). Fruit, vegetables and juice — as a group — contributed about 11 percent of total fat. Virtually all of this fat came from vegetables. Additional analyses (not shown) documented that most of this fat was contributed by French fries and other processed potato products.

Saturated Fat

More than two-thirds of the saturated fat in school lunches was contributed by combination entrees (52%) and by milk (18%). Other menu items contributed 12 percent of the saturated fat. Major contributors included high-fat salad dressings, condiments and spreads (4%) and desserts (5%). Separate meats and meat alternates, which were offered relatively infrequently (see Exhibit 3.2), contributed about seven percent of the saturated fat.

Sodium

Together, combination entrees (49%) and other menu items (16%) accounted for 65 percent of the sodium in the average school lunch. Condiments, spreads and salad dressings alone (all types) contributed 11 percent of the total sodium. Fruit, juice and vegetables were the third major source of sodium, contributing about 12 percent of the total. Virtually all of the sodium from this group came from vegetables.

Cholesterol

The leading source of cholesterol in NSLP lunches served in SY 1998-99 was combination entrees, which contributed close to 60 percent of the cholesterol in the average lunch. Major contributors included mixed dishes; sandwiches; and hamburgers, cheeseburgers and similar beef/pork sandwiches. Milk and meats and meat alternates (primarily breaded or fried meat, poultry or fish) each contributed about 14 percent of the cholesterol in the average lunch.

Vitamin A

Fruit, juice and vegetables were the major contributors of vitamin A in school lunches (41%). The majority of this vitamin A came from vegetables. Milk was the second leading contributor of vitamin A, supplying 30 percent of the total. Combination entrees contributed 20 percent of the vitamin A. Major contributors in this group included pizza; mixed dishes; and Chef's salads, salad bars and other food bars.

Vitamin C

Fruit, juice and vegetables were also the primary source of vitamin C in school lunches, contributing more than two-thirds of the vitamin C in the average lunch. Thirty-seven percent of the vitamin C was contributed by fruit and juice and 30 percent was contributed by vegetables. Fruit drinks and ades contributed about five percent of the vitamin C.

Calcium

Milk provided more than half of the calcium in the average school lunch. Combination entrees provided almost a third of the calcium, primarily from pizza, sandwiches and mixed dishes.

Iron

Half of the iron in the average school lunch was contributed by combination entrees. Fruit, vegetables and juice contributed another 17 percent of the total iron, with the majority (13%) coming from vegetables. Separate grains and breads contributed 12 percent of the total iron.

Chapter Four
Characteristics of Breakfasts Served in Public SBP Schools

This chapter presents information on the average nutrient content of breakfasts served in public SBP schools during SY 1998–99. Information is also provided on the types of food offered, the number of options available to students selecting a breakfast and the characteristics of breakfasts served to students. In addition, information is provided on variation in nutrient content by menu planning system and by relative fat content.

The general approach to data analysis and reporting in this chapter is identical to that used in the preceding chapter on the characteristics of school lunches. The data presented are based on a weighted nutrient analysis and are therefore not directly comparable to data from the SNDA-I study (which are based on an unweighted analysis). A comparison of SNDA-I and SNDA-II data, completed using comparable analytic techniques for the two data sets, is presented in Chapter Six.

Number and Types of Food Offered and Served to Students

This section provides background information on the characteristics of the breakfast menus offered to students as well as on students' general food selection patterns.

Number of Options Offered Within SBP Meal Component Categories

Information on the relative amount of choice available to students selecting an SBP breakfast is summarized in Exhibit 4.1. The exhibit shows the percentage of *daily SBP menus* that offered various numbers of options within major menu item categories.[1] More than eight out of 10 daily SBP menus provided students with the opportunity to select a specific type of milk; the remainder offered only one type of milk. This pattern is noticeably different from that observed for NSLP lunches, where 96 percent of all daily menus offered at least two milk choices (see Chapter Three). The primary reason for this difference is that fewer schools offered flavored milk at breakfast.

More than half of all SBP menus offered a choice of fruit, juice or vegetable (more than one). Secondary school menus tended to have more options in this category than elementary school menus. Sixteen percent of daily secondary school menus included four or more fruit, juice or vegetable options, compared to 10 percent of elementary school menus. Almost half of all elementary school menus were limited to

1 Schools that are not using the traditional or enhanced food-based menu planning systems are not required to offer specific food items. Menus offered in these schools are generally consistent with the basic elements of the food-based meal pattern, however, so the basic meal component categories still provide a useful framework for describing SBP menus.

Exhibit 4.1

Choice and Variety in Breakfast Menus

	Elementary Schools	Secondary Schools	All Schools
	Percentage of Daily Breakfast Menus		
Number of Types of Milk Offered per Day			
1	18%	17%	18%
2	42	32	38
3	30	32	31
4 or more	10	19	13
Median items per day	2	3	3
Median number of different items per week[1]	2	3	3
Number of Fruits/Juices/Vegetables Offered per Day			
1	49%	40%	46%
2	21	23	21
3	20	21	20
4 or more	10	16	12
Median items per day	2	2	2
Median number of different items per week[1]	3	3	3
Number of Combination Entrees Offered per Day			
None	71%	55%	66%
1	27	33	29
2 or more	3	12	6
Median items per day	0	0	0
Median number of different items per week[1]	1	1	1
Number of Separate Breads/Grains Offered per Day[2]			
None	7%	7%	7%
1	26	22	25
2	37	26	33
3	22	21	21
4-5	7	16	10
6 or more	2	8	4
Median items per day	2	2	2
Median number of different items per week[1]	6	6	6

Exhibit 4.1
(continued)

	Elementary Schools	Secondary Schools	All Schools
	Percentage of Daily Breakfast Menus		
Number of Separate Meat/Meat Alternates Offered per Day[2]			
None	74%	68%	72%
1	24	25	24
2 or more	3	7	4
Median items per day	0	0	0
Median number of different items per week[1]	1	1	1
Number of Daily Menus (Unweighted)	1,551	2,371	3,922
Number of Schools (Unweighted)	317	487	804

[1] Includes only schools that provided menu information for five days.

[2] Not included in combination entrees. All cold cereals counted as one choice.

Source: Weighted tabulations of menu data for one week between September 1998 and May 1999.

one fruit, juice or vegetable offering, compared to 40 percent of secondary school menus. For all schools, the median number of fruit, juice or vegetable choices offered per day was two. Across a week, schools offered a median of three different items in this category, indicating that some items were offered more than once per week.

Breakfast menus differed from lunch menus in that combination entrees were not the norm. As shown in Exhibit 4.1, more than 70 percent of all elementary school menus and more than half of all secondary school menus included no combination entrees. When entrees were offered, there was generally only one such item available. However, 12 percent of secondary school menus did offer two or more combination entrees.

The main focal point of most breakfast menus was breads and bread alternates (e.g., toast, bagels, cereal, pastries, muffins, pancakes or waffles). More than two-thirds of all daily breakfast menus included two or more bread or grain products (all types of cold cereal were considered one choice). More than a third of all menus included three or more choices. Secondary school menus offered the greatest number of options in this category; 24 percent of all daily breakfast menus in secondary schools included four or more breads or bread alternates.

Across all schools, the median number of daily bread/bread alternate choices was two and the median number of different items offered across the week was six. In considering these data, it is important to bear in mind that students were often expected to select two bread or grain items (e.g., cereal and toast) to satisfy requirements for a reimbursable meal.

Seventy-two percent of all daily breakfast menus included no meat or meat alternate items (other than those that might have been included in a combination entree). When such items were offered, there was generally only one option available.

Foods Most Frequently Included in SBP Menus

To obtain more detailed information on the types of food offered in SBP meals, menu items were classified into one of six major food groups — milk; fruit, juice and vegetables; grains and breads; meats/meat alternates; combination entrees; and other menu items (foods not "counted" toward component requirements in food-based meal patterns). Foods were further classified into 29 minor food groups.

Exhibit 4.2 shows the percentage of daily menus in which each major and minor food group was offered. The exhibit is limited to minor food groups that were offered in at least five percent of daily menus, overall, or for either type of school. Major findings are summarized below:

- The type of milk most frequently offered in SBP menus, in both elementary schools and secondary schools, was unflavored 1% milk. (The leading milk option in lunch menus was flavored 1% milk). The next most commonly offered milks were whole milk, 2% (unflavored) milk and flavored 1% milk.

Exhibit 4.2

Foods Most Commonly Offered in Breakfast Menus

	Elementary Schools	Secondary Schools	All Schools
	Percentage of Daily Menus in Which Item Was Offered		
Milk	**100%**	**100%**	**100%**
1% unflavored	55	56	56
Whole unflavored	49	48	49
2% unflavored	46	45	46
1% flavored	42	53	46
Skim unflavored[1]	23	29	25
Skim flavored[1]	8	16	11
2% flavored	8	4	7
Fruits, Juices and Vegetables	**99%**	**99%**	**99%**
Full-strength citrus juices	65	81	71
Full-strength non-citrus juices	56	56	56
Fresh fruit	16	19	17
Canned fruit	17	11	15
Potatoes (all types)	3	6	4
Grains/Breads (not part of a combination entree)	**93%**	**93%**	**93%**
Cold cereal	70	71	70
Bread, rolls, bagels, other plain breads	18	30	22
Donuts, Danish, other pastry	28	37	31
Pancakes, waffles, French toast	19	22	20
Muffins, sweet/quick breads, cereal bars	16	19	17
Buttered toast, bagels with cream cheese	22	17	20
Biscuits, cornbread, croissants	8	14	10
Crackers[2]	10	7	9
Meats/Meat Alternates (not part of a combination entree)	**26%**	**32%**	**28%**
Sausage	10	15	12
Eggs	5	6	6
Yogurt	4	7	5
Cheese	5	2	4

Exhibit 4.2
(continued)

	Elementary Schools	Secondary Schools	All Schools
	Percentage of Daily Menus in Which Item Was Offered		
Combination Entrees	**29%**	**45%**	**34%**
Breakfast sandwiches	14	26	18
Pizza (all types)	8	13	10
Sausage with pancake and similar products	4	6	5
Mexican-style entree	2	7	4
Other Menu Items[3]	**2%**	**6%**	**4%**
Fruit drinks/ades	1	5	2
Number of Daily Menus (Unweighted)	1,551	2,311	3,922
Number of Schools (Unweighted)	317	487	804

Notes: Exhibit is limited to items that appeared in at least five percent of menus for at least one type of school. See Exhibit E.6 for a detailed listing of items included in each group.

[1] Includes ½ percent milk.

[2] Generally graham crackers or saltines that could be coupled with peanut butter or cheese.

[3] Foods that do not contribute to satisfying the meal patterns for the traditional or enhanced food-based menu planning systems.

Source: Weighted tabulations of menu data for one week between September 1998 and May 1999.

Flavored milks were offered more often in secondary schools than in elementary schools. Fifty-eight percent of breakfast menus in elementary schools included one or more types of flavored milk compared to about 73 percent of secondary school menus.[2]

- The most common offering in the fruit, juice and vegetable category was juice. Citrus juice was offered more frequently than non-citrus juice. Sixty-five percent of all elementary school menus and 81 percent of all secondary school menus included one or more citrus juices. Just over half of all menus included non-citrus juice.

- Fruit was offered in breakfast menus much less frequently than juice. Fresh fruit was offered in fewer than 20 percent of all menus. The same is true for canned fruit. Potatoes were offered in fewer than five percent of all menus, most commonly at the secondary school level.

- Cold breakfast cereals were a mainstay of breakfast menus, appearing in roughly seven out of 10 menus in both elementary and secondary schools. Other breads and grains were offered with much less frequency. More than one in five breakfast menus included bread/ toast, bagels, English muffins or other plain breads. About 30 percent included pastries such as Danish, doughnuts, sweet rolls and the like. Pancakes, waffles or French toast were used in one out of five breakfast menus.

- Meats and meat alternates were infrequently offered as a discrete menu item (rather than as part of a combination entree). Separate meats or meat alternates were included in only 28 percent of all breakfast menus. Secondary school menus included meats and meat alternates more often than elementary school menus. Sausage was the item offered most frequently.

- Combination entrees were more common in secondary school menus than in elementary school menus (45% versus 29%). In all cases, the most common type of entree offered was a breakfast sandwich similar to those served in fast food restaurants (e.g., eggs with some combination of cheese and/or bacon, sausage or ham on an English muffin, bagel or biscuit). Other combination entrees that appeared in at least five percent of daily menus included pizza (10%) and pancake-wrapped sausages or similar products (5%).

- The only non-creditable menu item used with any frequency in breakfast menus was fruit drinks. These were used primarily in secondary schools and appeared in only five percent of those menus.

Characteristics of Breakfasts Actually Served to Students

In addition to having the ability to select specific foods within a meal component category, students participating in the SBP have varying levels of flexibility regarding the minimum number of foods or items they are required to take when selecting a meal. In general, however, students have fewer options in this regard at breakfast than they do at lunch. In the SBP, unlike the NSLP, the "Offer-versus-Serve" (OVS) option (see Chapter Three) is *not* mandatory for secondary schools. OVS is optional, at the discretion of the local school district, at all school levels.

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2 Reported percentages were derived by summing figures for all types of flavored milk. Although percentages for individual minor food groups are generally not mutually exclusive, in this case they are because schools rarely offer more than one type of flavored milk.

When OVS is implemented in schools using the traditional or enhanced food-based menu planning systems, students may refuse one of the four food items that must be offered (milk; fruit, juice or vegetable; two servings of grain/bread or meat/meat alternate or one of each). In schools using NSMP or ANSMP, which are required to offer at least three menu items (one of which must be milk), students may decline a maximum of one of the offered menu items.

As Exhibit 4.3 illustrates, the makeup of breakfasts served to students did vary from the full complement of foods included in the traditional and enhanced meal patterns. While milk was offered in every SBP menu, about 10 percent of the breakfasts served to students on an average day did not include milk. Milk was more commonly omitted in breakfasts served in secondary schools than in breakfasts served in elementary schools (14% versus 8%). This pattern is essentially identical to that observed for lunches (see Chapter Three).

On average, 88 percent of students who had an opportunity to include a serving of fruit, juice or vegetable in their SBP breakfast did so. The vast majority of breakfasts served to students included two or more servings of bread or grain and/or meat/meat alternate. However, a small percentage of breakfasts did not. It is important to note that students do not necessarily have to select two menu items to obtain two servings of bread/grain and/or meat/meat alternate. Many bread products are of sufficient size or weight to qualify for two servings of bread/grain, e.g., a full bagel or a full English muffin. The same is true for most breakfast sandwiches and other combination entrees.

Average Nutrient Content of Breakfasts Served to Students

This section presents data on the average nutrient content of breakfasts served to students in SY 1998–99 in comparison to defined SBP nutrition standards and NRC recommendations. The discussion is divided into three sections as outlined below.

- **Nutrient Content Relative to RDAs.** Mean contribution to RDAs for calories, protein, vitamin A, vitamin C, calcium and iron is evaluated in light of the defined nutrient standard for breakfast (25% of the RDA).

- **Percentage of Calories from Total Fat and Saturated Fat.** The mean percentage of calories provided by each type of fat is compared to defined SBP standards for total fat ($\leq$ 30%) and saturated fat (< 10%).

- **Cholesterol, Sodium, and Carbohydrate Content.** Mean cholesterol and sodium content are compared to NRC recommendations. The standards used reflect one-fourth of the NRC's recommended maximum daily intake. The mean percentage of calories from carbohydrate is compared to the NRC recommendation (> 55%).

Exhibit 4.3

Characteristics of Breakfasts Served to Students

Characteristic	Elementary Schools	Secondary Schools	All Schools
	Average Percentage of Breakfasts Served to Students		
All Breakfasts			
Included milk	92%	86%	90%
Included at least one fruit, juice, or vegetable (when offered)	89	86	88
Included two servings of bread, two servings of meat, or one of each	97	99	98
Number of Daily Menus (Unweighted)	1,551	2,311	3,922
Number of Schools (Unweighted)	317	487	804

Source: Weighted tabulations of menu and meal production data for one week between September 1998 and May 1999.

Mean Nutrient Content Relative to RDAs

SBP breakfasts served in SY 1998–99 met or exceeded the SBP standard of one-fourth of the RDA for all target nutrients (Exhibit 4.4).[3] Average calorie levels fell below the one-fourth RDA benchmark, however, ranging from 20 percent of the RDA for secondary school breakfasts to 23 percent for elementary school breakfasts.

Breakfasts were nutrient-dense, although not quite as dense as lunches. This is not unexpected given the more limited array of foods offered in breakfast menus. Elementary school breakfasts provided an average of 23 percent of the RDA for calories while providing more than 35 percent of the RDAs for all key nutrients. Breakfasts served to secondary school students provided 20 percent of the RDA for calories and 25 percent or more of the RDA for all key nutrients. SBP breakfasts were especially rich in Vitamin C, providing 81 percent of the RDA for elementary school students and 72 percent of the RDA for secondary school students.

Percentage of Schools Meeting RDA Standards

Data on the percentage of schools that satisfied the one-fourth RDA standard for calories and targeted nutrients underscore the fact that the calorie standard was difficult to meet. Overall, the average breakfast served in more than 80 percent of all schools provided less than one-fourth of students' daily energy needs (i.e., fewer than 20 percent of all schools met the SBP standard for calories). (See Exhibit 4.5.) The difficulty was most pronounced in secondary schools, where students' calorie needs are greatest. The percentage of secondary schools in which the average breakfast served to students satisfied the SBP standard for calories (8%) was about a third that of elementary schools (22%).

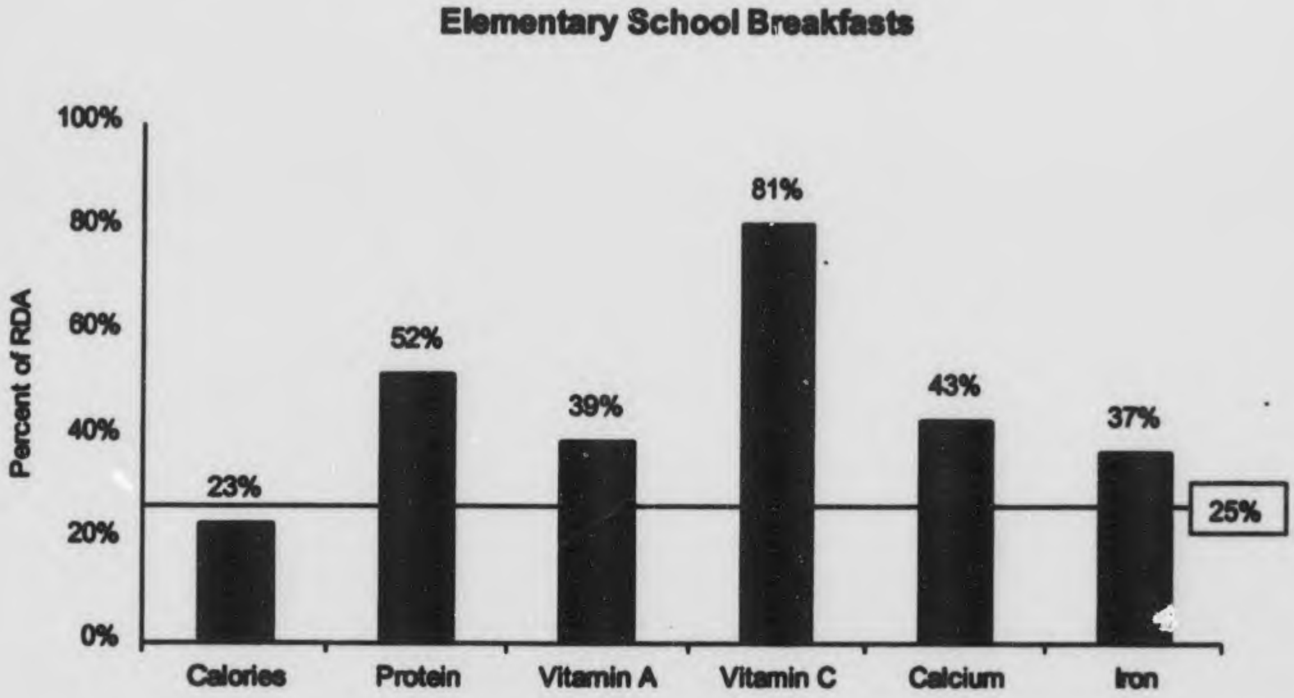
Breakfasts served in almost all schools (more than 90%) met the one-fourth RDA benchmark for protein, vitamin C, and calcium. However, fewer secondary schools than elementary schools met the standard for calcium (78% versus 99%). This is consistent with the finding, noted in Exhibit 4.3, that secondary school students were more likely to select a breakfast that did not include milk.

A smaller percentage of schools (about 80%) satisfied the SBP standards for vitamin A and iron, both of which tend to occur in concentrated amounts in a relatively limited number of foods. Again, the percentage of secondary schools that satisfied these standards was substantially lower than the percentage of elementary schools (Exhibit 4.5). Mean levels of these nutrients were roughly comparable across all school types (Exhibit B.1); however, the RDAs for middle school and high school students are greater.

It should also be noted that the RDA-based standards used in this analysis are based on the grade span of the children enrolled in each school (see Appendix E), a standard that provides the most accurate assessment of how well the meals served meet students' nutritional needs. Under the regulations, secondary schools are permitted to serve breakfasts that meet less-stringent criteria (i.e., minimum nutrition standards defined for all children in grades K-12). When minimum SBP nutrition standards are used as a benchmark, the percentage of secondary schools deemed to have met the various RDA

3 Data on actual energy and nutrient content of breakfasts served are presented in Exhibit B.1.

Exhibit 4.4 **Breakfasts Served to Students in SY 1998-99 Provided at Least One-Fourth of the RDA, With the Exception of Calories**



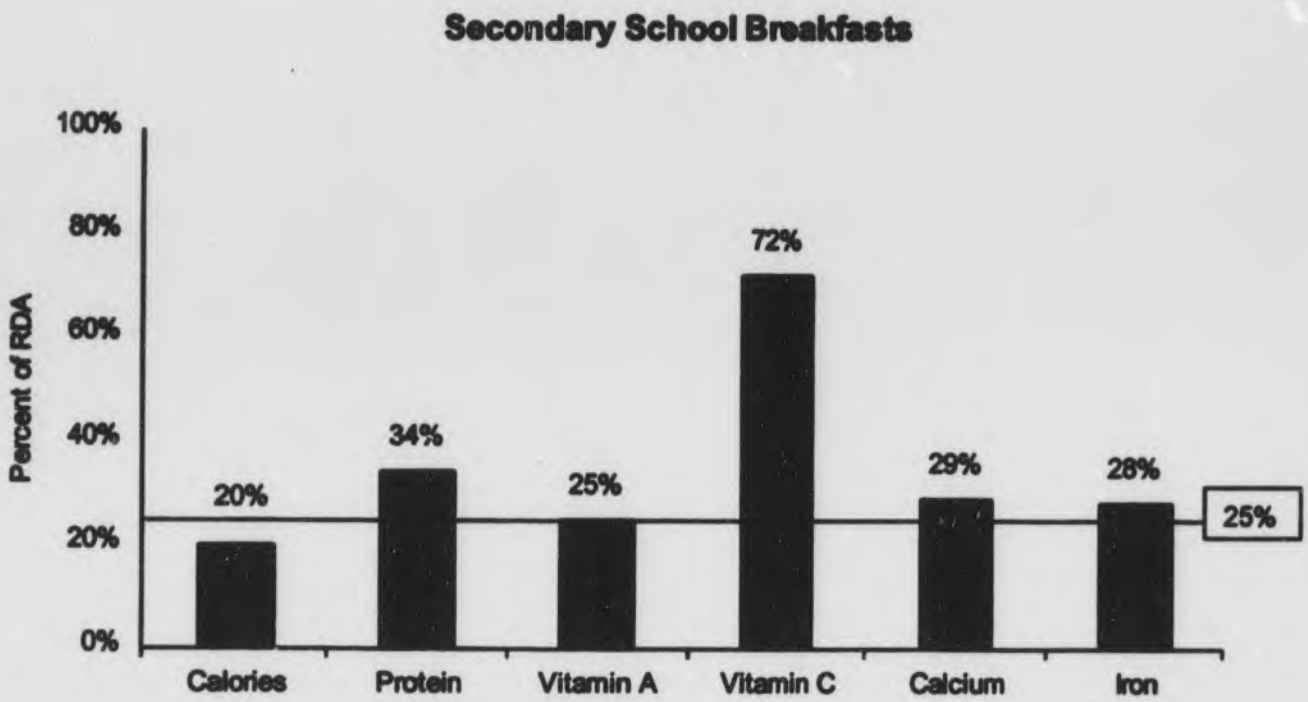


Exhibit 4.5

Percentage of Schools in Which the Average Breakfast Served to Students Provided One-Fourth or More of the RDA

	Elementary Schools	Secondary Schools	All Schools
	Percentage of Schools		
Total calories	22%	8%	17%
Protein	100	95	98
Vitamin A	95	48	79
Vitamin C	98	95	97
Calcium	99	78	92
Iron	93	57	81
Number of Schools (Unweighted)	317	487	804

Source: Weighted nutrient analysis of menu and meal production data for one week between September 1998 and May 1999.

standards is greater and, for some nutrients, the percentage of elementary schools is lower (see Exhibit B.3).

Percentage of Calories from Total Fat and Saturated Fat

On average, breakfasts served in SY 1998–99 in both elementary and secondary schools met the SBP standard for the percentage of calories from total fat (Exhibit 4.6). In addition, average breakfasts came close to meeting the SBP standard for calories from saturated fat. The average breakfast served to SBP participants provided between 27 percent (elementary schools) and 28 percent (secondary schools) of calories from fat (compared to the standard of no more than 30%). Breakfasts provided roughly 10 percent of calories from saturated fat (compared to the standard of less than 10%).

Percentage of Schools Meeting Standards for Fat and Saturated Fat

On average, breakfasts served in 71 percent of all schools met the SBP standard for the percentage of calories from fat (Exhibit 4.7). Elementary schools met the standard more often than secondary schools (75% versus 64%). The average percentage of calories from fat exceeded 34 percent in about 10 percent of elementary schools and 15 percent of secondary schools.

Although overall means exceeded the SBP standard for the percentage of calories from saturated fat (Exhibit 4.6), some individual schools did meet this standard. This was true, in fact, for more than half of all schools. Breakfasts served in elementary schools met the standard for calories from saturated fat more often than breakfasts served in secondary schools (54% versus 46%).

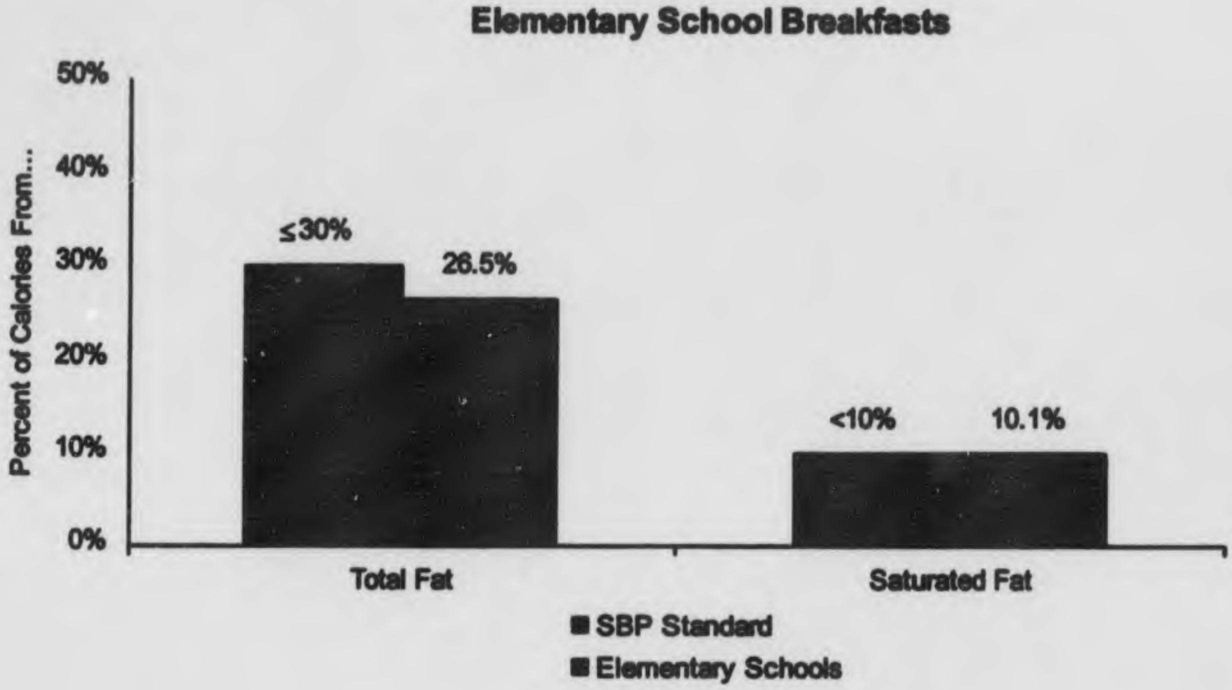
Cholesterol, Sodium and Carbohydrate Content

On average, breakfasts served in SY 1998–99 in both elementary schools and secondary schools provided less than 75 mg of cholesterol, a level that is consistent with the NRC recommendation of no more than 75 mg (or no more than one-quarter of the suggested maximum daily intake). (See Exhibit 4.8.) Eighty-five percent of all schools met this standard (Exhibit B.4).

The average breakfast served in elementary schools also satisfied the NRC recommendation for sodium (574 mg versus no more than 600 mg). Breakfasts served in secondary schools came close to meeting the NRC recommendation for sodium (672 mg). Only 42 percent of secondary schools met the NRC recommendation for sodium content, compared to 63 percent of elementary schools (Exhibit B.4).

Finally, breakfasts provided, on average, 59 percent (secondary schools) to 62 percent (elementary schools) of calories from carbohydrate. This compares favorably to the NRC recommendations of more than 55 percent of calories. Roughly eight out of 10 SBP schools met the NRC recommendation for calories from carbohydrate (Exhibit 4.7). Again, elementary schools met the recommendation more often than secondary schools (82% versus 72%).

Exhibit 4.6 **Breakfasts Served to Students in SY 1998-99 Met the SBP Standard for Calories From Fat and Almost Met the Standard for Calories From Saturated Fat**



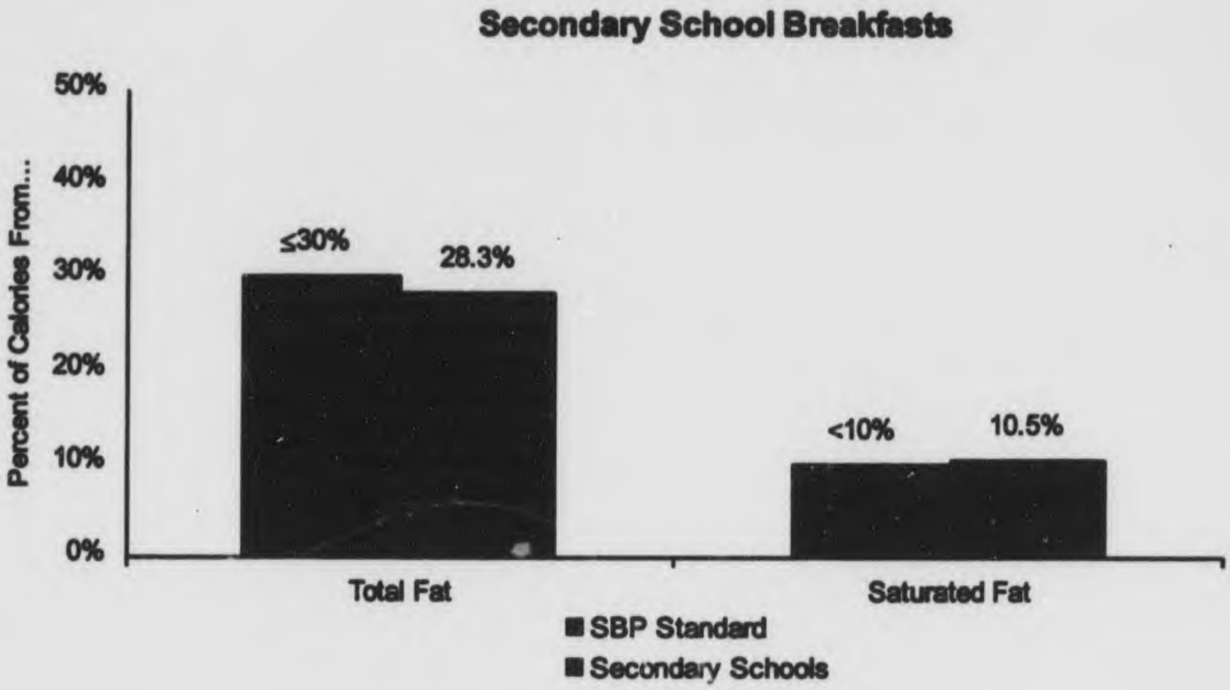


Exhibit 4.7

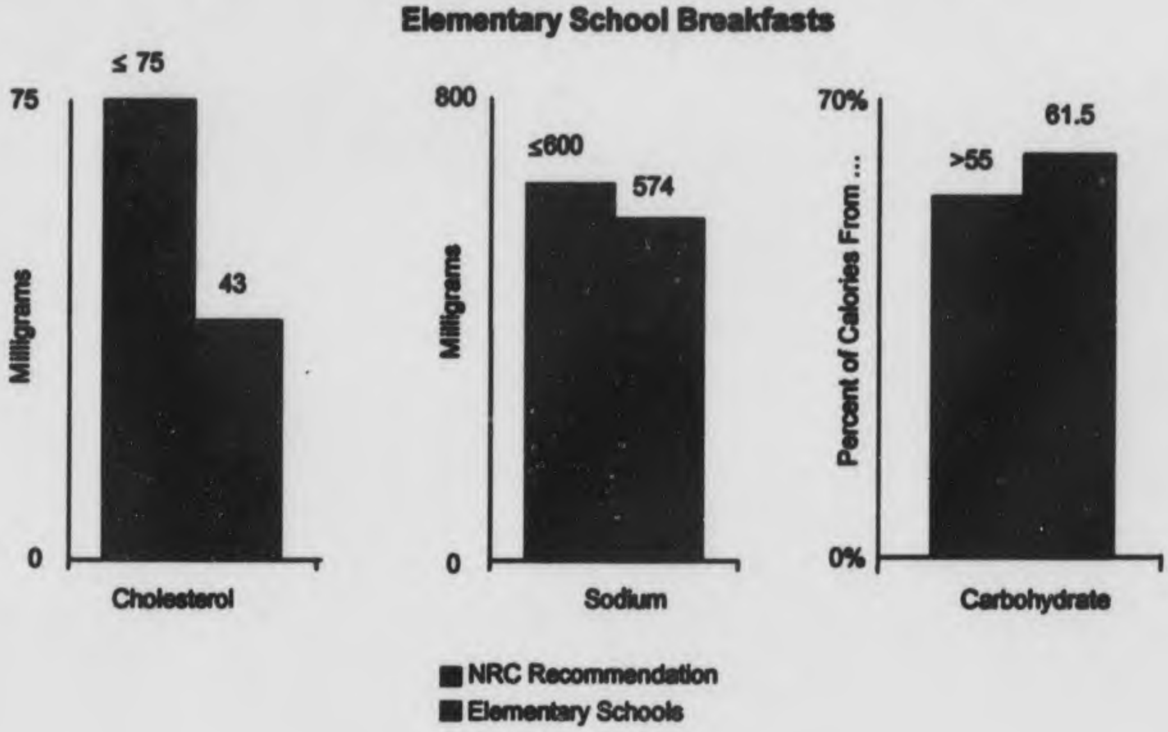
Distribution of the Percentage of Calories from Total Fat, Saturated Fat, and Carbohydrate in Average Breakfasts Served to Students

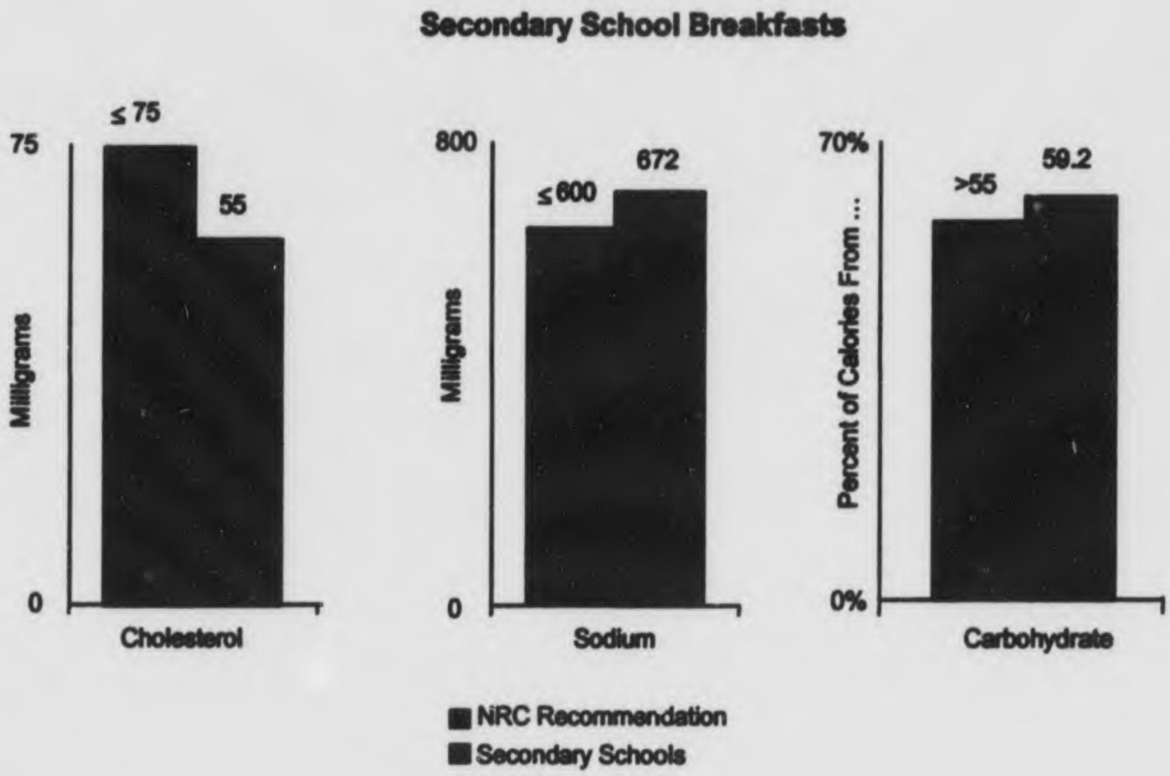
	Elementary Schools	Secondary Schools	All Schools
	Percentage of Schools		
Percentage of Calories from Fat			
No more than 30%	75%	64%	71%
30.1-34.0%	15	21	17
34.1-36.0%	4	3	4
36.1-38.0%	4	5	4
38.1-40.0%	1	3	2
More than 40%	<1	4	2
Percentage of Calories from Saturated Fat			
Less than 10%	54%	46%	52%
10.1-12.0%	26	30	27
12.1-14.0%	12	14	13
14.1-16.0%	4	8	5
More than 16%	4	3	3
Percentage of Calories from Carbohydrate			
Less than 45%	1	2	1
45.0-55.0%	18	25	20
More than 55%	82	72	79
Number of Schools (Unweighted)	317	487	804

Note: Highlighted rows show SBP standard (fat and saturated fat) or NRC recommendation (carbohydrate).

Source: Weighted nutrient analysis of menu and meal production data for one week between September 1998 and May 1999.

Exhibit 4.8 Breakfasts Served to Students Met NRC Recommendations for Cholesterol and Calories from Carbohydrate but Did Not Consistently Meet the Recommendation for Sodium





Average Nutrient Content of Breakfasts Served to Students, by Menu Planning Method

To determine whether the choice of menu planning system influences the nutritional quality of breakfasts served to students, mean nutrient content of breakfasts served in SY 1998–99 was compared on the basis of the menu planning system used. Because ANSMP was used in very few schools (a total of 15 schools in the unweighted sample), NSMP and ANSMP schools were combined for purposes of this analysis. Schools that reported using an alternative menu planning system (31 schools in the unweighted sample) were not included in the comparisons. Statistical significance of differences between menu planning systems was tested using two-tailed *t*-tests. Two comparisons were made: breakfasts served in schools using the traditional food-based menu planning system were compared to (a) breakfasts served in schools using NSMP or ANSMP and (b) breakfasts served in schools using the enhanced food-based menu planning system.

As noted in Chapter Three, readers are cautioned to recognize that NSMP/ANSMP systems may not have been fully operational at the time data were collected.[4] Previous research has shown that implementing NSMP can be a lengthy and complicated process, taking anywhere from three to 33 months (Fox 1998). Thus, differences observed between the traditional food-based menu planning system and NSMP/ANSMP should be interpreted as lower-bound estimates. Moreover, the absence of differences cannot be interpreted as indicative of no effect in fully implemented NSMP/ANSMP schools.

Exhibits 4.9 and 4.10 present information on the mean nutrient content of breakfasts served in schools using the various menu planning options. Breakfasts served in schools that used NSMP/ANSMP derived significantly fewer calories from saturated fat than breakfasts served in schools that used the traditional food-based menu planning system. This was true for both elementary schools and secondary schools. Breakfasts served in schools that used NSMP/ANSMP were consistent with the SBP standard of less than 10 percent of calories from saturated fat. In contrast, breakfasts served in schools that used the traditional food-based menu planning system derived roughly 11 percent of calories from saturated fat, a level which exceeds the SBP standard.

In comparison to breakfasts served in schools that used the traditional food-based menu planning system, NSMP/ANSMP schools also provided a smaller percentage of the RDA for calories (elementary schools only), a smaller percentage of calories from fat, a greater percentage of calories from carbohydrate (secondary schools only), and less sodium (elementary schools only).

On average, breakfasts served in both NSMP/ANSMP and traditional food-based system schools met most of the relevant standards. However, neither group of schools met the one-fourth RDA standard for calories. Of the statistically significant differences between NSMP/ANSMP schools and traditional food-based system schools reported above, two differences affected conclusions about the extent to which breakfasts satisfied SBP nutrient standards or NRC recommendations. Specifically, breakfasts

4 Because another USDA-sponsored study was collecting detailed information on SMI implementation at the same time as SNDA-II data were collected, detailed questions about implementation of the various menu planning options were not collected in this study.

Exhibit 4.9

Mean Nutrient Profile of Breakfasts Served, by Menu Planning System, Compared to Nutrition Standards for SBP Breakfasts and NRC Recommendations
Elementary Schools

	Standard/ Recommendation	Menu Planning System: Traditional Food-Based	NSMP/ ANSMP	Enhanced Food-Based	All Systems
Mean Percentage of RDA					
Total Calories	25%	23%	21%**	23%	23%
Protein	25%	54	49	54	52
Vitamin A	25%	38	40	38	39
Vitamin C	25%	81	81	84	81
Calcium	25%	43	41	44	43
Iron	25%	37	38	38	37
Mean Percentage of Calories from...					
Total Fat	≤30%	27.6%	24.4%*	26.8%	26.5%
Saturated Fat	<10%	10.7	9.1**	10.2	10.1
Carbohydrate	>55%[1]	60.3	63.6	61.1	61.5
Mean Amount					
Cholesterol (mg)	≤75[1]	51	36	38	43
Sodium (mg)	≤600[1]	605	528*	578	574
Number of Schools (Unweighted)		128	83	93	317

[1] NRC recommendation, not SBP standard.

Notes: Data for NSMP and ANSMP were combined because of extremely small sample size for ANSMP (5 schools).

Data for 13 schools that reported use of some other menu-planning system are not presented separately because of small sample size. These schools are included in the "All Systems" column.

* Difference between the traditional food-based system and NSMP/ANSMP is statistically significant at the .01 level.

** Difference between the traditional food-based system and NSMP/ANSMP is statistically significant at the .001 level.

Source: Weighted nutrient analysis of meal and menu production data for one week between September 1998 and May 1999.

Exhibit 4.10

Mean Nutrient Profile of Breakfasts Served, by Menu Planning System, Compared to Nutrition Standards for SBP Breakfasts and NRC Recommendations
Secondary Schools

	Standard/ Recommendation	Menu Planning System			
		Traditional Food-Based	NSMP/ ANSMP	Enhanced Food-Based	All Systems
Mean Percentage of RDA					
Total Calories	25%	20%	20%	19%	20%
Protein	25%	35	34	33	34
Vitamin A	25%	25	27	24	25
Vitamin C	25%	73	69	74	72
Calcium	25%	30	29	29	29
Iron	25%	28	31	25	28
Mean Percentage of Calories from...					
Total Fat	≤ 30%	29.8%	26.6%*	27.6%	28.3%
Saturated Fat	< 10%	11.2	9.7*	9.9	10.5
Carbohydrate	> 55%[1]	57.4	61.1*	59.9	59.2
Mean Amount					
Cholesterol (mg)	≤ 75[1]	59	53	52	55
Sodium (mg)	≤ 600[1]	696	679	636	672
Number of Schools (Unweighted)		220	121	128	487

[1] NRC recommendation, not SBP standard.

Notes: Data for NSMP and ANSMP were combined because of extremely small sample size for ANSMP (10 schools).

Data for 18 schools that reported use of some other menu planning system are not presented separately because of small sample size. These schools are included in the "All Systems" column.

* Difference between the traditional food-based system and NSMP/ANSMP is statistically significant at the .01 level.

Source: Weighted nutrient analysis of menu and meal production data for one week between September 1998 and May 1999.

served in NSMP/ANSMP schools met the SBP standard for the percentage of calories from saturated fat while breakfasts served in traditional food-based system schools did not. This was true for both elementary and secondary schools. In addition, at the elementary school level, difference in mean sodium content affected conclusions about the relevant NRC recommendation. The average sodium content of breakfasts served in elementary schools that used NSMP/ANSMP (528 mg) met the NRC recommendation of no more than 600 mg, while the average for elementary schools that used the traditional food-based menu planning system (605 mg) was slightly higher than the recommended level.

Data on the percentage of schools that met the various standards and recommendations suggest that schools using NSMP or ANSMP have a distinct advantage over schools using the traditional food-based system in meeting the SBP standard for calories from saturated fat. Among elementary schools, the percentage of NSMP/ANSMP schools that met the SBP standard for calories from saturated fat was significantly greater than the percentage of traditional food-based system schools (Exhibit B.5). The same trend was noted among secondary schools; however, the difference did not reach statistical significance (Exhibit B.6). In addition, among secondary schools, the percentage of NSMP/ANSMP schools that met the SBP standard for iron was significantly greater than the percentage of traditional food-based system schools (Exhibit B.6).

Characteristics of Low-Fat and Higher-Fat Breakfasts

USDA is committed to lowering the fat content of school meals without adversely affecting the amounts of other key nutrients offered to students. To determine whether this objective is being met, an analysis was undertaken to examine the effect of lower fat levels on the overall nutrient profile of breakfasts served to students.

Schools were stratified into two groups based on the average percentage of calories from fat in breakfasts served to students:

- **Schools with low-fat breakfasts:** Mean percentage of calories from fat was less than or equal to 30 percent (the SBP standard);
- **Schools with higher-fat breakfasts:** Mean percentage of calories from fat was more than 30 percent.

As discussed previously, breakfasts served to students in 71 percent of all schools provided, on average, no more than 30 percent of calories from fat. Thus, 71 percent of all schools were included in the low-fat group. The remaining 29 percent of schools were included in the higher-fat group. Creation of additional categories did not make sense because the number of schools was so small and the sample was clustered between just over 30 percent and 34 percent of calories from fat (see Exhibit 4.7).

The discussion that follows describes the average nutrient content of breakfasts served in schools that did and did not meet the SBP standard for the percentage of calories from fat. Information is also provided on general differences in the types of food offered in the two types of schools.

Average Nutrient Content

With regard to calories and the target RDA nutrients, nutrient profiles for the two groups of schools were very similar (Exhibit 4.11). For all key nutrients, the average breakfast served in schools in both the low-fat and higher-fat breakfast groups exceeded the one-fourth RDA standard defined for SBP meals. However, in keeping with the pattern reported previously, the mean calorie content of breakfasts served in both groups of schools fell short of the one-fourth RDA benchmark. These data indicate that decreased levels of fat in school breakfasts did not lead to notable decreases in the availability of calories or key nutrients.

Moreover, the data indicate that decreased levels of fat led to other positive changes in school breakfasts without compromising the overall nutrient profile. The average breakfast served in schools in the low-fat group provided a smaller percentage of calories from saturated fat and a greater percentage of calories from carbohydrate than the average breakfast served in schools in the higher-fat group. In fact, the average breakfast served in schools in the low-fat group met the SBP standard for calories from saturated fat as well as NRC recommendations for calories from carbohydrate and total sodium content. The average breakfast served in schools that offered higher-fat breakfasts met none of these standards.

Foods Most Commonly Offered

Exhibit 4.12 shows the relative frequency with which various food items were included in the menus offered by schools that served low-fat and higher-fat breakfasts. The exhibit shows the percentage of schools that offered each item *at least once per week*. Notable differences are summarized below. As noted in the introduction to the comparable analysis for NSLP meals (see Chapter Three), this analysis is meant to be descriptive and no statistical tests have been performed on the data. Because of small sample sizes for some of the individual cells, readers should be cautious not to over-interpret the data. Patterns observed in the data provide some insight into menu planning practices that may influence the level of fat in school breakfasts but should not be interpreted as fully predictive. The percentage of calories from fat in the average meal served to students is influenced by the full array of menu offerings, as well as by students' selection patterns, rather than by a single item or group of items.

Notable differences between menus offered in the low-fat and higher-fat groups are summarized below:

- **Milk:** Schools in the low-fat group offered whole milk less often and 1% milk (both flavored and unflavored) more often than schools in the higher-fat group.
- **Fruit, Juice and Vegetables:** Schools in the low-fat group offered fresh fruit, canned fruit and potatoes more often than schools in the higher-fat group.
- **Breads/Bread Alternates:** Schools in the low-fat group offered pancakes and waffles, plain bread and rolls, muffins and crackers more often than schools in the higher-fat group. In contrast, schools in the higher-fat group offered higher-fat breads such as biscuits, cornbread and croissants more often than schools in the low-fat group.

Exhibit 4.11

Compared to Higher-Fat Breakfasts, Low-Fat Breakfasts Provided Comparable Amounts of Calories and Key Nutrients

	Standard/ Recommendation	Relative Amount of Fat in Average Breakfast, as Served[1]	
		Low	**Higher**
Mean Percentage of RDA			
Total Calories	25%	21%	22%
Protein	25%	45	49
Vitamin A	25%	35	33
Vitamin C	25%	80	74
Calcium	25%	38	39
Iron	25%	35	32
Mean Percentage of Calories from...			
Total Fat	≤30%	24.2%	34.1%
Saturated Fat	<10%	9.1	12.9
Carbohydrate	>55%[2]	63.9	52.8
Mean Amount			
Cholesterol (mg)	≤75[2]	41	62
Sodium (mg)	≤600[2]	569	700
Number of Schools (Unweighted)		549	255

[1] Low-fat is defined as no more than 30 percent of total calories from fat. Schools in this group met the SBP standard for percentage of calories from fat. All schools not included in the low-fat group are included in the higher-fat group.

[2] NRC recommendation, not SBP standard.

Source: Weighted nutrient analysis of menu and meal production data for one week between September 1998 and May 1999.

Exhibit 4.12

Schools That Served Low-Fat Breakfasts Tended to Offer Certain Foods More Often than Schools That Served Higher-Fat Breakfasts

	Relative Amount of Fat in Average Breakfast, as Served[1]	
	Low	Higher
	Percentage of Schools Offering Item at Least Once per Week	
Milk		
1% unflavored	58%	53%
1% flavored	49	44
2% unflavored	47	47
Whole unflavored	46	59
Skim unflavored[1]	26	30
Skim flavored[1]	11	11
2% flavored	6	10
Fruits, Juices, Vegetables		
Full-strength citrus juices	86	86
Full-strength non-citrus juices	70	75
Fresh fruit	33	24
Canned fruit	32	25
Potatoes (all types)	12	8
Grains/Breads (not part of a combination entree)		
Cold cereal	94	93
Pancakes, waffles, French toast	69	47
Donuts, Danish, other pastry	64	69
Bread, rolls, bagels, other plain breads	42	34
Muffins, sweet/quick breads, cereal bars	46	35
Buttered toast, bagels with cream cheese	36	40
Biscuits, cornbread, croissants	25	37
Crackers[2]	20	8
Hot cereal	12	19
Meats/Meat Alternates (not part of a combination entree)		
Sausage	31	43
Eggs	23	29
Yogurt	12	7
Lean meat/poultry/fish	11	13
Cheese	7	12
Peanut Butter	5	5

Exhibit 4.12
(continued)

	Relative Amount of Fat in Average Breakfast, as Served[1]	
	Low	Higher
	Percentage of Schools Offering Item at Least Once per Week	
Combination Entrees		
Breakfast sandwiches	45	49
Pizza (all types)	30	38
Sausage with pancake and similar products	19	22
Mexican-style entree	15	9
Condiments and Spreads[3]		
Nonfat/lowfat spreads	74	64
Higher-fat spreads	29	30
Nonfat/lowfat condiments	9	11
Number of Daily Menus (Unweighted)	2,683	1,239
Number of Schools (Unweighted)	549	255

[1] Low-fat is defined as no more than 30 percent of total calories from fat. Schools in this group met the SBP standard for percentage of calories from fat. All schools not included in the low-fat group are included in the higher-fat group.

[2] Generally graham crackers or saltines that could be coupled with peanut butter or cheese.

[3] Foods that do not contribute to satisfying the meal patterns for the traditional or enhanced food-based menu planning systems.

Note: See Exhibit E.6 for a detailed listing of items included in each group.

Source: Weighted tabulations of menu and meal production data for one week between September 1998 and May 1999.

- **Meats/Meat Alternates:** Schools in the higher-fat group offered sausage, eggs and cheese more often than schools in the low-fat group. Schools in the low-fat group offered yogurt more often than schools in the higher-fat group.

- **Combination Entrees:** Compared to schools in the low-fat group, schools in the higher-fat group offered most types of combination entrees somewhat more frequently.

Sources of Calories and Nutrients in SBP Breakfasts as Selected

To provide information on the food sources of calories and key nutrients in SBP breakfasts, the percentage contribution to the calorie and nutrient content of the average breakfast was computed for six major food groups: milk; fruit, vegetables and juice; grains and breads (not part of a combination entree); meat and meat alternates (not part of a combination entree); combination entrees; and other menu items (items not "counted" toward food-based meal patterns). These major food groups were expanded to 25 minor food groups. Results are shown in Exhibit 4.13 and major findings are summarized below.

Calories

The major source of calories in SBP breakfasts served in SY 1998-99 was grain and bread products, which provided 37 percent of total calories. Major contributors included donuts, Danish and other pastries; cold cereals; and pancakes, waffles and French toast. Milk was the second leading source of calories in school breakfasts, providing about one-quarter of the calories in an average breakfast. Fruit, juice and vegetables contributed 12 percent of breakfast calories and combination entrees contributed another 13 percent.

Carbohydrate

Grains and breads were also the leading source of carbohydrate in school breakfasts (41%). Leading carbohydrate contributors in this group included cold cereals and donuts, Danish and other pastries. Milk and, as a group, fruit, juice and vegetables each contributed about 20 percent of the carbohydrate in the average school breakfast. Within the category of fruit, juice and vegetables, most of the carbohydrate came from juice.

Total Fat

More than 35 percent of the fat in school breakfasts came from grain and bread products. Donuts, Danish and other pastries were the major contributors in this group (13%). Pancakes, waffles, and French toast; buttered bread and rolls; biscuits, cornbread and croissants; and muffins and sweet breads contributed smaller amounts of fat (4-5% each). Milk contributed 26 percent of the fat in the average breakfast and combination entrees contributed another 21 percent.

Exhibit 4.13

Sources of Calories and Nutrients in SBP Breakfasts As Served

Food Group/Food(s)	Calories	Protein	Carbohydrate	Fat	Saturated Fat	Sodium
	Percentage Contribution to Average Amount Served					
Milk	**25.9%**	**47.9%**	**21.1%**	**25.5%**	**42.4%**	**19.3%**
Whole milk	5.1	8.1	2.5	9.0	15.0	3.0
Lowfat/nonfat milk[1]	20.9	39.8	18.6	16.5	27.4	16.3
Fruits, Juices, Vegetables	**12.0**	**3.5**	**19.5**	**0.8**	**0.4**	**0.6**
Fruits or vegetables	2.6	0.6	4.4	0.3	0.2	0.1
Juice	9.4	2.8	15.1	0.5	0.2	0.4
Grains/Breads (not part of a combination entree)	**37.1**	**22.3**	**41.1**	**35.6**	**21.5**	**44.4**
Bread, rolls, bagels, other plain breads	3.2	3.3	4.0	1.0	0.6	4.5
Buttered toast, bagels with cream cheese	3.0	2.1	2.7	4.3	2.9	4.0
Biscuits, cornbread, croissants	2.9	1.8	2.6	4.1	2.6	5.9
Cold cereal	8.3	3.8	12.3	2.3	1.3	11.1
Hot cereal	0.5	0.4	0.5	0.3	0.2	0.7
Crackers	0.9	0.5	1.1	0.8	0.5	0.9
Donuts, Danish, other pastries	9.9	4.9	9.4	12.9	8.0	7.4
Muffins, sweet/quick breads	3.3	1.5	3.3	4.0	2.2	2.6
Pancakes, waffles, French toast	5.1	4.1	5.1	5.2	3.2	7.4
Meat/Meat Alternates (not part of a combination entree)	**4.8**	**9.0**	**1.0**	**10.8**	**10.7**	**8.2**
Eggs	1.0	2.1	0.1	2.2	1.8	1.3
Yogurt	0.5	0.6	0.6	0.1	0.2	0.2
Peanut butter	0.4	0.5	0.1	1.0	0.5	0.2
Sausage	1.9	3.6	0.1	5.1	5.1	3.3
Cheese	0.5	1.0	0.0	1.3	2.1	1.3
Other	0.5	1.3	0.1	1.1	0.9	2.0

Exhibit 4.13
(continued)

Food Group/Food(s)	Calories	Protein	Carbohydrate	Fat	Saturated Fat	Sodium
	Percentage Contribution to Average Amount Served					
Combination Entrees	**12.8%**	**16.0%**	**8.0%**	**21.2%**	**19.5%**	**23.1%**
Breakfast sandwiches	6.8	8.8	3.9	11.9	11.5	13.2
Other combination entrees	6.0	7.2	4.1	9.4	8.0	9.9
Other Menu Items[2]	**7.4**	**1.4**	**9.3**	**6.6**	**5.5**	**4.4**
Fruit drinks/ades	0.2	0.0	0.3	0.0	0.0	0.0
Lowfat/nonfat condiments and spreads	4.7	0.1	8.1	0.2	0.1	1.2
Higher-fat condiments and spreads	1.2	0.5	0.1	4.2	3.6	1.0
Other	1.3	0.7	0.9	2.3	1.8	2.1

Exhibit 4.13
(continued)

Food Group/Food(s)	Cholesterol	Vitamin A	Vitamin C	Calcium	Iron
	Percentage Contribution to Average Amount Served				
Milk	**28.8%**	**48.9%**	**5.6%**	**75.4%**	**6.5%**
Whole milk	11.0	4.8	0.9	12.8	0.5
Low-fat milk[1]	17.9	44.1	4.7	62.6	6.0
Fruits, Juices, Vegetables	**0.0**	**3.1**	**76.8**	**3.0**	**5.4**
Fruits or vegetables	0.0	1.2	6.0	0.6	1.4
Juice	0.0	1.9	70.8	2.4	4.1
Grains/Breads (not part of a combination entree)	**16.3**	**38.3**	**14.7**	**10.9**	**73.1**
Bread, rolls, bagels, other plain breads	0.1	0.0	0.0	1.1	5.9
Buttered toast, bagels with cream cheese	0.7	1.9	0.0	1.1	3.1
Biscuits, cornbread, croissants	0.2	0.4	0.1	1.3	2.9
Cold cereal	0.0	27.7	12.0	1.6	37.9
Hot cereal	0.0	0.3	0.0	0.1	0.7
Crackers	0.0	0.1	0.0	0.1	1.0
Donuts, Danish, other pastries	3.5	5.9	2.4	3.2	13.0
Muffins, sweet/quick breads	3.7	0.5	0.1	0.6	3.5
Pancakes, waffles, French toast	8.2	1.4	0.0	1.8	5.2
Meat/Meat Alternates (not part of a combination entree)	**28.9**	**2.7**	**0.4**	**3.0**	**2.6**
Eggs	20.0	1.9	0.0	0.7	0.9
Yogurt	0.2	0.1	0.1	0.9	0.1
Peanut butter	0.0	0.0	0.0	0.1	0.2
Sausage	5.6	0.1	0.1	0.2	0.9
Cheese	1.1	0.7	0.0	1.2	0.1
Other	1.6	0.0	0.1	0.0	0.4

Exhibit 4.13
(continued)

Food Group/Food(s)	Cholesterol	Vitamin A	Vitamin C	Calcium	Iron
	Percentage Contribution to Average Amount Served				
Combination Entrees	**24.4%**	**4.6%**	**0.6%**	**7.2%**	**10.9%**
Breakfast sandwiches	15.0	2.4	0.1	3.7	5.5
Other combination entrees	9.4	2.3	0.5	3.5	5.3
Other Menu Items[2]	**1.8**	**2.4**	**2.0**	**0.6**	**1.5**
Fruit drinks/ades	0.0	0.0	1.3	0.0	0.1
Lowfat/nonfat condiments and spreads	0.1	0.2	0.1	0.2	0.5
Higher-fat condiments and spreads	1.2	2.0	0.0	0.2	0.2
Other	0.5	0.1	0.5	0.2	0.7
Number of Daily Menus (Unweighted)			3,922		
Number of Schools (Unweighted)			804		

[1] Includes 1% and 2% milks.

[2] Foods that do not contribute to satisfying the meal patterns for the traditional or enhanced food-based menu planning systems.

Notes: See Exhibit E.6 for a detailed listing of items included in each group.

Columns may not sum to 100 percent because of rounding.

Saturated Fat

Forty-two percent of the saturated fat in school breakfasts came from milk. Grain and bread products contributed 22 percent of the saturated fat, primarily from donuts, Danish and other pastries. Combination entrees contributed 20 percent of the saturated fat in the average breakfast.

Sodium

Grain and bread products contributed more than 40 percent of the sodium in school breakfasts. Major contributors within this group included cold cereals; pancakes, waffles and French toast; and donuts, Danish and other pastries. Combination entrees contributed almost a quarter of the sodium in the average breakfast and milk contributed another 19 percent.

Cholesterol

Leading sources of cholesterol in the average breakfast, as served, included milk (29%), meat/meat alternates (29%), and combination entrees (24%). Breakfast sandwiches — which generally included eggs — and eggs offered on their own, contributed, respectively, 15 percent and 20 percent of the cholesterol in the average breakfast.

Vitamin A

Milk provided almost half of the vitamin A in the average school breakfast. Grain and bread products, primarily cold cereals, contributed 38 percent of the vitamin A.

Vitamin C

Fruit, juice and vegetables were the major source of vitamin C in school breakfasts (77%). The majority of this vitamin C was contributed by juice. Grain and bread products contributed 15 percent of the vitamin C in the average breakfast. Virtually all of the vitamin C from this group was contributed by cold cereals.

Calcium

Milk provided about three-quarters of the calcium in the average school breakfast, as served. Grain and bread products provided 11 percent of the calcium, with contributions widely dispersed across the various minor food groups in this category.

Iron

Almost three-quarters of the iron in the average breakfast came from grain and bread products. Cold cereals were the major contributor (38%); followed by donuts, Danish and other pastries (13%); plain bread, rolls and bagels (6%); and pancakes, waffles and French toast (5%). Combination entrees provided 11 percent of the iron in school breakfasts. Milk and the fruit/juice/vegetable groups each contributed about six percent of the total iron.

Chapter Five
Comparison of Weighted and Unweighted Nutrient Analyses

Current NSLP and SBP menu planning requirements and monitoring standards are built around use of a weighted nutrient analysis (although the CN Reauthorization Act of 1998 waived the requirement through SY 2003 for school districts that obtain a waiver). This chapter presents comparisons of weighted and unweighted analyses of the menu and meal production information provided by schools that participated in the SNDA-II study.[1] Data for school lunches are presented first, followed by data for school breakfasts.

There is a great deal of interest among both policy makers and school food service professionals in differences between the two approaches to analyzing the nutrient content of school meals. To reiterate, a *weighted* nutrient analysis incorporates information about student selection patterns and does not assume that every student takes one serving of every type of food offered. This approach provides a picture of the *average meal served* to or *selected* by students. In contrast, an *unweighted* nutrient analysis represents a simple average of all foods offered to students, assuming that students take a serving of each type of food offered to them. For schools using the food-based menu planning systems, this would include, for lunch, an average serving of: milk, entree, separate grain/bread (if offered), dessert or other additional item (if offered), and condiments, as well as two average servings of fruit, juice and/or vegetables. For schools using NSMP or ANSMP, this would include one average serving of milk, an average entree, and one or more average servings of side dishes, depending on how the daily menu is structured. An *unweighted* nutrient analysis provides a picture of the *average meal offered* to students.

The methodology used in the unweighted nutrient analysis was based on the approach used in the SNDA-I study and earlier studies of the NSLP and SBP. The basic algorithm is built around the food-based meal patterns, as described above (a detailed description of the methodology is included in Appendix E). To permit comparisons with data from SNDA-I (summarized in the next chapter), this methodology had to be used. Because the assumptions included in the methodology do not reflect how NSMP/ANSMP menus are structured and marketed to students, a separate analysis was completed in which the unweighted analysis for NSMP/ANSMP schools was modified to reflect the basic differences in menu structure discussed above. Incorporation of the revised unweighted analysis for NSMP/ANSMP schools had no material effect on the results.

Because the use of a modified approach to the unweighted analysis for NSMP/ANSMP schools had no effect on the findings but had a substantial potential for causing confusion for readers of this report (different unweighted analysis results would be presented in this chapter and the next (SNDA-I versus SNDA-II) chapter), a decision was made to use only one version of the unweighted analysis — the version that essentially replicated the SNDA-I methodology — in this report. The interested reader may

1 The meal production data are used only in the weighted analysis.

find supplementary exhibits that present results of the analyses that incorporated a modified unweighted analysis for NSMP/ANSMP schools in Appendices A (Exhibits A.14 – A.17) and B (Exhibits B.14 – B.17).

School Lunches

This section compares results of weighted and unweighted analyses of school lunches along two dimensions: overall means compared to NSLP standards and NRC recommendations and the percentage of schools considered to have met the various standards and recommendations.

Mean Nutrient Content Relative to RDAs

For both elementary and secondary school lunches, the unweighted nutrient analysis resulted in greater estimated RDA contributions than the weighted nutrient analysis (Exhibit 5.1). The size of the disparity between weighted and unweighted means was consistently greater for secondary school lunches. For both types of schools, differences between weighted and unweighted means were greatest for vitamins A and C and smallest for iron and protein. All of the differences noted were statistically significant.

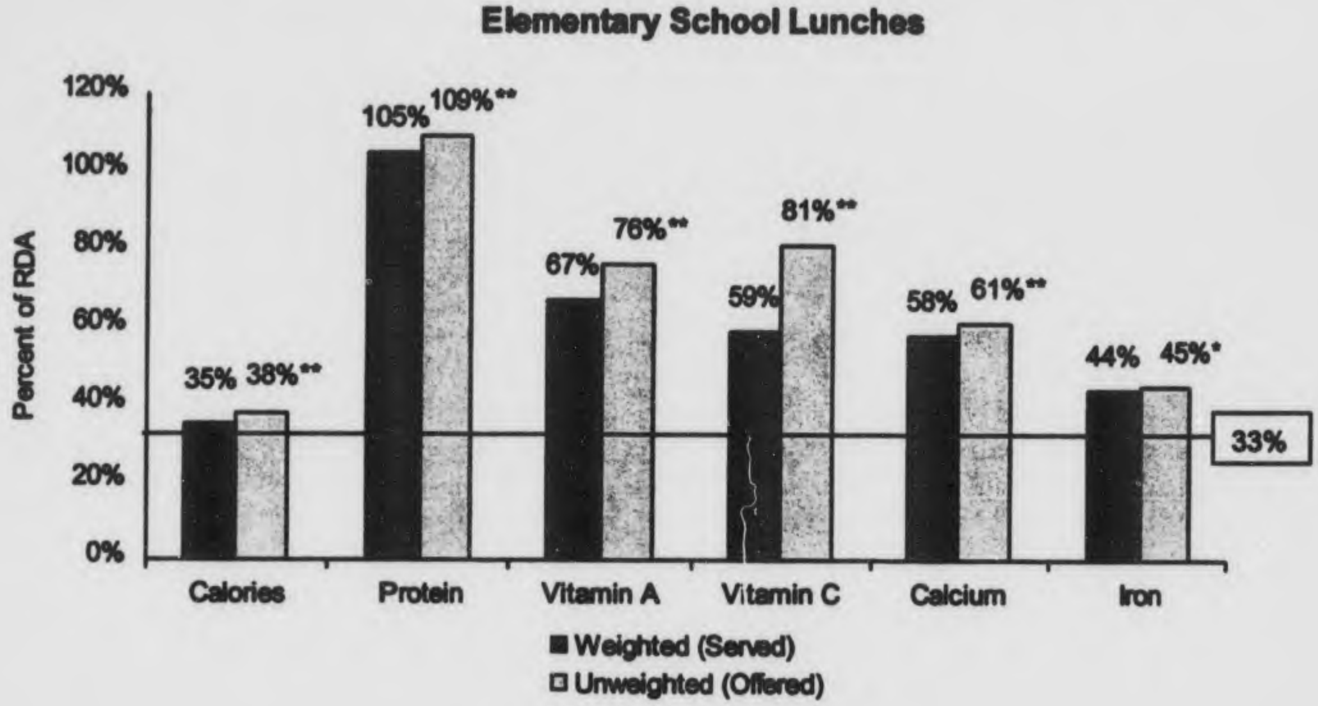
The finding that unweighted estimates of calorie and nutrient content tend to be greater than weighted estimates is consistent with differences between the two analytic methodologies. By definition, an unweighted analysis includes an average serving of every type of menu item offered, whereas a weighted analysis includes only foods actually served to students. Therefore, one would expect an unweighted analysis to produce greater mean estimates of calories and nutrients unless students consistently took at least one serving of each type of food offered to them. As reported in Chapter Three, the meal production data provided by cafeteria managers (and used in the weighted analysis) indicate that many students *did not* take a serving of each type of food offered to them at lunch.

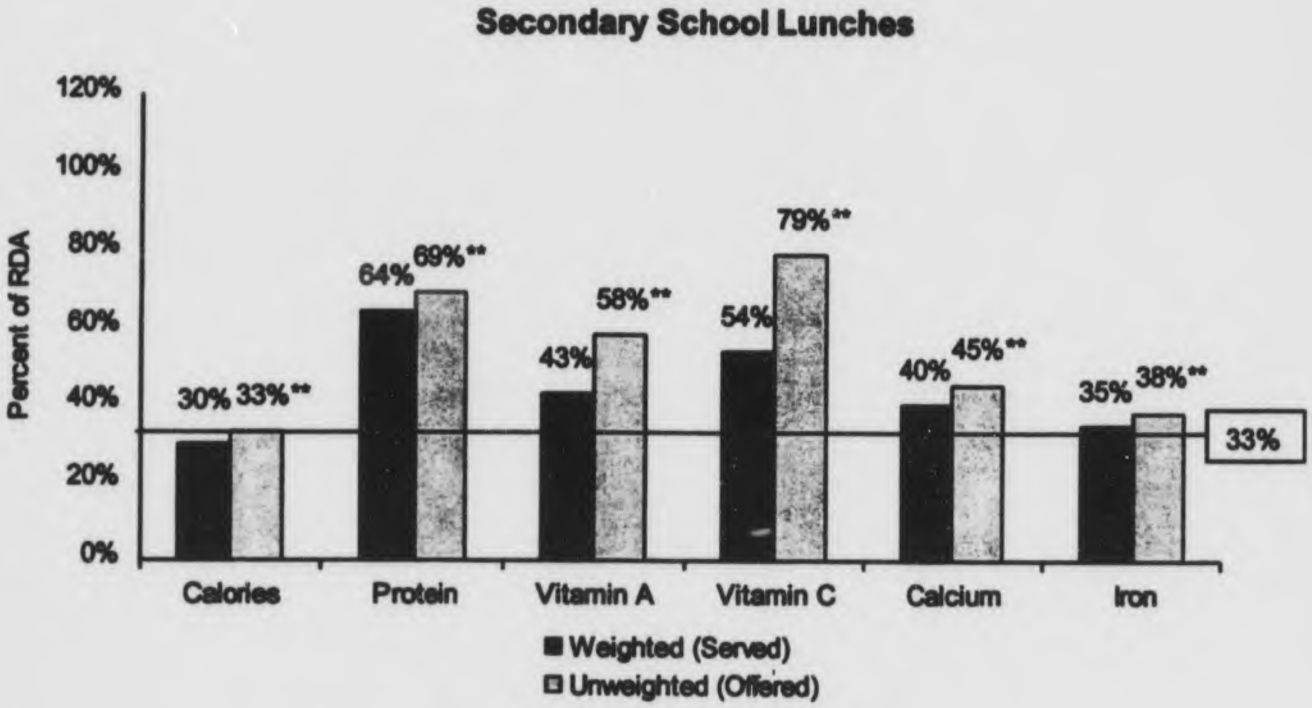
In addition, the fact that differences between weighted and unweighted estimates were greater for secondary school lunches than elementary school lunches suggests that secondary school students were more likely than elementary school students to omit one or more of the items offered. This is also consistent with data reported in Chapter Three.

While acknowledging numerical differences in results of the two analytic approaches, and the statistical significance of these differences, it is important to recognize that both methods led to virtually identical conclusions about whether school lunches, on average, met defined standards for calories and RDA nutrients. The conclusion differs only for calories in secondary school lunches. When a weighted analysis was used, the average secondary school lunch provided 30 percent of the RDA for calories. When an unweighted analysis was used, the average secondary school lunch met the NSLP standard of providing 33 percent of the RDA for calories.

Thus, whether the analysis is based on the average lunch served to/selected by students (weighted analysis) or the average lunch offered to students (unweighted analysis), the data indicate that, in SY 1998–99, the average school lunch met all of the established RDA standards except, when a weighted analysis is used, calories in secondary school lunches.

Exhibit 5.1 Estimates of Calorie and Nutrient Content of the Average Lunch Were Different for Weighted and Unweighted Analyses but Conclusions About the One-Third RDA Standard Were Similar





* Difference is statistically significant at the .01 level.

** Difference is statistically significant at the .001 level.

Percentage of Calories from Total Fat and Saturated Fat

For elementary school lunches, the two analyses resulted in virtually identical estimates of the percentage of calories provided by fat (Exhibit 5.2). Among secondary schools, the weighted analysis resulted in a slightly greater estimate of the percentage of calories from fat than the unweighted analysis (35% versus 34%). The difference between these two estimates was statistically significant.

Weighted and unweighted estimates of the percentage of calories provided by saturated fat were identical for elementary school lunches. For secondary school lunches, the estimate from the weighted analysis was slightly greater than the estimate from the unweighted analysis, however, both estimates rounded to 12 percent. This difference was also statistically significant.

Despite the statistical significance of the differences cited above, conclusions about whether school lunches met defined NSLP standards for fat and saturated fat were identical for the two analysis methods. Whether the analysis was based on the average lunch served to students (weighted analysis) or the average lunch offered to students (unweighted analysis), the data indicate that, in SY 1998–99, the average school lunch did not meet established NSLP standards for the percentage of calories from fat or saturated fat.

Cholesterol, Sodium and Carbohydrate Content

For both elementary and secondary school lunches, the unweighted analysis produced somewhat greater mean estimates of cholesterol and sodium content than the weighted analysis (Exhibit 5.3). In addition, the unweighted analysis of secondary school lunches produced a greater mean estimate of the percentage of calories from carbohydrate than the weighted analysis. For elementary school lunches, differences were statistically significant for cholesterol and sodium. For secondary school lunches, differences were statistically significant for all three measures.

Again, however, differences did not affect overall conclusions about whether the average school lunch offered (unweighted analysis) or served (weighted analysis) in SY 1998–99 met NRC recommendations. Both weighted and unweighted analyses found that school lunches met the NRC recommendation for cholesterol but did not meet NRC recommendations for sodium or the percentage of calories from carbohydrate.

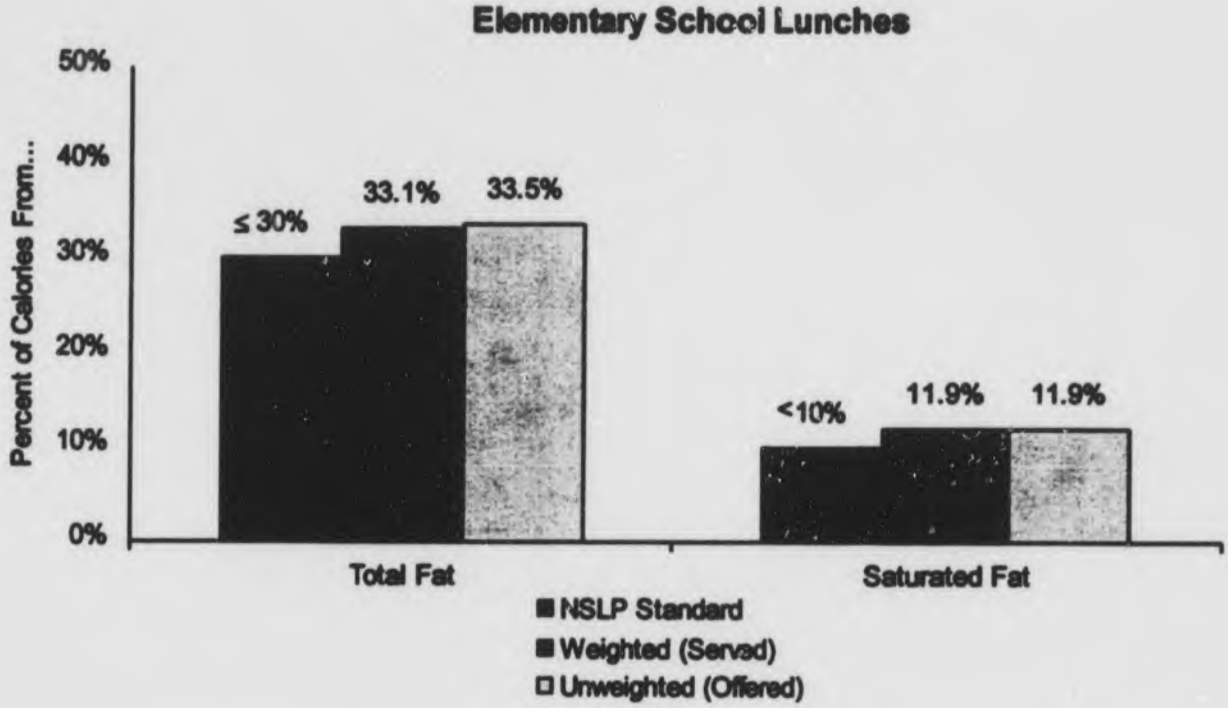
Percentage of Schools That Met Nutrient Standards and Recommendations

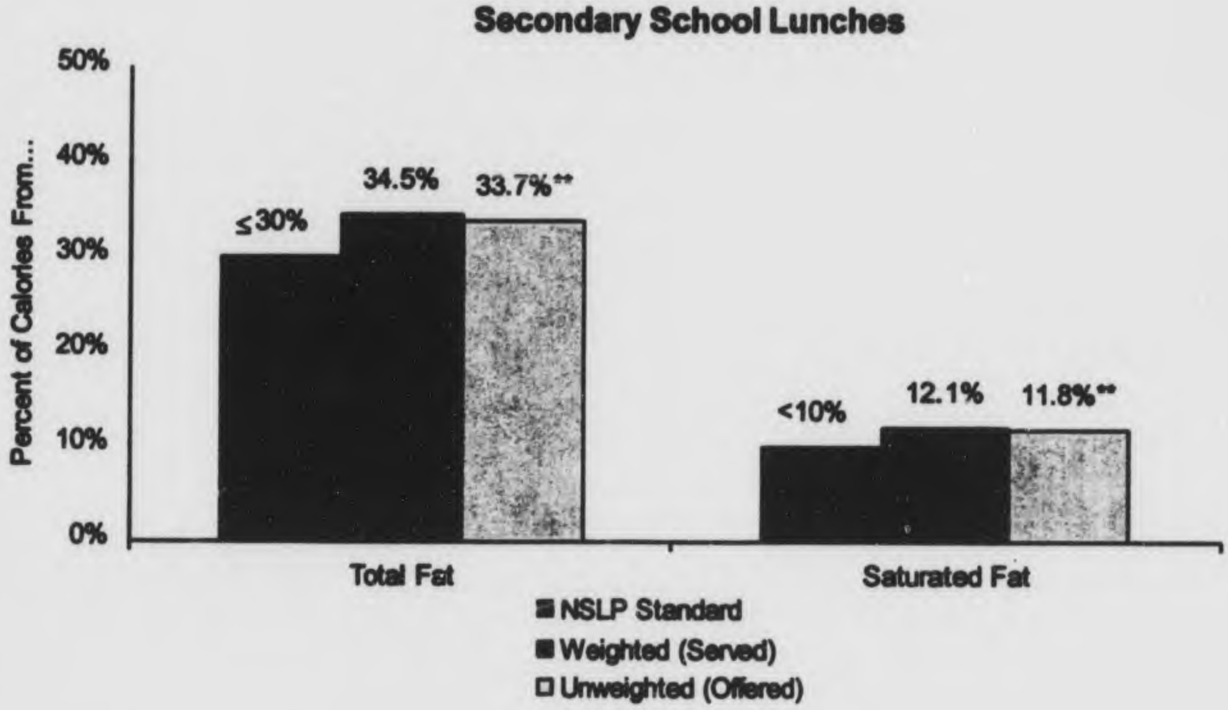
Another way of assessing differences between the two analysis methods is to compare the percentage of schools that each method would classify as having met the various NSLP standards and NRC recommendations. Looking at the data this way reveals that the choice of analytic approach can have a significant impact on whether or not an individual school meets a specific nutrition standard. This is particularly true for secondary schools.

NSLP Standards for Calories and Key Nutrients

Among elementary schools, the only measures for which the two analytic approaches yielded results that were significantly different (with regard to the percentage of schools classified as having met NSLP standards) were calories and vitamin C (Exhibit 5.4). When a weighted analysis was used, the percentage

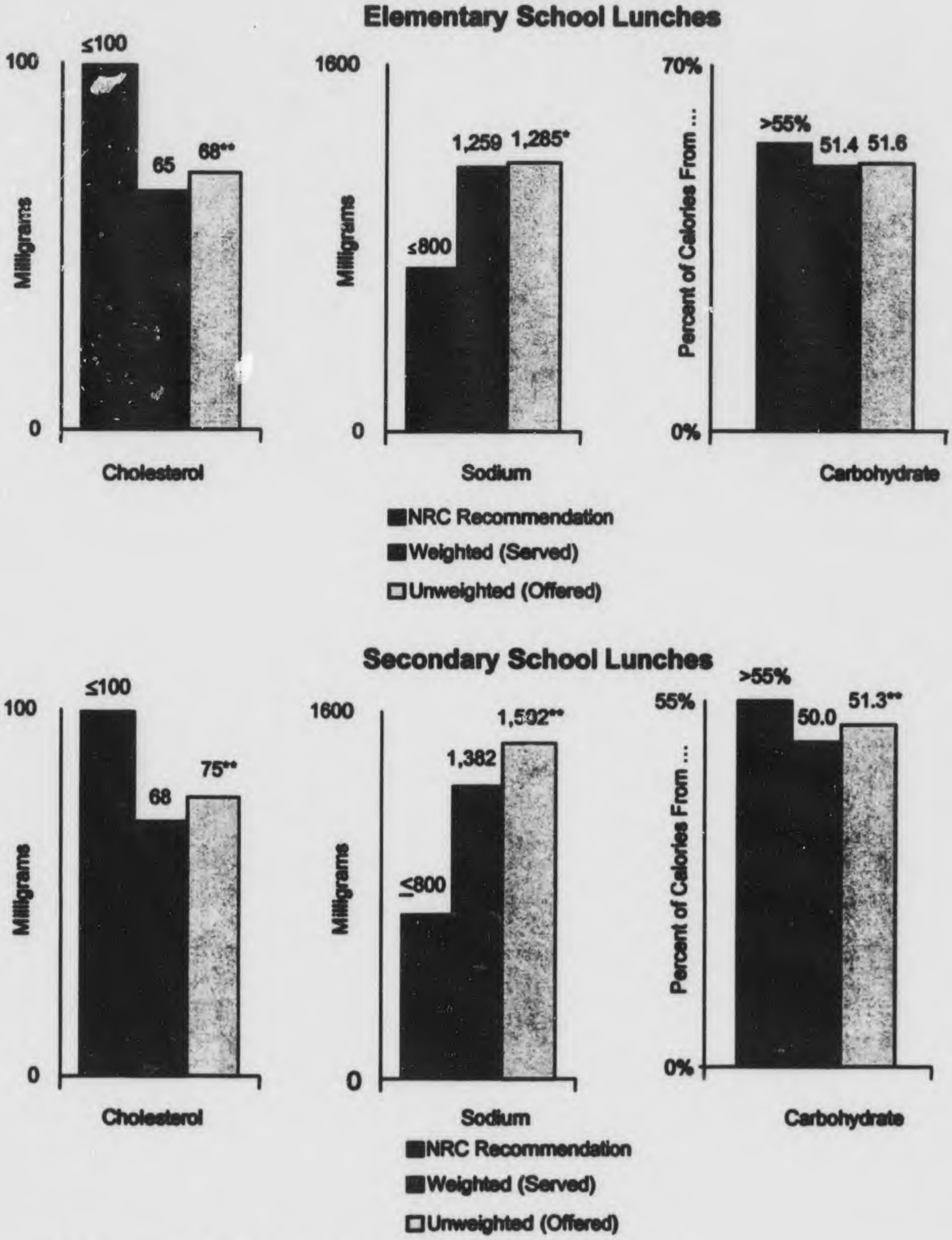
Exhibit 5.2 **Estimates of the Percentage of Calories from Fat and Saturated Fat in Lunches Were Similar for Weighted and Unweighted Analyses**





** Difference is statistically significant at the .001 level.

Exhibit 5.3 **Estimates of Cholesterol and Sodium Content Were Different for Weighted and Unweighted Analyses but Conclusions About Whether Lunches Met NRC Recommendations Were Identical**



* Difference is statistically significant at the .01 level

** Difference is statistically significant at the .001 level.

Exhibit 5.4

Percentage of Schools That Satisfied NSLP Standards and NRC Recommendations for Lunch Based on Weighted and Unweighted Analyses
Elementary Schools

Standard/Recommendation	Weighted (Served)	Unweighted (Offered)	Percent Difference (Weighted vs. Unweighted)
	Percentage of Schools		
Defined NSLP Standards			
Calories	68%	82%	-17%**
Protein	100	100	0
Vitamin A	98	99	-1
Vitamin C	86	94	-9**
Calcium	100	100	0
Iron	93	96	-3
Percentage of Calories from Fat	21	18	+17
Percentage of Calories from Saturated Fat	15	15	0
NRC Recommendations			
Percentage of Calories from Carbohydrate	18	20	-10
Cholesterol	99	95	+4
Sodium	1	1	0
Number of Schools (Unweighted)	398		

** Difference between weighted and unweighted analyses is statistically significant at the .001 level.

Source: Menu and meal production data for one week between September 1998 and May 1999.

of elementary schools that met the one-third RDA standard for calories was 17 percent lower than when a weighted analysis was used (68% versus 82%). The percentage of elementary schools that met the RDA standard for vitamin C was nine percent lower (86% versus 94%) when a weighted analysis was used.

The disparity between results of weighted and unweighted analyses was greater among secondary schools (Exhibit 5.5). Statistically significant differences were noted for calories and all RDA nutrients except protein. In all cases, the unweighted analysis classified a larger percentage of schools as having met the standard than did the weighted analysis. The relative size of the differences for key nutrients ranged from 14 percent (calcium) to 28 percent (vitamin A). Results were most divergent for calories. Using an unweighted analysis, 45 percent of secondary schools met the one-third RDA standard. Using a weighted analysis, the percentage of schools meeting the standard was more than 50 percent lower, at 20 percent.

NSLP Standards for the Percentage of Calories from Fat and Saturated Fat
For elementary schools, there were no statistically significant differences between weighted and unweighted analyses in conclusions about the percentage of schools that met NSLP standards for the percentage of calories from fat or saturated fat (Exhibit 5.4). Among secondary schools, however, differences between results of weighted and unweighted analyses were statistically significant for the percentage of schools judged to have met the standard for calories from fat (Exhibit 5.5). The difference favored the unweighted analysis. That is, the unweighted analysis was more likely than the weighted analysis to classify a school as having met the standard of providing no more than 30 percent of calories from fat. Using a weighted analysis, the percentage of secondary schools tnat met the NSLP standard for calories from fat was 33 percent lower than when an unweighted analysis was used (14% versus 21%)

NRC Recommendations for Cholesterol, Sodium and Calories from Carbohydrate
For both elementary schools and secondary schools, results of the two analyses were identical for sodium (Exhibit 5.4 and 5.5). Virtually no schools met the standard for sodium, regardless of the analytic approach used. Among elementary schools, there were no significant differences between weighted and unweighted analyses in the percentage of schools deemed to have met NRC recommendations for cholesterol or the percentage of calories from carbohydrate. Among secondary schools, however, differences were statistically significant for both of these measures. The result for calories from carbohydrate followed expectations — more schools were judged to have met the recommendation when an unweighted analysis was used. The result for cholesterol was different from the pattern noted for all other nutrients, however. The percentage of schools deemed to have met the NRC recommendation for cholesterol was greater (rather than smaller) when a weighted analysis was used.

Factors Influencing Estimates of Relative Fat Content

Exploratory analyses were carried out to identify factors that may contribute to differences in weighted and unweighted estimates of relative fat content — a key indicator of nutritional quality. Twenty-five individual daily menus were selected at random from those with the most widely divergent results for weighted and unweighted analyses. The menus and associated meal production data were examined to determine whether specific types of situations (e.g., types of food offered or student selection patterns) were associated with greater estimates of the percentage of calories provided by fat for either one analytic approach or the other.

Exhibit 5.5

Percentage of Schools That Satisfied NSLP Standards and NRC Recommendations for Lunch Based on Weighted and Unweighted Analyses
Secondary Schools

Standard/Recommendation	Weighted (Served)	Unweighted (Offered)	Percent Difference (Weighted vs. Unweighted)
	Percentage of Schools		
Defined NSLP Standards			
Calories	20%	45%	-56%**
Protein	100	100	0
Vitamin A	65	90	-28**
Vitamin C	79	94	-16**
Calcium	86	100	-14**
Iron	60	71	-15**
Percentage of Calories from Fat	14	21	-33**
Percentage of Calories from Saturated Fat	13	16	-19
NRC Recommendations			
Percentage of Calories from Carbohydrate	14	22	-36**
Cholesterol	96	90	+7**
Sodium	<1	<1	0
Number of Schools (Unweighted)	677		

** Difference between weighted and unweighted analyses is statistically significant at the .001 level.

Source: Menu and meal production data for one week between September 1998 and May 1999.

Menus that resulted in *greater estimates of the percentage of calories from fat when a weighted analysis was used* had one or more of the characteristics identified below. In the discussions that follow, an attempt has been made to explain why these characteristics would tend to contribute to greater estimates of the percentage of calories from fat when the nutrient analysis is weighted and lower estimates when the analysis is unweighted.

- *Availability of separate grain/bread items or other high-carbohydrate items (e.g., fruit drinks) that the majority of students did not select*. An unweighted analysis would assume that all meals included an average of serving of these foods, thereby increasing calories from carbohydrate and diluting the percentage of calories provided by fat.

- *A minority of students, often 50 percent or fewer, selected milk of any kind (secondary school menus only)*. An unweighted analysis would assume that all meals included an average of serving of milk. Milk, by virtue of its carbohydrate content, tends to increase calories from carbohydrate and dilute the percentage of calories provided by fat.

- *A majority of students selected the highest-fat entree options.* The fat content of the average entree included in an unweighted analysis would be diluted (tend to be lower than the cumulative fat contribution of the entrees considered in the weighted analysis) because it gives equal consideration to the high-fat and low-fat entrees, even though the latter were actually selected by few students.

- *French fries were offered as one vegetable option and were selected by a majority of students*. In an unweighted analysis, the fat contribution of the French fries would be diluted because the French fries would be averaged in with all other available fruits, juices and vegetables which, on the whole, tend to be substantially lower in fat than French fries.

In contrast, menus that resulted in *greater estimates of the percentage of calories from fat when an unweighted analysis was used* had one or more of the following characteristics:

- *Salad dressing was offered for a side salad and/or entree salad that was actually selected by a minority of students*. If few students select the salad, the fat contributed by the salad dressing has very little effect on the results of a weighted nutrient analysis. In an unweighted analysis, however, salads are averaged in with all other options (fruits and vegetables in the case of side salads and entrees in the case of entree salads) and it is assumed that salad dressing is served with each salad.

- *The highest-fat entree option(s) were selected by a minority of students*. This is the reverse of the entree selection issue discussed above (where students tended to select the highest-fat entree options more (rather than less) often than lower-fat options). In this case, the fat content of the average entree considered in the unweighted analysis will tend to be greater than the cumulative fat contribution of the entrees considered in the weighted analysis.

- *Higher-fat milk options were offered (e.g., whole milk or 2% milk), but were selected by a minority of students*. If higher-fat milks are offered but rarely selected, the average milk considered in the unweighted analysis will tend to be higher in fat (because all milks are considered equally) than the cumulative contribution of milks considered in the weighted analysis.

- *A high-fat condiment was offered with a non-entree menu item that was selected by a minority of students (e.g., butter with a roll).* The effect of this situation is similar to the salad and salad dressing situation discussed above. The unweighted analysis will assume that every meal included the roll, *with butter* (or, if more than one additional grain/bread item is offered, an average of the roll with butter and all other options). In contrast, the butter will contribute to the weighted analysis only in relation to the number of meals in which it was included.

- *A high-fat item offered as an optional additional item (e.g., clam chowder, macaroni salad) was actually selected by a minority of students.* The effect of this situation is similar to that described for salads with dressing and rolls with butter.

School Breakfasts

This section compares results of weighted and unweighted analyses of school breakfasts along the same two dimensions used in the preceding analysis of school lunches: overall means compared to SBP standards and NRC recommendations and the percentage of schools considered to have met the various standards and recommendations.

Mean Nutrient Content Relative to RDAs

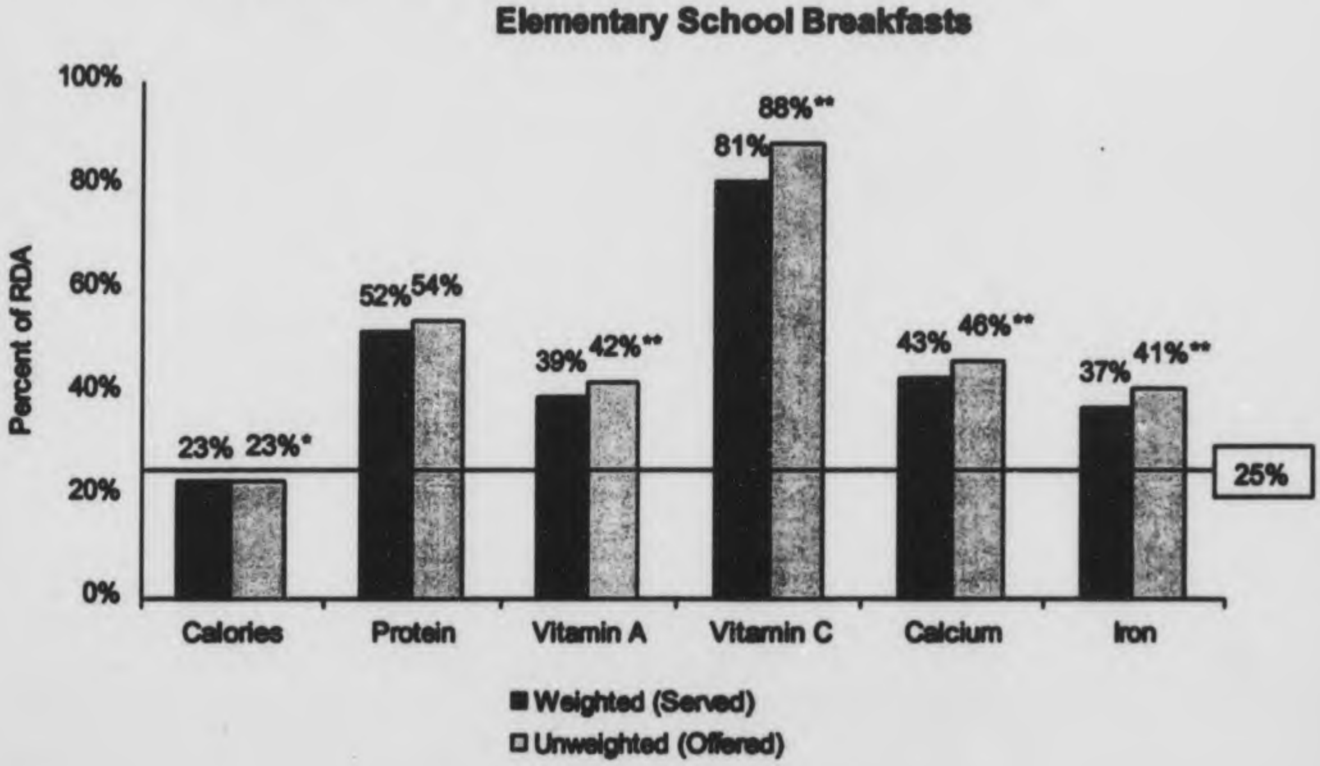
For most nutrients, the unweighted nutrient analysis of breakfast menus resulted in significantly greater estimated contributions to the RDAs than the weighted nutrient analysis (Exhibit 5.6). Differences between weighted and unweighted means were greatest for vitamin A (with the weighted mean for secondary schools just meeting the one-fourth RDA standard) and iron and smallest for protein and calories. (The difference for calories was 22.6% [weighted] versus 23.4% [unweighted]).

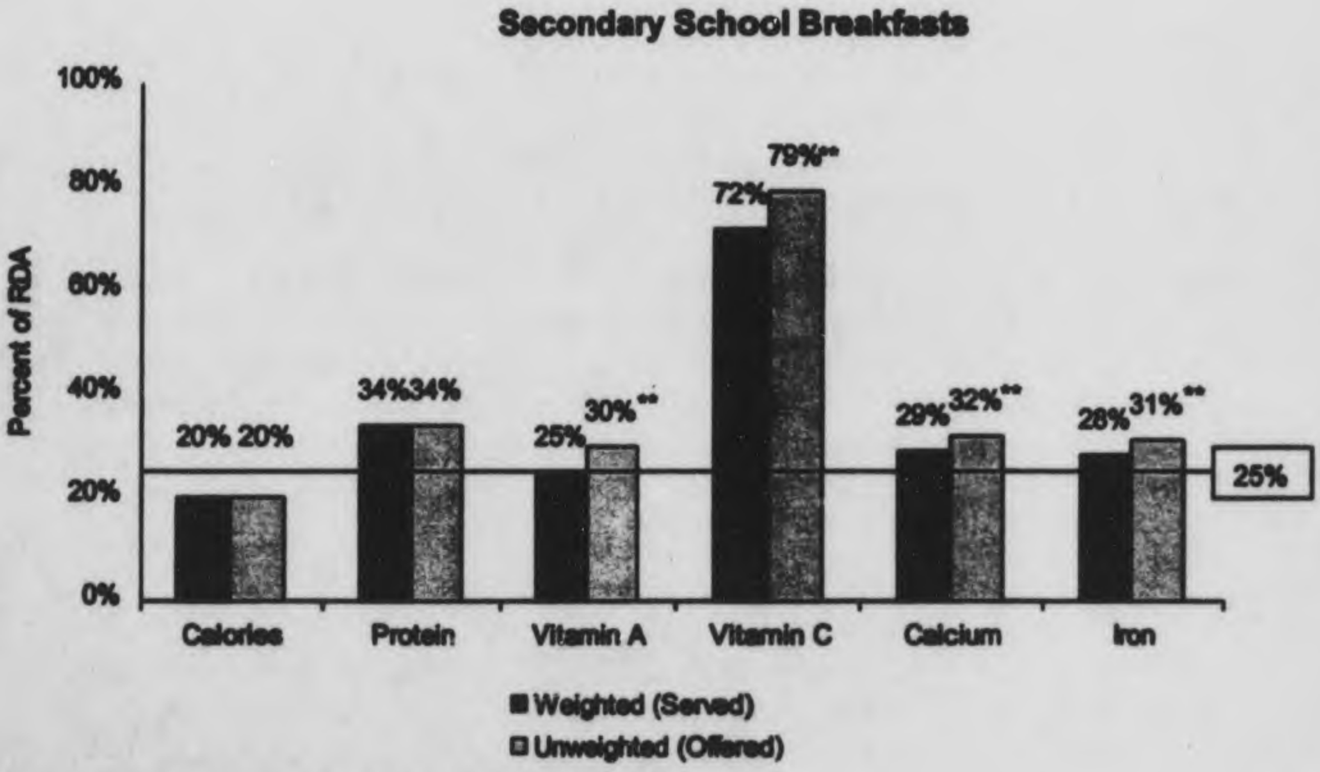
With the exception of calories, where estimated means for both analyses fell short of the one-fourth RDA standard, means for both weighted and unweighted analyses met or exceeded the SBP standard. Thus, general conclusions about the importance of differences between the two analysis methods are similar to those reached for the comparison of weighted and unweighted analyses of lunch menus. Whether the analysis is based on the average breakfast served to students (weighted analysis) or the average breakfast offered (unweighted analysis), the data indicate that, in SY 1998–99, the average school breakfast met all of the established RDA standards except for calories.

Percentage of Calories from Total Fat and Saturated Fat

For both elementary school and secondary school breakfasts, the weighted analysis resulted in a slightly greater estimate of the percentage of calories provided by total fat and by saturated fat than the unweighted analysis (Exhibit 5.7). However, the only difference that was statistically significant and

Exhibit 5.6 **Estimates of Calorie and Nutrient Content of the Average Breakfast Were Different for Weighted and Unweighted Analyses but Conclusions About the One-Fourth RDA Standard Were Similar**



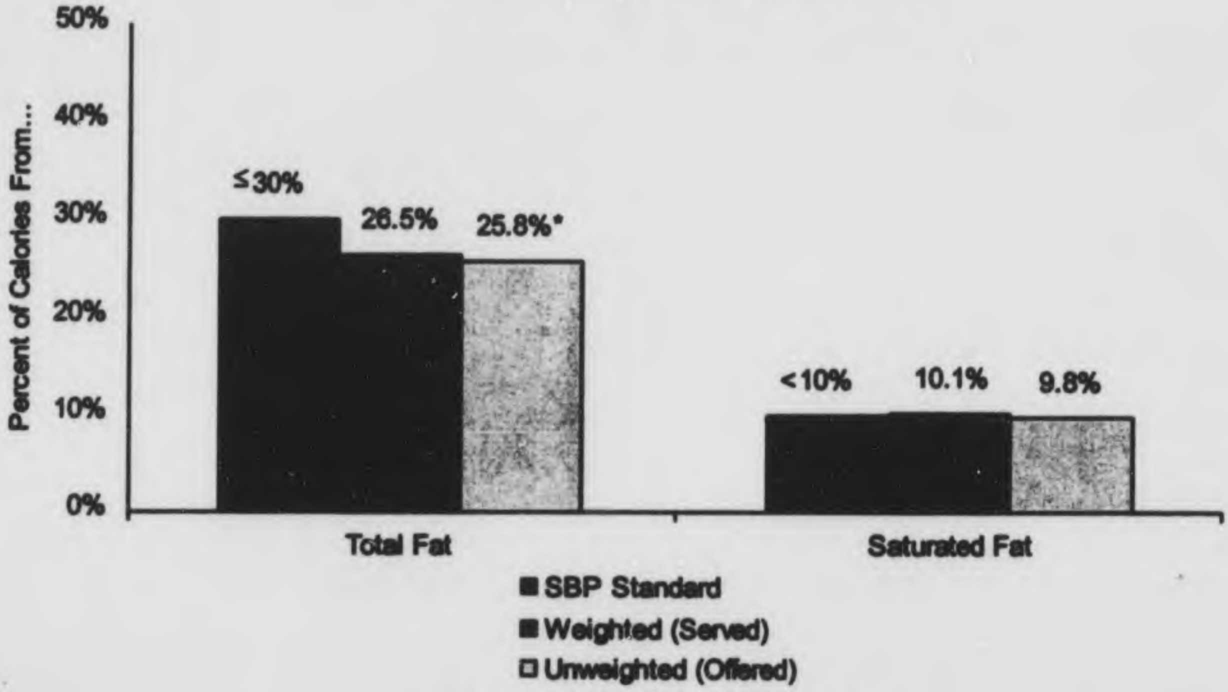


* Difference is statistically significant at the .01 level.

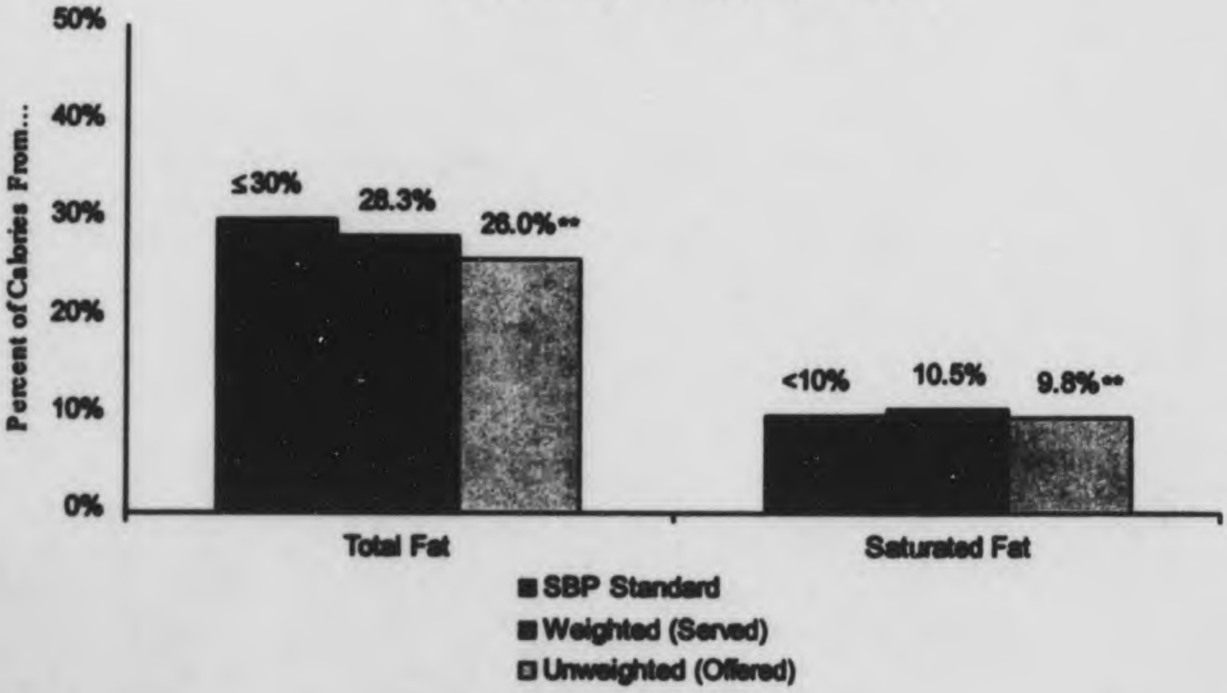
** Difference is statistically significant at the .001 level.

Exhibit 5.7 Estimates of the Percentage of Calories from Fat and Saturated Fat in Breakfasts Were Similar for Weighted and Unweighted Analyses

Elementary School Breakfasts



Secondary School Breakfasts



* Difference is statistically significant at the .01 level.

** Difference is statistically significant at the .001 level.

affected conclusions about whether SBP meals met program standards was the difference in the percentage of calories provided by saturated fat in secondary school breakfasts. When a weighted analysis was used, the mean percentage of calories from saturated fat in secondary school breakfasts just exceeded the program standard (10.5% of calories compared to the standard of less than 10%). When an unweighted analysis was used, the mean was just below 10 percent (9.8%) and was therefore consistent with the standard.

Cholesterol, Sodium and Carbohydrate Content

The weighted analysis produced greater mean estimates of cholesterol and sodium content than the unweighted analysis (Exhibit 5.8). In contrast, the unweighted analysis resulted in greater mean estimates of the percentage of calories provided by carbohydrate. With the exception of cholesterol and sodium for elementary school breakfasts, all of the differences were statistically significant. However, most did not affect conclusions about whether the average school breakfast met NRC recommendations. Regardless of the analysis method used, the average school breakfast in SY 1998–99 met the NRC recommendation for cholesterol (equivalent to one-fourth of the recommended maximum daily intake) as well as the NRC recommendation for the percentage of calories from carbohydrate. With regard to sodium content, both analyses found that breakfasts in elementary schools satisfied the NRC recommendation. Secondary school breakfasts exceeded the recommendation when a weighted analysis was used but essentially met the recommendation when an unweighted analysis was used.

Percentage of Schools That Met Nutrient Standards and Recommendations

Exhibits 5.9 and 5.10 summarize the percentage of elementary and secondary schools that met SBP standards and NRC recommendations when weighted and unweighted analyses were used. The following sections discuss results for the various nutrition standards and recommendations examined in this report.

SBP Standards for Calories and Key Nutrients

Among elementary schools, differences between the two analysis methods in the percentage of schools considered to have met SBP standards for calories and RDA nutrients were apparent but none were statistically significant. Among secondary schools, differences were statistically significant for calories and all RDA nutrients except Vitamin C. With the exception of calories, the unweighted analysis was more likely than the weighted analysis to classify a school as having met the one-fourth RDA standard.

SBP Standards for the Percentage of Calories from Fat and Saturated Fat

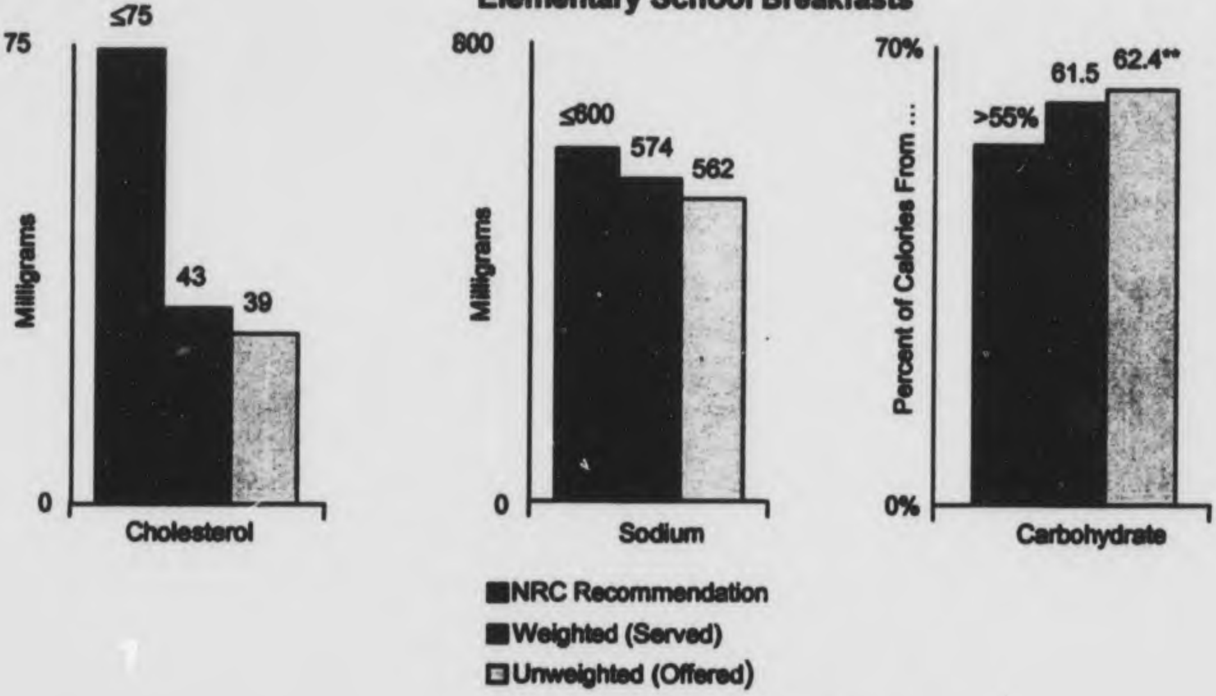
No significant differences were observed for elementary schools (Exhibit 5.9), but significant differences were observed for secondary schools (Exhibit 5.10). Specifically, the unweighted analysis classified significantly more secondary schools as having met SBP standards for calories from fat and calories from saturated fat than did the weighted analysis. Compared to results of the unweighted analysis, the weighted analysis considered 15-16 percent fewer secondary schools to be in line with the standards for calories from fat and saturated fat.

NRC Recommendations for Cholesterol, Sodium and Calories from Carbohydrate

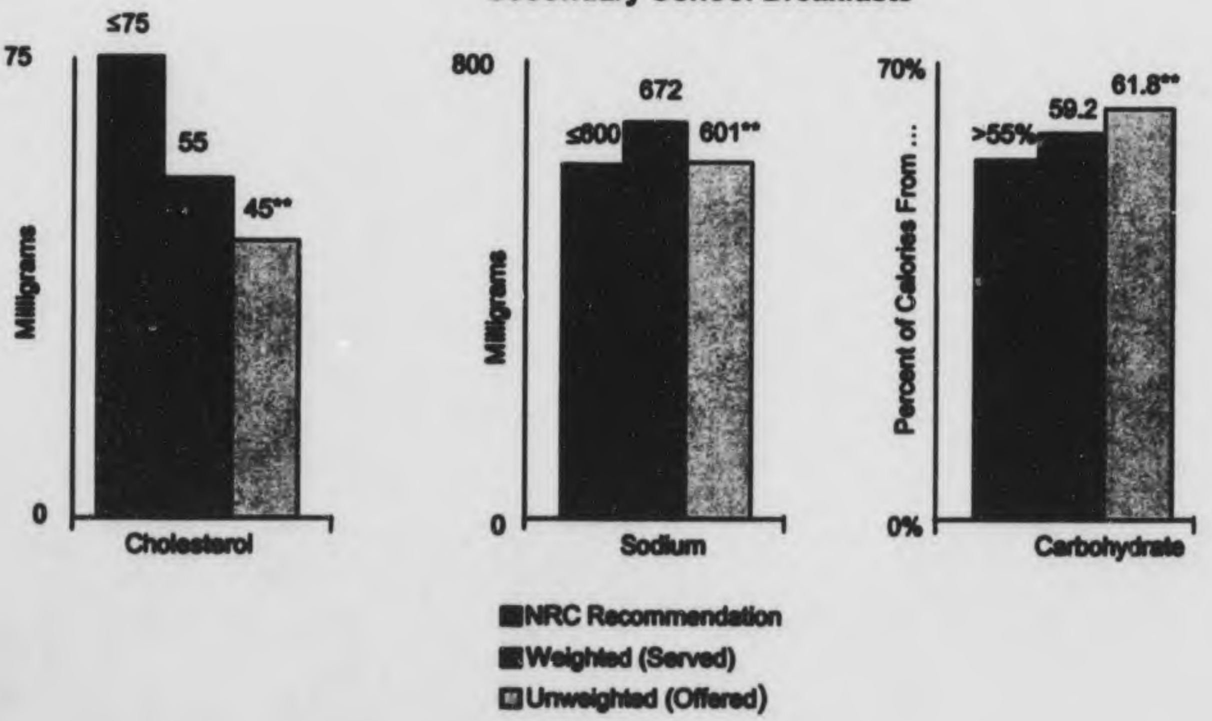
In comparison to the unweighted analysis, the weighted analysis classified significantly fewer schools as having met NRC recommendations for cholesterol and the percentage of calories from carbohydrate (Exhibits 5.9 and 5.10). This was true for both elementary schools and secondary schools, but the

Exhibit 5.8 **Estimates of Cholesterol and Sodium Content Were Different for Weighted and Unweighted Analyses but Conclusions About Whether Breakfasts Met NRC Recommendations Were Generally Similar**

Elementary School Breakfasts



Secondary School Breakfasts



** Difference is statistically significant at the .001 level.

Exhibit 5.9

Percentage of Schools That Satisfied SBP Standards and NRC Recommendations for Breakfast Based on Weighted and Unweighted Analyses
Elementary Schools

Standard/Recommendation	Weighted (Served)	Unweighted (Offered)	Percent Difference (Weighted vs. Unweighted)
	Percentage of Schools		
Defined SBP Standards			
Calories	22%	24%	-8%
Protein	100	100	0
Vitamin A	95	99	-4
Vitamin C	98	98	0
Calcium	99	100	-1
Iron	93	90	+3
Percentage of Calories from Fat	75	79	-5
Percentage of Calories from Saturated Fat	54	60	-10
NRC Recommendations			
Percentage of Calories from Carbohydrate	82	90	-9*
Cholesterol	90	96	-6**
Sodium	63	69	-9
Number of Schools (Unweighted)	317		

* Difference between weighted and unweighted analyses is statistically significant at the .01 level.

** Difference between weighted and unweighted analyses is statistically significant at the .001 level.

Source: Menu and meal production data for one week between September 1998 and May 1999.

Exhibit 5.10

Percentage of Schools That Satisfied SBP Standards and NRC Recommendations for Breakfast Based on Weighted and Unweighted Analyses
Secondary Schools

Standard/Recommendation	Weighted (Served)	Unweighted (Offered)	Percent Difference (Weighted vs. Unweighted)
	Percentage of Schools		
Defined SBP Standards			
Calories	8%	3%	+167%**
Protein	95	100	-5**
Vitamin A	48	72	-33**
Vitamin C	95	99	-4
Calcium	78	100	-22**
Iron	57	68	-16*
Percentage of Calories from Fat	64	76	-16**
Percentage of Calories from Saturated Fat	46	54	-15*
NRC Recommendations			
Percentage of Calories from Carbohydrate	72	88	-18**
Cholesterol	76	91	-16**
Sodium	42	57	-26**
Number of Schools (Unweighted)	487		

* Difference between weighted and unweighted analyses is statistically significant at the .01 level.

** Difference between weighted and unweighted analyses is statistically significant at the .001 level.

Source: Menu and meal production data for one week between September 1998 and May 1999.

difference was most pronounced among secondary schools. In addition, among secondary schools, significantly fewer schools met the NRC recommendation for sodium when a weighted analysis was used.

Factors Influencing Estimates of Relative Fat Content

Exploratory analyses were carried out to identify factors that may contribute to differences in conclusions about relative fat content when weighted and unweighted analyses are used. Twenty-five individual daily menus were selected at random from those with the most widely divergent results for weighted and unweighted analyses and menus and meal production data were examined. Observations made during this review and potential impacts on weighted and unweighted nutrient analyses are summarized below.

Menus that resulted in *greater estimates of the percentage of calories from fat when a weighted analysis was used* had one or more of the following characteristics in common:

- *Most students selected the highest-fat breakfast option(s).* Most often the contrast between options was stark (e.g., breakfast sausage or a breakfast sandwich versus cold cereals). The impact of this stark a difference is obvious. If a majority of students select the highest-fat breakfast option(s), the mean fat content is likely to be higher under a weighted analysis than an unweighted analysis. This is especially true when the low-fat options are very low in fat (e.g., hot or cold cereals, plain breads).

- *Whole milk was offered and selected by a majority of students.* Given that the array of foods offered for breakfast is limited in comparison to lunch, milk tends to have more influence on breakfast analyses. If whole milk is available and selected most often, the contribution of the fat in the whole milk to the overall nutrient average will be greater for the weighted analysis than the unweighted analysis (which will consider, equally, all other — and lower-fat — milk choices).

Menus that resulted in *greater estimates of the percentage of calories from fat when an unweighted analysis was used* had one or more of the following characteristics:

- *A minority of students selected the highest-fat menu option(s) (e.g., cream cheese, peanut butter, pastries).* This is the converse of the situation described above, where a majority of students selected the highest-fat options. Situations where students tend toward the lower-fat options lead to more favorable results under a weighted analysis. This is true because the unweighted analysis weights all available options equally and assumes that all optional items (e.g., cream cheese) are taken.

- *Whole milk was offered but was selected by a minority of students.* This is the converse of the milk situation described above. If whole milk is offered but not frequently selected, the contribution of the fat in the whole milk to the nutrient analysis will always be greater in an unweighted analysis.

Chapter Six
Changes in Nutrient Content of School Meals Offered Since SY 1991–92

This chapter compares the nutrient content of school meals offered in SY 1998–99 to those offered in SY 1991–92, when the last national study of school meals programs (the first *School Nutrition Dietary Assessment Study* (SNDA-I)) was completed. Differences noted between SNDA-I (SY 1991–92) and SNDA-II (SY 1998–99) can not be attributed to any one factor. Factors that may contribute to observed differences include changes in the food supply over time (e.g., the introduction of new products and changes in product formulations in both USDA commodity foods and foods available in the quantity food service market); as well as changes in menu planning, food purchasing, and food preparation practices of school food service personnel. Differences in data collection methodology (data for all schools in SNDA-II were collected via a mail survey while data for more than half of the SNDA-I schools were collected on site) and/or in the nutrient databases used in the two studies may also contribute to the observed differences.[1,2] Every precaution was taken to minimize the potential influence of differences in data collection methodology and analysis.

Overview of the Analysis

The data presented in this chapter are based on *unweighted* nutrient analyses of lunch and breakfast menus. An unweighted analysis was used because SNDA-I was based on an unweighted nutrient analysis and did not collect the information needed to complete a weighted analysis. Thus, the only way to compare SNDA-I and SNDA-II data was to re-analyze the SNDA-II data using an unweighted analysis.

As noted in the preceding chapter, an unweighted analysis is based solely on the foods *offered* to students. It does not take into consideration the number and types of foods actually included in the meals served to students. As such, an unweighted analysis provides a picture of the *average meal offered* to students. At the time the SNDA-I study was completed, this was the standard approach used to evaluate the nutrient content of school meals.

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1 For nutrient analysis, both studies essentially used USDA's standard reference nutrient database (the most current version available at each point in time), supplemented with information on commercial products used in school food service. In SNDA-I, the Nutrition Data System (NDS) software was used to enter data on foods and portions offered. However, for purposes of the nutrient analysis, NDS entries were linked to items in USDA's standard reference database. For commercial products not in the database, a special NDS recipe calculation function was used, in conjunction with food product nutrition information, to create nutrient values. The nutrient data base used in SNDA-II (the third release of the Child Nutrition data base (CN-3) developed for NSMP software) was developed using USDA's standard reference database. Commercial products not included in the database were added using product nutrition information.

2 Another potential source of differences between the two data sets is change over time in database values for the same food(s) because of improved or enhanced analytic techniques (e.g., incorporation of updated data on nutrient X or nutrient Y). Given the limited and basic set of nutrients examined in this analysis, however, it is unlikely that this source contributed substantially to the differences observed.

In SNDA-I, the traditional meal pattern provided the framework for the unweighted analysis. The nutrient content of the average lunch offered in each school was determined by summing the nutrients in an average serving of milk; two average servings of fruit/vegetables; an average entree; an average additional grain/bread (if offered); an average dessert or other non-creditable menu item (if offered); and an average serving of condiments. Non-creditable items did not "count" toward satisfying any of the component requirements of the traditional meal pattern.

To obtain a basis for comparison, SNDA-II data were reanalyzed, following the analytic approach outlined above, to produce unweighted estimates of the average nutrient content of school meals. An exception was made to account for the fact that, in SY 1998–99, many schools encouraged students to take more than two fruit/vegetable servings. If the meal production data provided for the weighted analysis indicated that, on average, students took more than two servings of fruit and/or vegetables, the algorithm used to determine the nutrients in the average lunch was adjusted to include three or, in rare cases, four servings of fruit/vegetables.[3] A detailed description of the methodology used in the unweighted analysis is included in Appendix E.

Finally, because SNDA-II was limited to public schools, SNDA-I data were reanalyzed with the sample restricted to public schools. Data for middle schools and high schools were combined to produce estimates for secondary schools.

Average Nutrient Content of Lunches Offered in Public Schools: SY 1998–99 and SY 1991–92

This section presents data on the average nutrient content of lunches offered at the two points in time. For calories and RDA nutrients, exhibits present actual means rather than the percentage of the RDA provided. This is done because SNDA-I and SNDA-II used markedly different approaches to assess the percentage of the RDA provided in school meals. SNDA-I compared the average calorie and nutrient content of meals offered for a given school type to all potentially relevant RDAs. For example, the mean nutrient content of elementary school meals was compared to RDAs for three different age/sex groups: 7-10 year olds, 11-14 year old females and 11-14 year old males. In keeping with current program regulations, the SNDA-II analysis compared weekly nutrient averages for each individual school to a customized, weighted RDA that was based on the grade configuration of the school (see Appendix E).

To overcome these differences in approach and to present information in a manner that is consistent with the context in which school meal programs are operating today, both SNDA-I and SNDA-II data were compared to minimum nutrition standards defined in current NSLP regulations. Thus, the mean nutrient content of lunches offered in elementary schools was compared to minimum nutrition standards defined

3 As described in Chapter Five and Appendix E, an alternative approach to the unweighted analysis was also implemented for NSMP/ANSMP schools, which do not follow a food-based meal pattern. Because incorporation of these alternative data had no material effect on the outcome of the analysis, a decision was made to use the unweighted analysis modeled after SNDA-I for all schools. This not only simplifies presentation and discussion of the data, it maintains comparability between the two studies.

for schools with grades K-6. Lunches offered in secondary schools (middle schools and high schools) were compared to minimum nutrition standards defined for schools with grades 7 through 12.

Data on the mean percentage of calories from fat, saturated fat and carbohydrate, as well as mean cholesterol and sodium content, were handled the same way in this chapter as in previous chapters. Indeed, SNDA-I and SNDA-II used identical standards and recommendations to assess these nutrients. The only difference is that at the time SNDA-I data were collected, standards for the percentage of calories from fat and saturated fat had not been officially adopted as standards for the NSLP and SBP.

The statistical significance of differences between meals offered in SY 1998–99 and SY 1991–92 was assessed using two-tailed *t*-tests (independent samples). Because of the large number of *t*-tests that were conducted simultaneously, a conservative cutoff was used to define statistical significance, thereby decreasing the likelihood of reporting chance findings. Only differences that were statistically significant at the .01 level or better are reported.

Mean Calorie and Nutrient Content Relative to Minimum Nutrition Standards

Exhibit 6.1 shows the mean calorie and nutrient content of elementary and secondary school lunches offered in SY 1998–99 and SY 1991–92. As a point of reference, minimum standards defined for NSLP meals served in schools with grades K through 6 (elementary schools) and 7-12 (secondary schools) are shown in the shaded column.

As the data indicate, the average elementary school lunch offered in both SY 1991–92 and SY 1998–99 exceeded defined minimum standards for calories, protein, vitamin A, vitamin C, calcium and iron. The average lunch offered in SY 1998–99 included significantly more of all targeted nutrients except protein.

With the exception of calories, findings were similar for lunches offered in secondary schools (Exhibit 6.1). In both SY 1991–92 and SY 1998–99, lunches offered in secondary schools fell below the defined minimum calorie level but exceeded minimums for all RDA nutrients. The average secondary school lunch offered in SY 1998–99 provided, with the exception of protein, significantly more of all target nutrients than the average secondary school lunch offered in SY 1991–92.

Because lunches offered at both points in time exceeded the defined minimum standards, the relative importance of the fact that lunches offered in SY 1998–99 provided significantly greater amounts of all key nutrients appears to be minimal. However, as data presented in the following sections demonstrate, the fact that the overall calorie and nutrient content of school lunches was maintained between SY 1991–92 and SY 1998–99, as several other characteristics of the lunches changed, is noteworthy.

Percentage of Calories from Total Fat and Saturated Fat

On average, neither lunches offered in SY 1998–99 nor SY 1991–92 met NSLP standards for the percentage of calories from fat or saturated fat (Exhibit 6.2). This was true for both elementary schools and secondary schools. In both cases, however, lunches offered in SY 1998–99 derived a significantly smaller percentage of calories from fat and saturated fat than lunches offered in SY 1991–92.

Exhibit 6.1

Mean Calorie and Nutrient Content of Lunches Offered in SY 1991–92 and SY 1998–99 Compared to Current NSLP Standards

	NSLP Standard	SY 1998-99[1] (Offered)	SY 1991-92[2] (Offered)	Percentage Change (SY 1998-99 vs. SY 1991-92)
Elementary Schools				
Mean Amount				
Total Calories	[redacted]	738	715	+3%
Protein (gm)	[redacted]	30	30	0
Vitamin A (mcg RE)	[redacted]	491	397	+24**
Vitamin C (mg)	[redacted]	37	28	+32**
Calcium (mg)	[redacted]	505	483	+5**
Iron (mg)	[redacted]	4.6	4.1	+12**
Number of Schools (Unweighted)		398	260	
Secondary Schools				
Mean Amount				
Total Calories	[redacted]	798	820	-3%
Protein (gm)	[redacted]	33	33	0
Vitamin A (mcg RE)	[redacted]	519	418	+24**
Vitamin C (mg)	[redacted]	42	34	+24**
Calcium (mg)	[redacted]	542	518	+5**
Iron (mg)	[redacted]	5.0	4.8	+4*
Number of Schools (Unweighted)		677	234	

[1] Data from the present study—the second School Nutrition Dietary Assessment Study (SNDA-II).

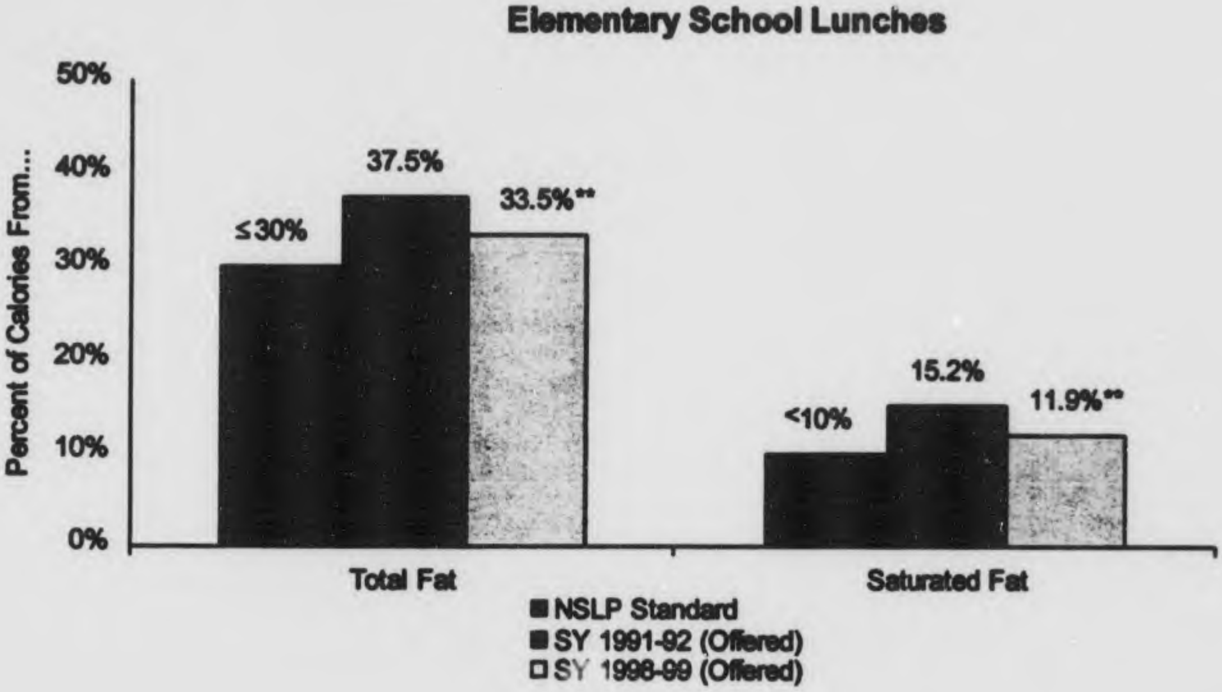
[2] Data for all public schools in the first School Nutrition Dietary Assessment Study (SNDA-I).

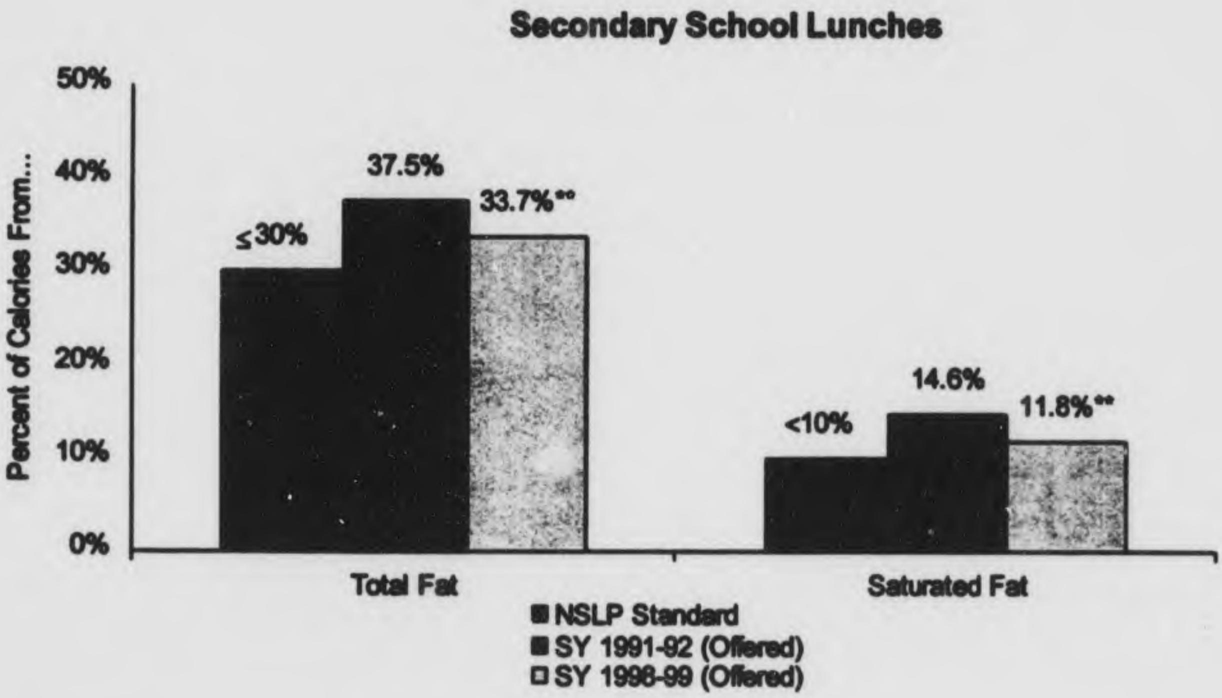
Note: NSLP standards reflect minimums defined in current program regulations for grades K-6 (elementary schools) and 7-12 (secondary schools).

* Difference between SY 1998-99 and SY 1991-92 is statistically significant at the .01 level.

** Difference between SY 1998-99 and SY 1991-92 is statistically significant at the .001 level.

Exhibit 6.2 **Between SY 1991-92 and SY 1998-99 There Was a Significant Trend Toward Lower Levels of Fat and Saturated Fat in School Lunches, as Offered**





** Difference is statistically significant at the .001 level.

Note: NSLP standards for the percentage of calories from fat and saturated fat were not in effect during SY 1991-92.

Specifically, the average percentage of calories from fat decreased from 38 percent in SY 1991–92 to 34 percent in SY 1998–99, a decrease of roughly 10 percent. The average percentage of calories from saturated fat decreased from about 15 percent to about 12 percent, a decrease of roughly 20 percent. These differences demonstrate that between SY 1991–92 and SY 1998–99 there was a meaningful and statistically significant trend toward lower levels of fat and saturated fat in school lunches, relative to calorie content.

Thus, the evidence suggests that public NSLP schools are making good progress toward meeting USDA's strategic goal of satisfying the SMI standards for calories from fat and saturated fat by the year 2005. While the available data indicate that there is more work to be done, it is important to realize that concentrated efforts in this area did not begin until the implementation of the School Meals Initiative (SMI) in 1995. Schools may not have begun implementing changes designed to lower the fat and saturated fat content of school meals until SY1996-97 or later. Consequently, the available data should be viewed as indicative of roughly two to three years of reform efforts (SY 1995-96 or SY 1996-97 through the beginning of SY 1998–99) rather than a full seven years of effort (the time elapsed since SNDA-I).

Finally, as noted in the preceding discussion of RDA nutrients, it is important to note that these improvements in fat and saturated fat content were achieved without a negative impact on either the calorie or nutrient content of lunches offered to students.

Percentage of Schools Meeting Standards for Fat and Saturated Fat

Although overall means for calories from fat and saturated fat in lunches offered in both SY 1991–92 and SY 1998–99 did not meet NSLP standards for these nutrients, lunches offered in some individual schools in SY 1998–99 did meet these standards. This represents a dramatic departure from what was observed in SY 1991–92. In SY 1991–92, only one percent of all schools offered lunches that provided no more than 30 percent of calories from fat. In SY 1998–99, this figure was substantially higher — 18 percent of elementary schools and 21 percent of secondary schools (Exhibit 6.3).

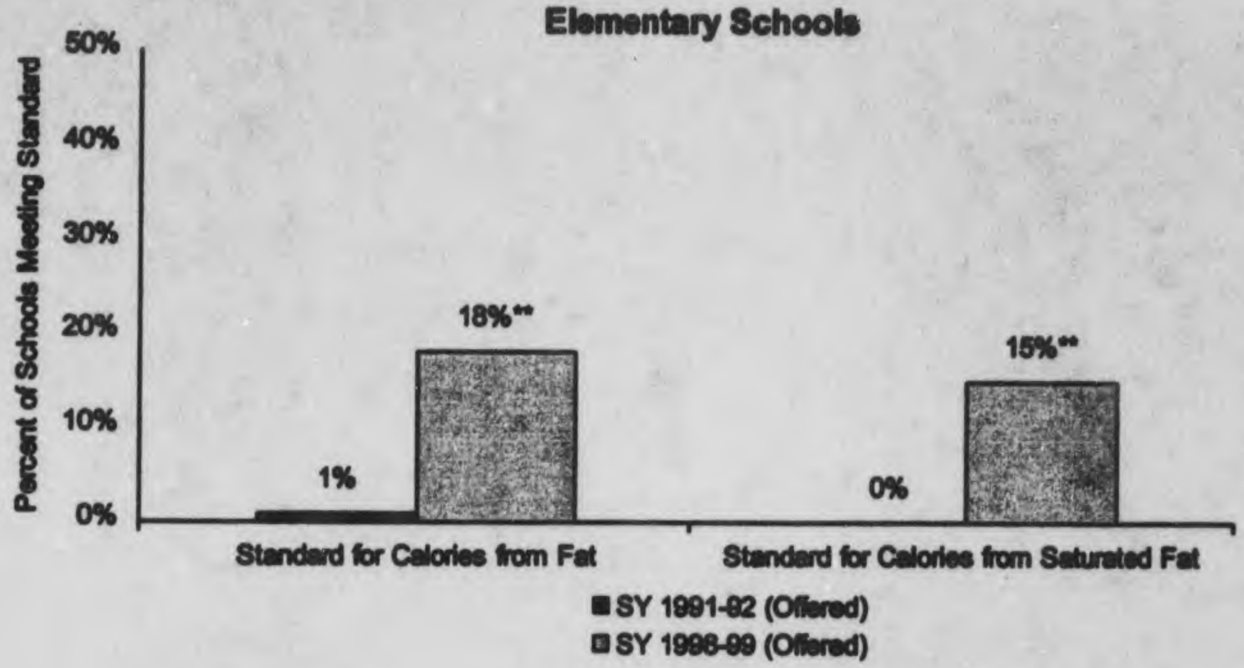
The increase in the number of schools meeting the standard for saturated fat is equally noteworthy. In SY 1991–92, no schools satisfied this standard. In SY 1998–99, 15 percent of elementary schools and 16 percent of secondary schools met the standard

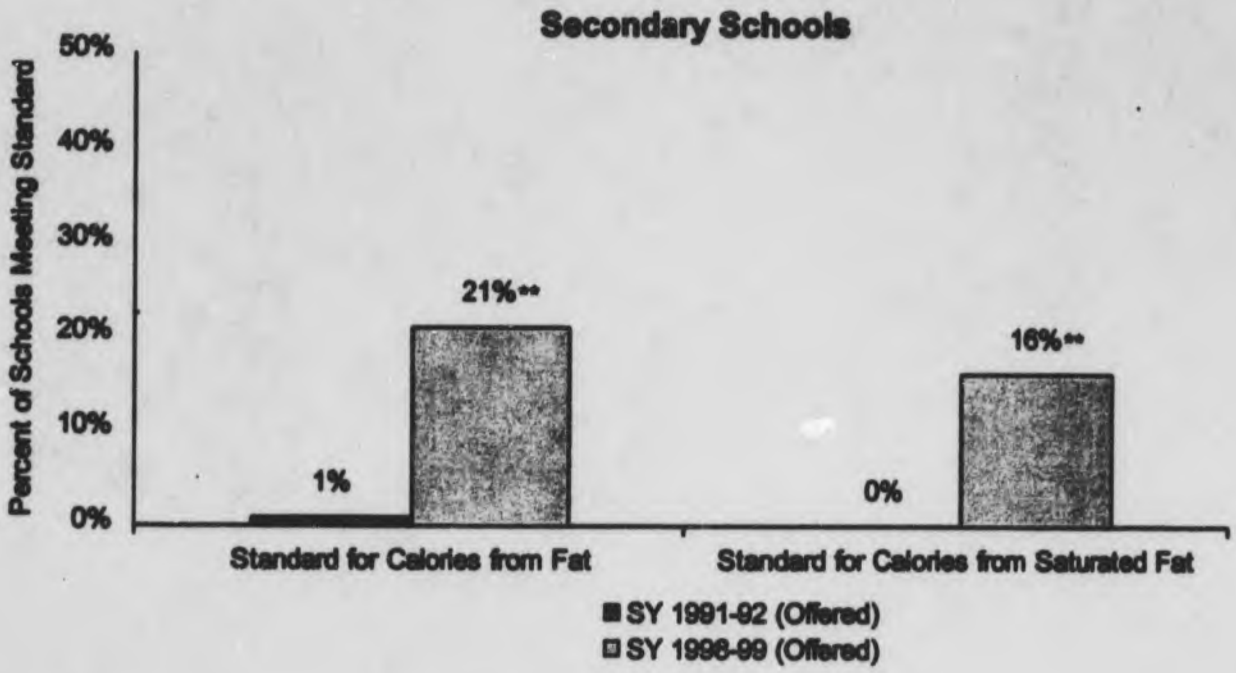
Cholesterol, Sodium and Carbohydrate Content

On average, lunches offered in SY 1991–92 and SY 1998–99 in both elementary schools and secondary schools satisfied the NRC recommendation of providing no more than 100 mg of cholesterol (Exhibit 6.4). Means for SY 1998–99 were significantly lower; however, this difference has little substantive importance because means for both years met the NRC recommendation.

In contrast, the mean sodium content of lunches offered, in both years and in both types of schools, exceeded the NRC recommendation for maximum sodium intake (no more than 800 mg, or one-third of the suggested maximum daily intake of 2,400 mg) by a substantial margin. Mean sodium content of elementary school lunches offered in SY 1991–92 and SY 1998–99 were 61 percent (SY 1998–99) to 75 percent (SY 1991–92) higher than the recommended maximum. Means for secondary school lunches were substantially higher, approaching or exceeding double the recommended amount. Lunches offered

Exhibit 6.3 For Lunches as Offered, the Percentage of Schools That Met Standards for Total Fat and Saturated Fat Has Increased Substantially Since SY 1991-92



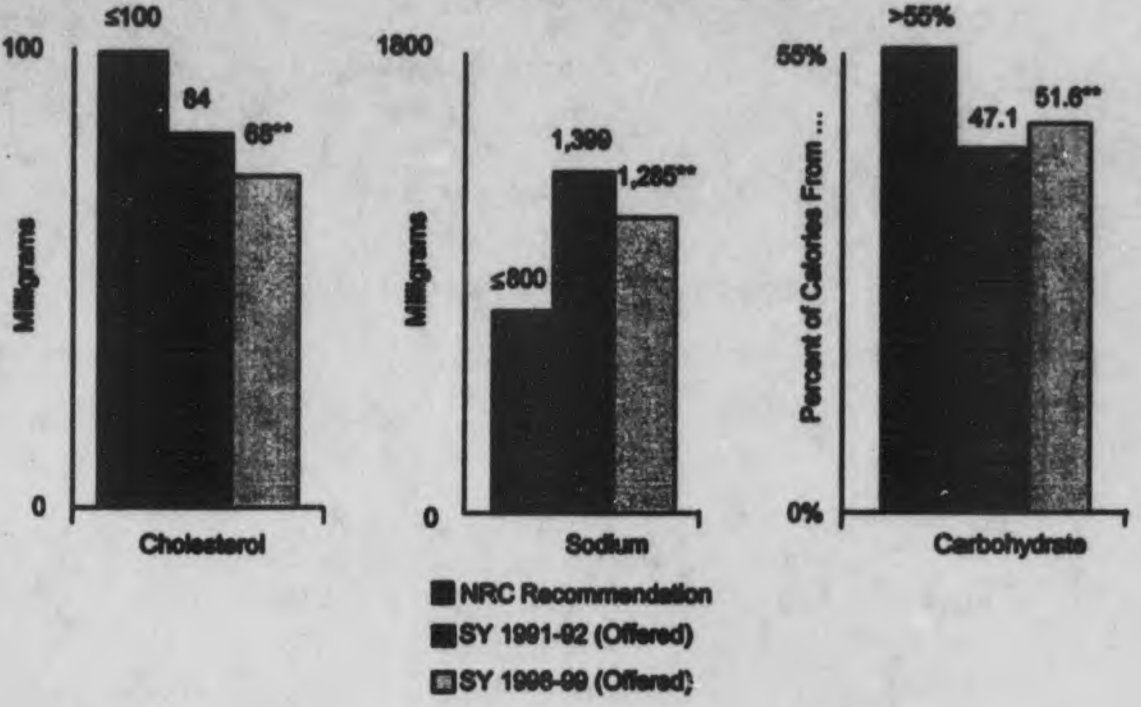


** Difference is statistically significant at the .001 level.

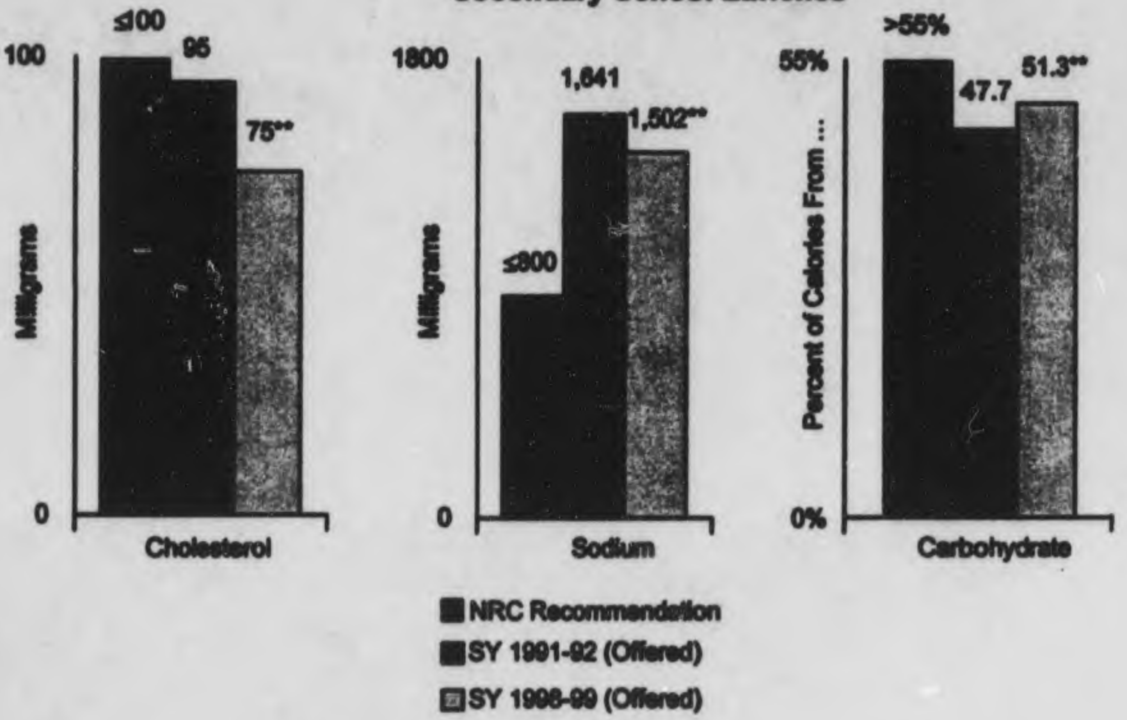
Note: NSLP standards for the percentage of calories from fat and saturated fat were not in effect during SY 1991-92.

Exhibit 6.4 **Lunches Offered in SY 1998-99 Were Significantly Lower in Cholesterol and Sodium and Higher in Calories from Carbohydrate than Lunches Offered in SY 1991-92**

Elementary School Lunches



Secondary School Lunches



** Difference is statistically significant at the .001 level.

in both elementary schools and secondary schools in SY 1998–99 were significantly lower in sodium than lunches offered in SY 1991–92. The differences were relatively small, however, and did little to bring the overall means within range of the recommended level.

Finally, lunches offered in both SY 1991-92 and SY 1998-99 provided fewer calories from carbohydrate, on a percentage basis, than recommended by the NRC.

Distribution of Fat, Carbohydrate, Cholesterol and Sodium Content

Exhibits 6.5 and 6.6 show the distribution of fat, carbohydrate, cholesterol, and sodium in lunches offered in SY 1998–99 and SY 1991–92 in, respectively, elementary schools and secondary schools. As shown, not only has the percentage of schools meeting the various NSLP standards and recommendations increased over time, the relevant distributions have shifted toward lower levels of fat and saturated fat, relative to calorie content, as well as toward greater levels of carbohydrate.

Change over time was most modest for sodium. In SY 1998–99, the percentage of schools meeting the NRC recommendation for sodium content was only one percent for elementary schools and less than one percent for secondary schools. It is important to recognize that, while schools are now required to meet defined standards for calories from fat and saturated fat (which inevitably influences the percentage of calories provided by carbohydrate), schools are not required to meet a specific standard for sodium content.

Availability and Nutrient Content of Low-Fat Lunch Options

Even when the average lunch offered exceeds the standard of providing no more than 30 percent of calories from fat, it is possible that individual students could select meals that meet this standard if they chose menu items that were low in fat. This section discusses the percentage of schools that offered choices that, when averaged over a school week, provided no more than 30 percent of calories from fat and how this percentage has changed over time. Data are also presented on the average nutrient content of these low-fat lunch options.

The methodology used in this analysis replicates the methodology used in the SNDA-I study and is comparable to the methodology used in the basic unweighted nutrient analysis. However, rather than summing the nutrients included in an average serving from each major meal component category, this analysis included only the lowest-fat choices (based on the percentage of calories from fat). Thus, the lowest-fat lunch consisted of the lowest-percent-fat milk option, the lowest-percent-fat entree option, and the two lowest-percent-fat fruit/vegetable options. Desserts and other non-creditable items were not included in the analysis because they are not required components of a reimbursable meal. Results of the analysis provide an estimate of the nutrients students would receive, on average, if they consistently selected the lowest-fat items available in each meal component category.

Exhibit 6.5

Distribution of Fat, Carbohydrate, Cholesterol and Sodium in Lunches Offered in SY 1991–92 and SY 1998–99
Elementary Schools

	SY 1998-99[1] (Offered)	SY 1991-92[2] (Offered)
Percentage of Calories from Fat		
[redacted]		
30.1-34.0%	41	13
34.1-38.0%	31	43
More than 38.0	11	44
Percentage of Calories from Saturated Fat		
[redacted]		
10.1-12.0%	39	5
12.1-14.0%	33	19
14.1-16.0%	10	42
More than 16.0%	3	34
Percentage of Calories from Carbohydrate		
Less than 45%	6	21
45-55%	74	78
[redacted]		
Cholesterol		
[redacted]		
101-133 mg.	5	16
More than 133 mg.	1	<1
Sodium		
[redacted]		
801-1,000 mg.	5	4
More than 1,000 mg.	94	96
Number of Schools (Unweighted)	398	260

[1] Data from the present study—the second School Nutrition Dietary Assessment Study (SNDA-II).

[2] Data for all public elementary schools in the first School Nutrition Dietary Assessment Study (SNDA-I).

Notes: Highlighted rows show NSLP standard (fat and saturated fat) or NRC recommendation (carbohydrate, cholesterol, and sodium).

NSLP standards for the percentage of calories from fat and saturated fat were not in effect during SY 1991-92.

Exhibit 6.6

Distribution of Fat, Carbohydrate, Cholesterol and Sodium in Lunches Offered in SY 1991–92 and SY 1998–99
Secondary Schools

	SY 1998-99[1] (Offered)	SY 1991-92[2] (Offered)
Percentage of Calories from Fat		
[redacted]		
30.1-34.0%	31	22
34.1-38.0%	32	34
More than 38.0	16	42
Percentage of Calories from Saturated Fat		
[redacted]		
10.1-12.0%	41	4
12.1-14.0%	33	32
14.1-16.0%	8	46
More than 16%	3	17
Percentage of Calories from Carbohydrate		
Less than 45%	10	28
45-55%	68	68
[redacted]		
Cholesterol		
[redacted]		
101-133 mg.	10	29
More than 133 mg.	1	6
Sodium		
[redacted]		
801-1,000 mg.	1	<1
More than 1,000 mg.	99	100
Number of Schools (Unweighted)	677	234

[1] Data from the present study—the second School Nutrition Dietary Assessment Study (SNDA-II).

[2] Data for all public secondary (middle and high) schools in the first School Nutrition Dietary Assessment Study (SNDA-I).

Notes: Highlighted rows show NSLP standard (fat and saturated fat) or NRC recommendation (carbohydrate, cholesterol, and sodium).

NSLP standards for the percentage of calories from fat and saturated fat were not in effect during SY 1991-92.

Availability of Low-Fat Lunch Options

In SY 1991–92, 34 percent of all elementary schools offered options for a complete meal that, when averaged over a week, provided no more than 30 percent of calories from fat (Exhibit 6.7). In SY 1998–99, the percentage of elementary schools meeting this criterion was almost 2.5 times greater — 82 percent.

The percentage of secondary schools offering meal options that provided no more than 30 percent of calories from fat over the course of the week also increased between SY 1991–92 and SY 1998–99. The relative magnitude of the increase was substantially smaller, however, because more secondary schools than elementary schools met the criterion in SY 1991–92 (Exhibit 6.8). In SY 1991–92, the percentage of secondary schools offering meal options that provided, on average, no more than 30 percent of calories from fat was 71 percent. The comparable figure for SY 1998–99 was 91 percent, a 28 percent increase.

These data indicate that, even though overall means for the percentage of calories from fat in meals offered to students continued to exceed the program goal in SY 1998–99, students in 82 percent of all elementary schools and 91 percent of all secondary schools *had the opportunity* to select meals that met this goal. We know from the data presented in Chapter Three that, on average, students did not select such meals. Nonetheless, it is important to recognize that the options were available.

In addition to satisfying the NSLP goal for calories from saturated fat, the lowest-percent-fat meals offer other nutritional benefits. For example, in SY 1998–99, the lowest-percent-fat meals offered in 65 percent of elementary schools and 79 percent of secondary schools were consistent with the NSLP standard for calories from saturated fat (Exhibits 6.7 and 6.8). The lowest-percent-fat meals offered in two-thirds of elementary schools and 79 percent of secondary schools satisfied the NRC recommendation for calories from carbohydrate. In addition, the lowest-percent-fat lunches offered in 21 percent of elementary schools and 14 percent of secondary schools satisfied the NRC recommendation for sodium.

Mean Nutrient Content of Low-Fat Lunch Options

Lower levels of fat, saturated fat and sodium in the lowest-percent-fat meals were achieved without compromising the overall nutrient contribution of school lunches. As Exhibit 6.9 illustrates, the lowest-percent-fat lunches offered in elementary schools in both SY 1991–92 and SY 1998–99 met the minimum nutrition standards defined for lunches offered in grades K-6 for protein, vitamin A, vitamin C, calcium and iron. With the exception of iron in SY 1998–99, which fell just short of the benchmark, the same was true for the lowest-percent-fat meals offered in secondary schools (Exhibit 6.10).

The lowest-percent-fat meals offered in both SY 1991–92 and SY 1998–99, in both elementary schools and secondary schools, were, however, low in calories compared to the defined minimum standards. This was especially true for the lowest-percent-fat meals offered in SY 1998–99, where the mean calorie content was 11 percent (elementary schools) to 15 percent (secondary schools) lower than the lowest-percent-fat meals offered in SY 1991–92. The fact that the lowest-percent-fat meals were relatively low in calories is not surprising. Often (but not always), the lowest-fat option is also the lowest in calories. In addition, the analysis intentionally excludes desserts, which can be high in fat. (As shown in Exhibit 3.13, desserts contributed five percent of the fat in the average school lunch, as served.)

Exhibit 6.7

Distribution of Fat, Carbohydrate, Cholesterol and Sodium in Lowest-Percent-Fat Lunches Offered in SY 1991–92 and SY 1998–99
Elementary Schools

	SY 1998-99[1] (Offered)	SY 1991-92[2] (Offered)
Percentage of Calories from Fat		
[redacted]		
30.1-34.0%	14	32
34.1-38.0%	3	21
More than 38.0	1	13
Percentage of Calories from Saturated Fat		
[redacted]		
10.1-12.0%	23	20
12.1-14.0%	8	31
14.1-16.0%	2	24
More than 16.0%	2	8
Percentage of Calories from Carbohydrate		
Less than 45%	2	10
45-55%	33	72
[redacted]		
Cholesterol		
[redacted]		
101-133 mg.	<1	3
More than 133 mg.	0	0
Sodium		
[redacted]		
801-1,000 mg.	38	7
More than 1,000 mg.	41	93
Number of Schools (Unweighted)	398	260

[1] Data from the present study—the second School Nutrition Dietary Assessment Study (SNDA-II).

[2] Data for all public elementary schools in the first School Nutrition Dietary Assessment Study (SNDA-I).

Notes: Highlighted rows show NSLP standard (fat and saturated fat) or NRC recommendation (carbohydrate, cholesterol, and sodium).

NSLP standards for the percentage of calories from fat and saturated fat were not in effect during SY 1991-92.

Exhibit 6.8

Distribution of Fat, Carbohydrate, Cholesterol and Sodium in Lowest-Percent-Fat Lunches Offered in SY 1991–92 and SY 1998–99

Secondary Schools

	SY 1998-99[1] (Offered)	SY 1991-92[2] (Offered)
Percentage of Calories from Fat		
[redacted]		
30.1-34.0%	6	15
34.1-38.0%	2	9
More than 38.0	1	5
Percentage of Calories from Saturated Fat		
[redacted]		
10.1-12.0%	13	18
12.1-14.0%	5	25
14.1-16.0%	2	9
More than 16%	1	2
Percentage of Calories from Carbohydrate		
Less than 45%	2	4
45-55%	20	40
[redacted]		
Cholesterol		
[redacted]		
101-133 mg.	1	1
More than 133 mg.	<1	2
Sodium		
[redacted]		
801-1,000 mg.	29	4
More than 1,000 mg.	56	95
Number of Schools (Unweighted)	677	234

[1] Data from the present study—the second School Nutrition Dietary Assessment Study (SNDA-II).

[2] Data for all public secondary (middle and high) schools in the first School Nutrition Dietary Assessment Study (SNDA-I).

Notes: Highlighted rows show NSLP standard (fat and saturated fat) or NRC recommendation (carbohydrate, cholesterol and sodium).

NSLP standards for the percentage of calories from fat and saturated fat were not in effect during SY 1991-92.

Exhibit 6.9

Mean Nutrient Profile of Lowest-Percent-Fat Lunches Offered in SY 1991–92 and SY 1998–99 Compared to Minimum NSLP Standards and NRC Recommendations: *Elementary Schools*

	Standard/ Recommendation	SY 1998-99[1] (Offered)	SY 1991-92[2] (Offered)	Percent Change (SY 1998-99 vs. (SY 1991-92)
Mean Amount	[redacted]			
Total Calories	[redacted]	576	645	-11%**
Protein (gm)	[redacted]	28	29	-3**
Vitamin A (mcg RE)	[redacted]	458	388	+18
Vitamin C (mg)	[redacted]	35	29	+21
Calcium (mg)	[redacted]	460	466	-1
Iron (mg)	[redacted]	4.0	4.1	-2
Mean Percentage of Calories from...	[redacted]			
Fat (%)	[redacted]	25.0	31.8	-21**
Saturated Fat (%)	[redacted]	9.2	12.6	-27**
Carbohydrate (%)	[redacted]	57.3	51.3	+12**
Mean Amount	[redacted]			
Cholesterol (mg)	[redacted]	50	68	-26**
Sodium (mg)	[redacted]	992	1,323	-25**
Number of Schools (Unweighted)		398	260	

[1] Data from the present study—the Second School Nutrition Dietary Assessment Study (SNDA-II).

[2] Data for all public elementary schools in the first School Nutrition Dietary Assessment Study (SNDA-I).

[3] NRC recommendation, not NSLP standard.

Note: NSLP nutrient standards are based on minimums defined in program regulations for grades K-6.

** Difference between SY 1998-99 and SY 1991-92 is statistically significant at the .001 level.

Exhibit 6.10

Mean Nutrient Profile of Lowest-Percent-Fat Lunches Offered in SY 1991–92 and SY 1998–99 Compared to Minimum NSLP Standards and NRC Recommendations: *Secondary Schools*

	Standard/ Recommendation	SY 1998-99[1] (Offered)	SY 1991-92[2] (Offered)	Percent Change (SY 1998-99 vs. SY 1991-92)
Mean Amount	[redacted]			
Total Calories	[redacted]	591	693	-15%**
Protein (gm)	[redacted]	29	32	-9**
Vitamin A (mcg RE)	[redacted]	425	341	+25**
Vitamin C (mg)	[redacted]	44	39	+13
Calcium (mg)	[redacted]	474	476	<1
Iron (mg)	[redacted]	4.2	4.7	-11**
Mean Percentage of Calories from...	[redacted]			
Fat (%)	[redacted]	21.8	27.0	-19**
Saturated Fat (%)	[redacted]	8.1	10.5	-23**
Carbohydrate (%)	[redacted]	59.8	55.7	+7**
Mean Amount	[redacted]			
Cholesterol (mg)	[redacted]	49	65	-25**
Sodium (mg)	[redacted]	1,071	1,436	-25**
Number of Schools (Unweighted)		677	234	

[1] Data from the present study—the second School Nutrition Dietary Assessment Study (SNDA-II).

[2] Data for all public secondary (middle and high) schools in the first School Nutrition Dietary Assessment Study (SNDA-I).

[3] NRC recommendation, not NSLP standard.

Note: NSLP nutrient standards are based on minimums defined in program regulations for grades 7-12.

** Difference between SY 1998-99 and SY 1991-92 is statistically significant at the .001 level.

The calorie content of the lowest-fat lunches could be increased by adding additional servings of fruit, vegetables or breads, or by adding a low-fat, high-carbohydrate dessert choice (e.g., gelatin, animal crackers, fruit dessert, low-fat baked good).

Among elementary schools, the lowest-percent-fat lunches offered in SY 1998–99 satisfied NSLP standards for calories from fat and saturated fat and well as calories from carbohydrate (Exhibit 6.9). Comparable lunches offered in elementary schools in SY 1991–92 came close to some of these goals but did not meet them. Among secondary schools (Exhibit 6.10), the lowest-percent-fat lunches offered at both points in time satisfied NSLP standards for calories from fat as well as the NRC recommendation for calories from carbohydrate. The lowest-percent-fat lunch offered in secondary schools SY 1998–99 also satisfied the NSLP standard for calories from saturated fat (less than 10%). The average lunch offered in SY 1991–92 just exceeded this standard (10.5%).

Finally, the lowest-percent-fat lunches offered at both points in time and in both elementary and secondary schools were consistent with the NRC recommendation for cholesterol (Exhibits 6.9 and 6.10). Lunches offered at both points in time and in both types of schools exceeded the NRC recommendation for sodium. The lowest-fat-lunches offered in SY 1998–99 were significantly lower in sodium than the lunches offered in SY 1991–92. Nonetheless, on average, the lowest-percent-fat lunches offered in SY 1998-99 continued to exceed the NRC recommendation for sodium.

Average Nutrient Content of Breakfasts Offered in Public Schools: SY 1998-99 and SY 1991-92

This section presents data on the average nutrient content of breakfasts offered in SY 1991–92 and SY 1998–99. In SNDA-I, the nutrient content of the average breakfast offered in each school was determined by summing the nutrients in an average serving of milk; an average serving of fruit, juice or vegetable; and two average servings of grains/breads and/or meats/meat alternates. The same approach was used in generating unweighted averages for the SNDA-II data (see Appendix E).

Mean Calorie and Nutrient Content Relative to Minimum Nutrition Standards

Exhibit 6.11 shows the mean calorie and nutrient content of elementary school breakfasts offered in SY 1991–92 and SY 1998–99. Minimum nutrition standards defined for SBP breakfasts (which are applicable to all schools, grades K-12), are shown in the shaded column. For secondary schools, optional nutrition standards for grades 7-12 are also shown.

The average breakfast offered in elementary schools in both SY 1999–92 and SY 1998–99 fell short of the minimum calorie level defined in current program regulations. The relatively low calorie level did not, however, have an adverse effect on the overall nutrient contribution of SBP breakfasts. In fact, elementary school breakfasts offered at both points in time provided, on average, more than the minimum required amounts of protein, vitamin A, vitamin C, calcium, and iron.

Elementary school breakfasts offered in SY 1998–99 provided significantly more vitamin C and significantly less protein and calcium than breakfasts offered in SY 1991–92. The observed differences

Exhibit 6.11

Mean Calorie and Nutrient Content of Breakfasts Offered in SY 1991–92 and SY 1998–99 Compared to Current SBP Standards

	SBP Standard	SY 1998-99[1] (Offered)	SY 1991-92[2] (Offered)	Percentage Change (SY 1998-99 vs. SY 1991-92)
Elementary Schools				
Mean Amount	[redacted]			
Total Calories		462	480	-4%
Protein (gm)		15	16	-6**
Vitamin A (mcg RE)		278	290	-4
Vitamin C (mg)		40	33	+21**
Calcium (mg)		378	398	-5**
Iron (mg)		4.2	3.8	+11
Number of Schools (Unweighted)		317	166	
Secondary Schools				
Mean Amount	[redacted]			
Total Calories		483	537	-10%**
Protein (gm)		16	17	-6*
Vitamin A (mcg RE)		265	293	-10
Vitamin C (mg)		42	37	+14
Calcium (mg)		386	409	-6**
Iron (mg)		4.1	4.1	0
Number of Schools (Unweighted)		487	121	

[1] Data from the present study — the second School Nutrition Dietary Assessment Study (SNDA-II).

[2] Data for all public schools in the first School Nutrition Dietary Assessment Study (SNDA-I).

Note: SBP standards reflect minimums defined in current program regulations for grades K-12 and an optional set of standards for grades 7-12.

* Difference between SY 1998-99 and SY 1991-92 is statistically significant at the .01 level.

** Difference between SY 1998-99 and SY 1991-92 is statistically significant at the .001 level.

are inconsequential, however, because elementary school breakfasts offered at both points in time provided, on average, more than the minimum required amount of all key nutrients.

Among secondary schools, breakfasts offered in both SY 1991–92 and SY 1998–99 provided fewer calories than either the minimum defined for grades K-12 or the optional level suggested for grades 7-12 (Exhibit 6.11). This was especially true for breakfasts offered in SY 1998-99. The mean calorie content of secondary school breakfasts offered in SY 1998–99 was about 10 percent lower than breakfasts offered in SY 1991–92. In spite of lower-than-desired calorie levels, secondary school breakfasts offered at both points in time more than satisfied the required minimum standards for all targeted nutrients as well as the more stringent optional standards.

Secondary school breakfasts offered in SY 1998–99 provided significantly less protein and calcium than breakfasts offered in SY 1991–92. Again, however, the relative importance of differences in mean nutrient content is inconsequential because breakfasts offered at both points in time more than satisfied the suggested standards.

Percentage of Calories from Total Fat and Saturated Fat

On average, breakfasts offered in both elementary schools and secondary schools in SY 1991–92 came close to meeting the standard for the percentage of calories from fat but exceeded the standard for the percentage of calories from saturated fat by a substantial margin (Exhibit 6.12). Breakfasts offered in SY 1998–99 provided a significantly smaller percentage of calories from both total fat and saturated fat. As a consequence, the average breakfast offered in SY 1998-99, in both elementary schools and secondary schools, was consistent with SBP standards for these nutrients.

Percentage of Schools Meeting Standards for Fat and Saturated Fat

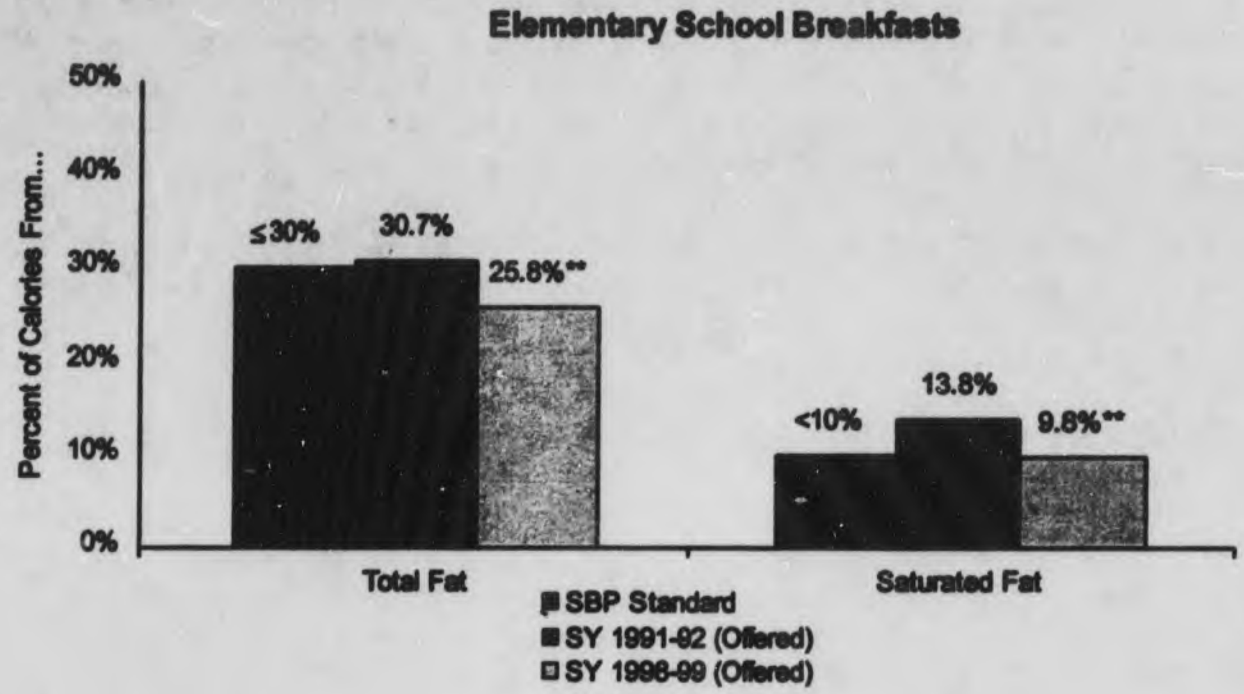
There was a marked increase in the number of schools that met SBP standards for total fat and saturated fat between SY 1991–92 and SY 1998–99 (Exhibit 6.13). In SY 1991–92, fewer than half of all public schools offered breakfasts that provided no more than 30 percent of calories from fat. The picture in SY 1998–99 was dramatically different. In SY 1998–99, breakfasts offered in more than three-quarters of elementary schools and secondary schools met the standard for calories from fat. This represents an overall increase of 62 percent (secondary schools) to 84 percent (elementary schools) in the proportion of schools meeting the SBP standard for calories from fat.

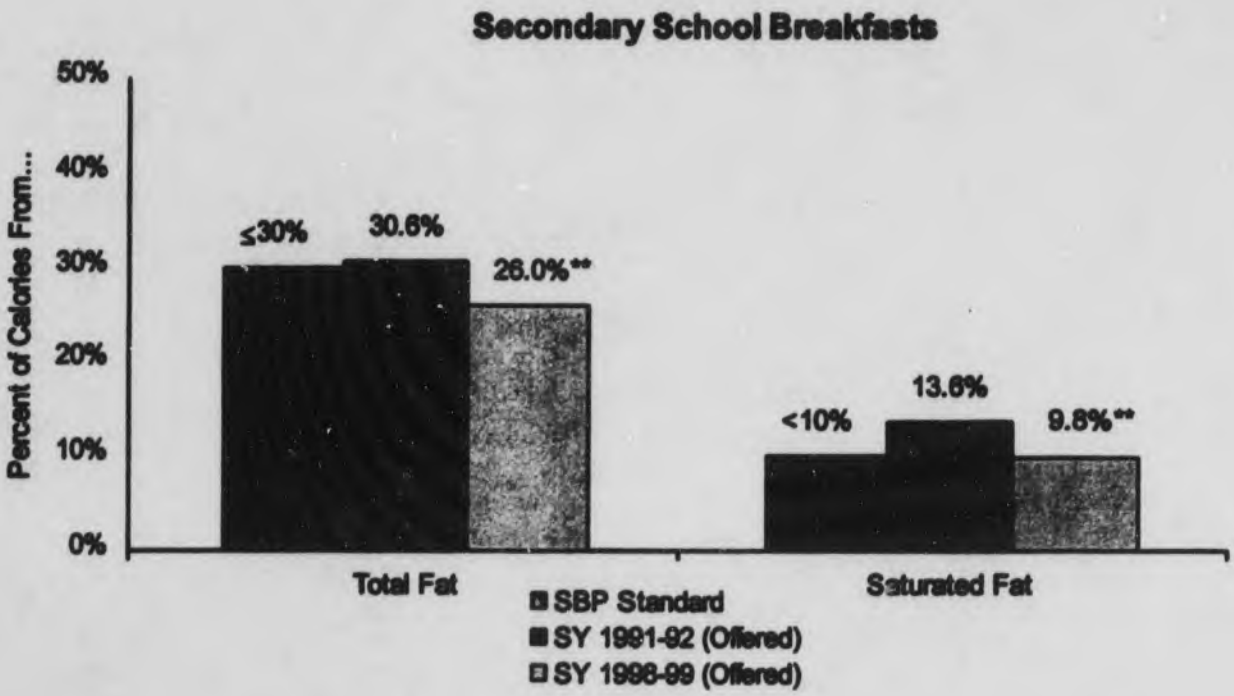
The increase in the number of schools meeting the standard for saturated fat was even more dramatic. In SY 1991–92, fewer than seven percent of schools satisfied this standard. In SY 1998–99, well over half of all schools met the standard.

Cholesterol, Sodium and Carbohydrate Content

In both elementary schools and secondary schools, breakfasts offered in both SY 1991–92 and SY 1998–99 were consistent with NRC recommendations for cholesterol content and for the percentage of calories from carbohydrate (Exhibit 6.14). Breakfasts offered in SY 1998–99 were significantly lower in cholesterol and higher in calories from carbohydrate than breakfasts offered in SY 1991–92; however, these differences did not affect conclusions about whether NRC recommendations were met.

Exhibit 6.12 Between SY 1991-92 and SY 1998-99 There Was a Significant Decrease in the Relative Fat and Saturated Fat Content of School Breakfasts, as Offered

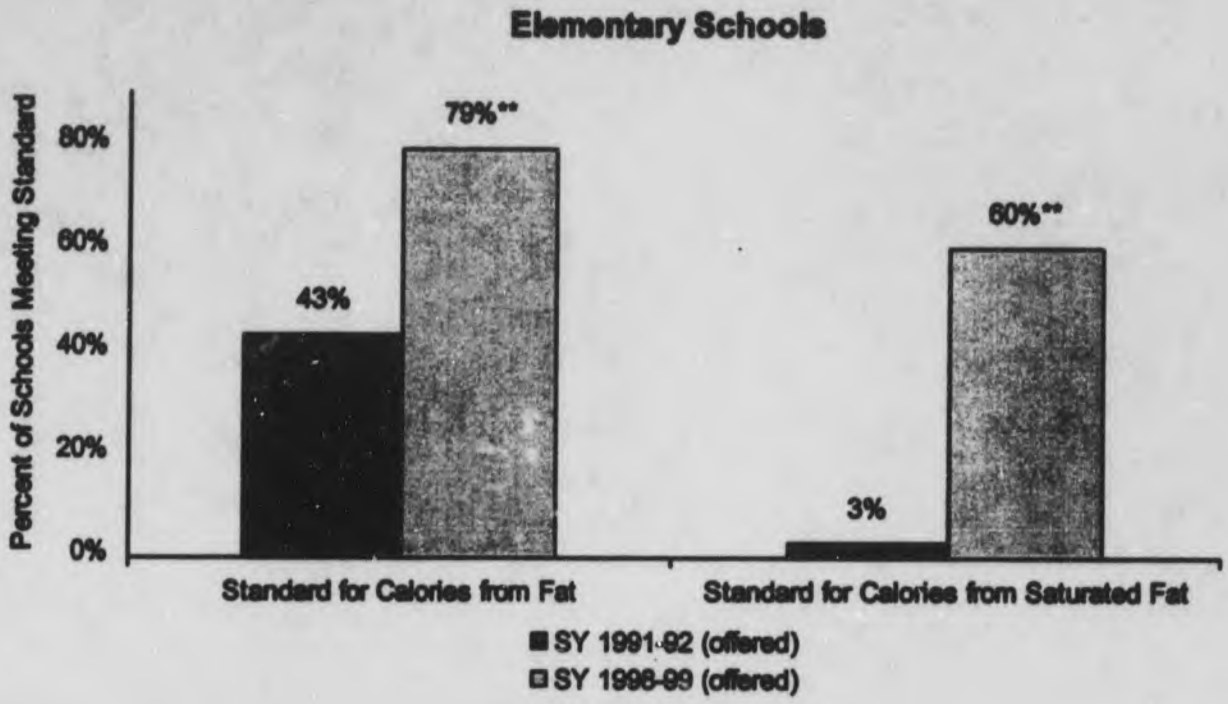


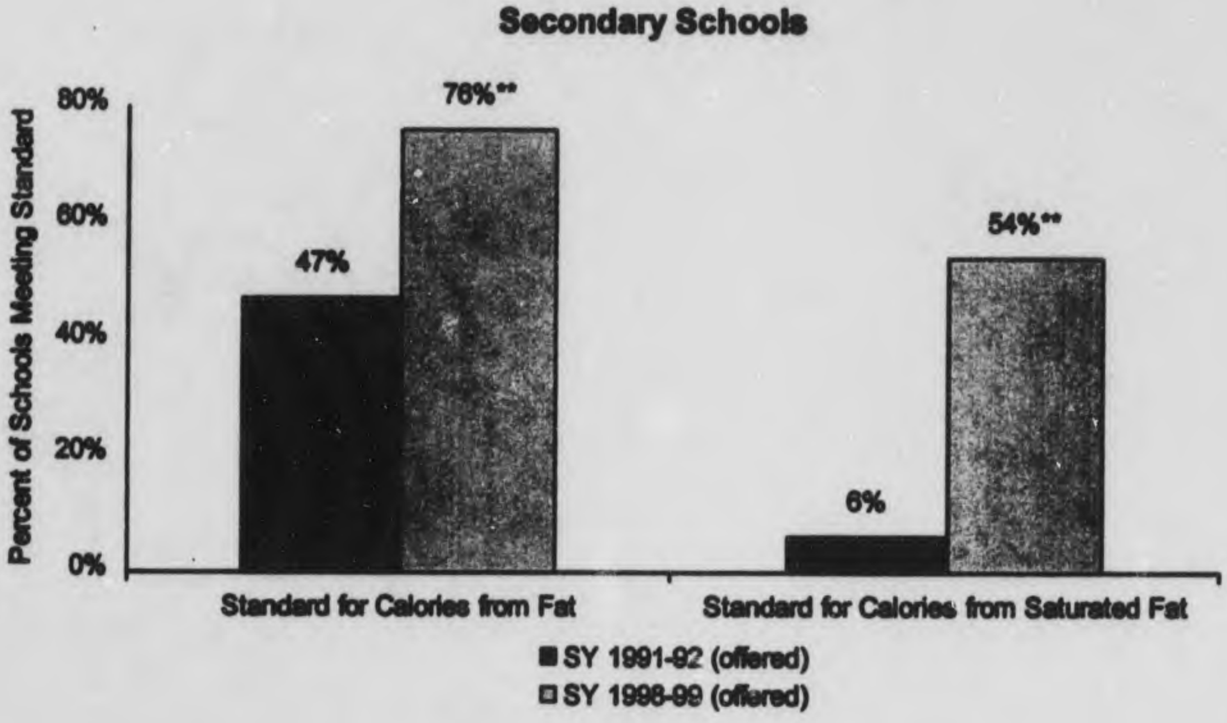


** Difference is statistically significant at the .001 level.

Note: SBP standards for the percentage of calories from fat and saturated fat were not in effect during SY 1991-92.

Exhibit 6.13 **For Breakfasts as Offered, the Percentage of Schools That Met Standards for Total Fat and Saturated Fat Has Increased Substantially Since SY 1991-92**



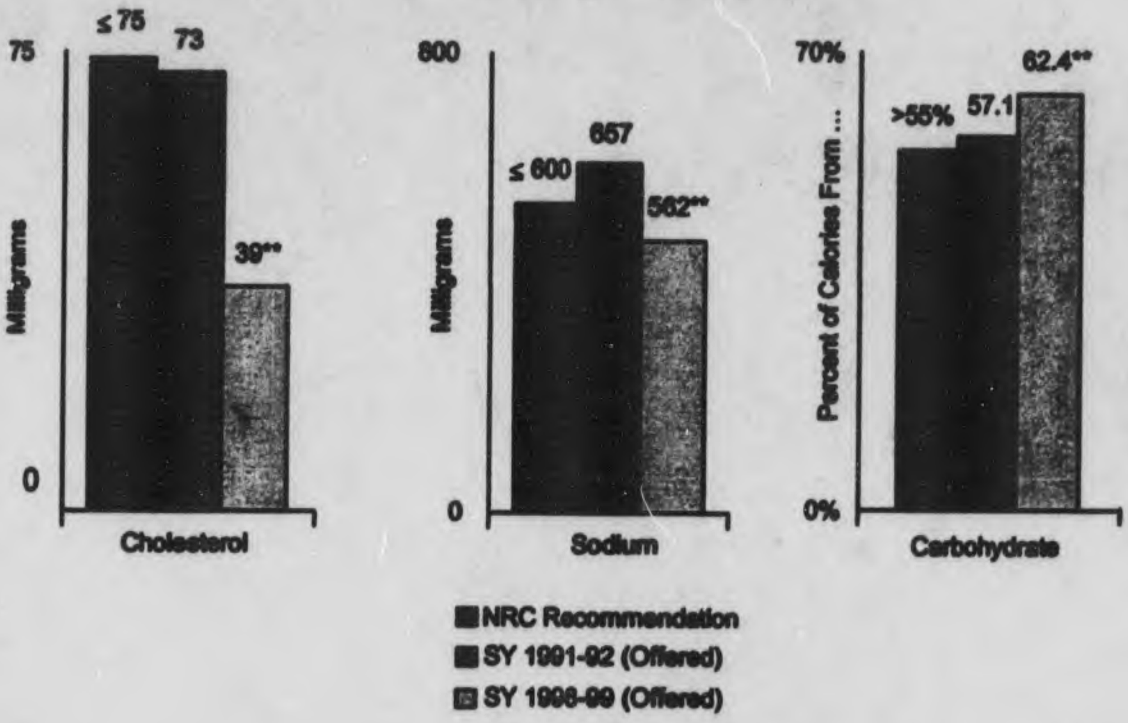


** Difference is statistically significant at the .001 level.

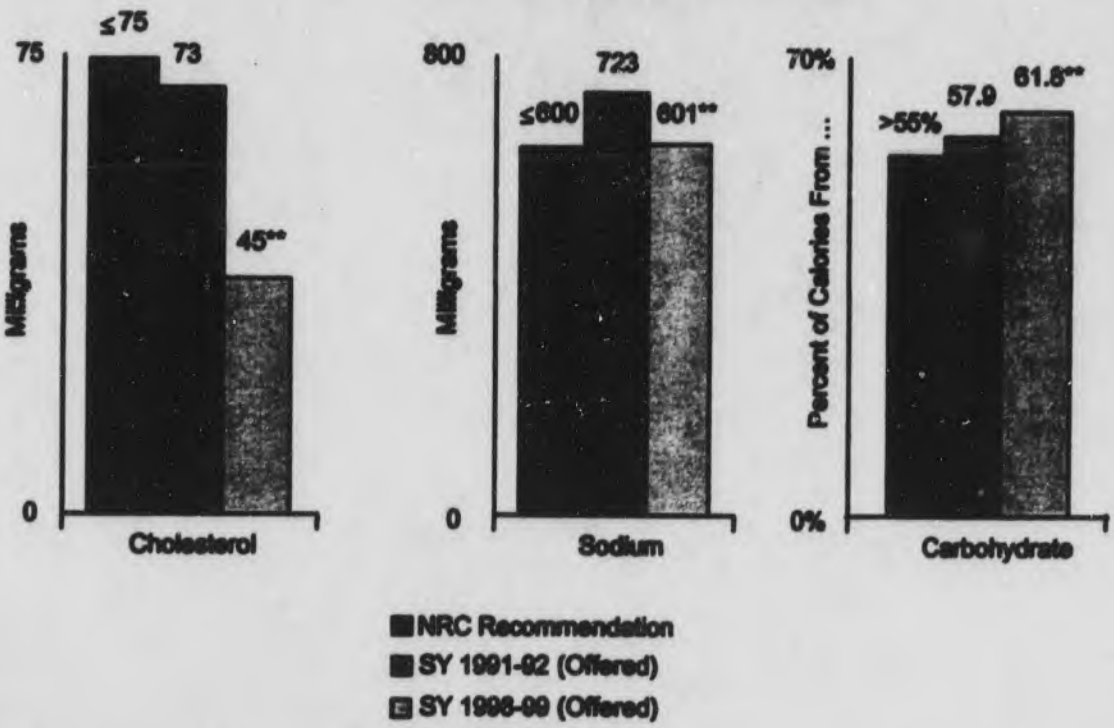
Note: SBP standards for the percentage of calories from fat and saturated fat were not in effect during SY 1991-92.

Exhibit 6.14 Breakfasts Offered in SY 1998-99 Were Significantly Lower in Cholesterol and Sodium and Higher in Calories from Carbohydrate than Breakfasts Offered in SY 1991-92

Elementary School Breakfasts



Secondary School Breakfasts



** Difference is statistically significant at the .001 level.

In SY 1991–92, breakfasts offered in both elementary schools and secondary schools exceeded the recommended level of sodium. In SY 1998–99, mean sodium content of breakfasts offered in both types of schools was significantly lower. The average breakfast offered in elementary schools satisfied the NRC recommendation for sodium and the average breakfast offered in secondary schools came very close to meeting the recommendation.

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Appendix A
Supplementary Exhibits: Nutrient Content of NSLP Lunches

Exhibit A.1

Mean Calorie and Nutrient Content of Average Lunches Served to Students in SY 1998–99

	Elementary Schools		Secondary Schools		Middle Schools		High Schools		All Schools	
	Mean Amount (S.E.)									
Total Calories	695	(6.9)	724	(5.5)	712	(6.7)	735	(7.4)	705	(5.3)
Total Fat (gm)	26	(0.3)	28	(0.3)	27	(0.4)	28	(0.4)	26	(0.3)
Saturated Fat (gm)	9	(0.2)	10	(0.1)	10	(0.1)	10	(0.2)	9	(0.1)
Carbohydrate (gm)	89	(1.1)	91	(0.9)	90	(1.2)	92	(1.1)	90	(0.9)
Protein (gm)	29	(0.2)	30	(0.2)	30	(0.2)	31	(0.2)	30	(0.2)
Percentage of Calories from:										
Fat (%)	33.1	(0.3)	34.5	(0.2)	34.3	(0.3)	34.6	(0.3)	33.6	(0.2)
Saturated Fat (%)	11.9	(0.1)	12.1	(0.1)	12.1	(0.1)	12.2	(0.1)	12.0	(0.1)
Carbohydrate (%)	51.4	(0.3)	50.0	(0.3)	50.3	(0.3)	49.7	(0.3)	50.9	(0.2)
Vitamin A (mcg RE)	437	(15.7)	390	(10.1)	391	(15.2)	388	(10.2)	420	(11.5)
Vitamin C (mg)	27	(1.3)	29	(0.8)	29	(1.1)	30	(1.0)	28	(1.0)
Calcium (mg)	478	(4.0)	475	(3.9)	472	(4.9)	478	(5.3)	477	(3.1)
Iron (mg)	4.4	(0.1)	4.7	(0.0)	4.6	(0.1)	4.8	(0.1)	4.5	(0.0)
Cholesterol (mg)	65	(0.9)	68	(1.0)	66	(1.3)	69	(1.0)	66	(0.8)
Sodium (mg)	1,259	(15.3)	1,382	(14.5)	1,346	(16.4)	1,418	(19.5)	1,303	(11.7)
Number of Schools (Unweighted)	398		677		339		338		1,075	

Source: Weighted nutrient analysis of menu and meal production data for one week between September 1998 and May 1999.

Exhibit A.2

Mean Percentage of Recommended Dietary Allowances Provided in Average Lunches Served to Students in SY 1998-99

	Elementary Schools		Secondary Schools		Middle Schools		High Schools		All Schools	
	Mean (S.E.)									
Total Calories	35%	(0.3)	30%	(0.2)	30%	(0.3)	29%	(0.3)	33%	(0.3)
Protein	105	(0.9)	64	(0.4)	66	(0.5)	62	(0.5)	91	(0.9)
Vitamin A (mcg RE)	67	(2.5)	43	(1.1)	44	(1.7)	43	(1.1)	59	(1.8)
Vitamin C (mg)	59	(2.8)	54	(1.5)	57	(2.2)	52	(1.7)	58	(2.1)
Calcium (mg)	58	(0.5)	40	(0.3)	40	(0.4)	40	(0.4)	52	(0.5)
Iron (mg)	44	(0.6)	35	(0.3)	34	(0.4)	35	(0.4)	41	(0.5)
Number of Schools (Unweighted)	398		677		339		338		1,075	

Source: Weighted nutrient analysis of menu and meal production data for one week between September 1998 and May 1999.

Exhibit A.3

Percentage of Schools in Which the Average Lunch Served to Students Met the Minimum Nutrition Standards Defined in Current NSLP Regulations

	Elementary Schools	Secondary Schools	All Schools
	Percentage of Schools		
Calories	60%	15%	44%
Protein	100	100	100
Vitamin A	98	64	86
Vitamin C	86	78	83
Calcium	100	85	95
Iron	87	58	77
Number of Schools (Unweighted)	398	677	1,075

Source: Weighted nutrient analysis of menu and meal production data for one week between September 1998 and May 1999.

Exhibit A.4

Distribution of Cholesterol and Sodium in Average Lunches Served to Students in SY 1998–99

	Elementary Schools	Secondary Schools	All Schools
	Percentage of Schools		
Cholesterol			
≤100.0 mg	99%	96%	98%
>100.0 mg	1	4	2
Sodium			
≤800.0 mg	1%	<1%	<1%
800.1-1,000.0 mg	8	3	6
>1,000.0 mg	92	97	94
Number of Schools (Unweighted)	398	677	1,075

Notes: Highlighted rows show NRC recommendations (equivalent to one-third of recommended maximum daily intake for cholesterol and sodium).

Column sections may not sum to 100 percent due to rounding.

Source: Weighted nutrient analysis of menu and meal production data for one week between September 1998 and May 1999.

Exhibit A.5

Percentage of Schools That Satisfied NSLP Standards and NRC Recommendations for Lunch, by Menu Planning System
Elementary Schools

	Menu Planning System			
	Traditional Food-Based	**NSMP/ ANSMP**	**Enhanced Food-Based**	**All Systems**
	Percentage of Schools			
Defined NSLP Standards				
Calories	78%	55%*	70%	68%
Protein	100	100	100	100
Vitamin A	98	100	97	98
Vitamin C	84	88	87	86
Calcium	100	100	100	100
Iron	95	96	90	93
Percentage of Calories from Total Fat	20	20	25	21
Percentage of Calories from Saturated Fat	13	18	17	15
NRC Recommendations				
Percentage of Calories from Carbohydrate	16	24	16	18
Cholesterol	98	99	99	99
Sodium	<1	<1	2	1
Number of Schools (Unweighted)	155	108	122	398

Notes: Data for NSMP and ANSMP were combined because of small sample size for ANSMP (7 schools).

Data for 13 schools that reported use of some other menu planning system are not presented separately because of small sample size. These schools are included in the "All Systems" column.

* Difference between the traditional food-based system and NSMP/ANSMP is statistically significant at the .01 level.

Source: Weighted nutrient analysis of menu and meal production data for one week between September 1998 and May 1999.

Exhibit A.6

Percentage of Schools That Satisfied NSLP Standards and NRC Recommendations for Lunch, by Menu Planning System
Secondary Schools

	Menu Planning System			
	Traditional Food-Based	NSMP/ ANSMP	Enhanced Food-Based	All Systems
	Percentage of Schools			
Defined NSLP Standards				
Calories	17%	24%	18%	20%
Protein	100	100	100	100
Vitamin A	62	59	73	65
Vitamin C	72	84	82	79
Calcium	87	81	91	86
Iron	61	60	58	60
Percentage of Calories from Total Fat	11	15	18	14
Percentage of Calories from Saturated Fat	8	15	19	13
NRC Recommendations				
Percentage of Calories from Carbohydrate	11	14	20	14
Cholesterol	93	100	97	96
Sodium	<1	<1	0	<1
Number of Schools (Unweighted)	282	175	197	677

Notes: Data for NSMP and ANSMP were combined because of small sample size for ANSMP (13 schools).

Data for 23 schools that reported use of some other menu planning system are not presented separately because of small sample size. These schools are included in the "All Systems" column.

None of the differences between the traditional food-based system and NSMP/ANSMP or between the traditional and enhanced food-based systems is statistically significant.

Source: Weighted nutrient analysis of menu and meal production data for one week between September 1998 and May 1999.

Exhibit A.7

Mean Nutrient Profile of Average Lunches Served in SY 1998–99, by Menu Planning System, Compared to NSLP Standards and NRC Recommendations
All Schools

		Menu Planning System			
	Standard/ Recommendation	**Traditional Food-Based**	**NSMP/ ANSMP**	**Enhanced Food-Based**	**All Systems**
Mean Percentage of RDA					
Total Calories	33%	34%	33%	34%	33%
Protein	33%	92	88	91	91
Vitamin A	33%	59	55	63	59
Vitamin C	33%	58	56	58	58
Calcium	33%	52	51	52	52
Iron	33%	42	40	40	41
Mean Percentage of Calories from...					
Total Fat	≤30%	34.3%	33.1%	32.9%†	33.6%
Saturated Fat	<10%	12.5	11.8	11.6††	12.0
Carbohydrate	>55%[1]	50.2	51.3	51.5	50.9
Mean Amount					
Cholesterol (mg)	≤100[1]	68	63	65	66
Sodium (mg)	≤800[1]	1,321	1,286	1,303	1,303
Number of Schools (Unweighted)		437	283	319	1,075

[1] NRC recommendation, not NSLP standard.

Notes: Data for NSMP and ANSMP were combined because of small sample size for ANSMP (20 schools).

Data for 36 schools that reported use of some other menu planning system are not presented separately because of small sample size. These schools are included in the "All Systems" column.

† Difference between means for the traditional and enhanced food-based systems is statistically significant at the .01 level.

†† Difference between means for the traditional and enhanced food-based systems is statistically significant at the .001 level.

Source: Weighted nutrient analysis of meal and menu production data for one week between September 1998 and May 1999.

Exhibit A.8

Percentage of Schools That Satisfied NSLP Standards and NRC Recommendations for Lunch, by Menu Planning System
All Schools

	Menu Planning System			
	Traditional Food-Based	NSMP/ ANSMP	Enhanced Food-Based	All Systems
	Percentage of Schools			
Defined NSLP Standards				
Calories	57%	44%	52%	51%
Protein	100	100	100	100
Vitamin A	86	85	89	87
Vitamin C	80	87	85	84
Calcium	95	93	97	95
Iron	83	83	79	82
Percentage of Calories from Total Fat	17	18	23	19
Percentage of Calories from Saturated Fat	12	17	18	15
NRC Recommendations				
Percentage of Calories from Carbohydrate	14	21	17	17
Cholesterol	97	100	98	98
Sodium	<1	<1	1	1
Number of Schools (Unweighted)	437	283	319	1,075

Notes: Data for NSMP and ANSMP were combined because of small sample size for ANSMP (20 schools).

Data for 36 schools that reported use of some other menu planning system are not presented separately because of small sample size. These schools are included in the "All Systems" column.

None of the differences between the traditional food-based system and NSMP/ANSMP or between the traditional and enhanced food-based systems is statistically significant.

Source: Weighted nutrient analysis of menu and meal production data for one week between September 1998 and May 1999.

Exhibit A.9

Mean Nutrient Profile of Average Lunches Served in SY 1998–99, by Menu Planning System, Compared to NSLP Standards and NRC Recommendations
Middle Schools

	Standard/ Recommendation	Menu Planning System			
		Traditional Food-Based	NSMP/ ANSMP	Enhanced Food-Based	All Systems
Mean Percentage of RDA					
Total Calories	33%	31%	30%	31%	30%
Protein	33%	67	64	66	66
Vitamin A	33%	43	40	49	44
Vitamin C	33%	57	55	59	57
Calcium	33%	40	39	40	40
Iron	33%	35	34	34	34
Mean Percentage of Calories from...					
Total Fat	≤30%	35.0%	34.3%	33.1%†	34.3%
Saturated Fat	<10%	12.5	12.0	11.6†	12.1
Carbohydrate	>55%[1]	49.3	50.3	51.7†	50.3
Mean Amount					
Cholesterol (mg)	≤100[1]	70	62	66	66
Sodium (mg)	≤800[1]	1,339	1,332	1,382	1,346
Number of Schools (Unweighted)		140	90	98	339

[1] NRC recommendation, not NSLP standard.

Notes: Data for NSMP and ANSMP were combined because of small sample size for ANSMP (6 schools).

Data for 11 schools that reported use of some other menu planning system are not presented separately because of small sample size. These schools are included in the "All Systems" column.

† Difference between traditional and enhanced food-based systems is statistically significant at the .01 level.

Source: Weighted nutrient analysis of menu and meal production data for one week between September 1998 and May 1999.

Exhibit A.10

Percentage of Schools That Satisfied NSLP Standards and NRC Recommendations for Lunch, by Menu Planning System
Middle Schools

	Menu Planning System			
	Traditional Food-Based	NSMP/ ANSMP	Enhanced Food-Based	All Systems
	Percentage of Schools			
Defined NSLP Standards				
Calories	23%	23%	24%	23%
Protein	100	100	100	100
Vitamin A	65	48	72	62
Vitamin C	79	88	85	84
Calcium	86	82	91	87
Iron	58	56	55	56
Percentage of Calories from Total Fat	9	15	22	14
Percentage of Calories from Saturated Fat	7	12	21	13
NRC Recommendations				
Percentage of Calories from Carbohydrate	11	11	25	15
Cholesterol	91	100	97	95
Sodium	0	0	0	0
Number of Schools (Unweighted)	140	90	98	339

Notes: Data for NSMP and ANSMP were combined because of small sample size for ANSMP (6 schools).

Data for 11 schools that reported use of some other menu planning system are not presented separately because of small sample size. These schools are included in the "All Systems" column.

None of the differences between the traditional food-based system and NSMP/ANSMP or between the traditional and enhanced food-based systems is statistically significant.

Source: Weighted nutrient analysis of menu and meal production data for one week between September 1998 and May 1999.

Exhibit A.11

Mean Nutrient Profile of Average Lunches Served in SY 1998–99, by Menu Planning System, Compared to NSLP Standards and NRC Recommendations
High Schools

	Standard/ Recommendation	Menu Planning System: Traditional Food-Based	NSMP/ ANSMP	Enhanced Food-Based	All Systems
Mean Percentage of RDA					
Total Calories	33%	29%	30%	29%	29%
Protein	33%	62	62	61	62
Vitamin A	33%	41	43	47	43
Vitamin C	33%	48	58	51	52
Calcium	33%	39	41	41	40
Iron	33%	36	36	35	35
Mean Percentage of Calories from...					
Total Fat	≤ 30%	35.5%	34.1%	33.9%	34.6%
Saturated Fat	< 10%	12.5	12.0	11.9	12.2
Carbohydrate	> 55%[1]	48.7	50.4	50.4	49.7
Mean Amount					
Cholesterol (mg)	≤ 100[1]	72	67	67	69
Sodium (mg)	≤ 800[1]	1,407	1,449	1,403	1,418
Number of Schools (Unweighted)		142	85	99	338

[1] NRC recommendation, not NSLP standard.

Notes: Data for NSMP and ANSMP were combined because of small sample size for ANSMP (7 schools).

Data for 12 schools that reported use of some other menu planning system are not presented separately because of small sample size. These schools are included in the "All Systems" column.

None of the differences between the traditional food-based system and NSMP/ANSMP or between the traditional and enhanced food-based systems is statistically significant.

Source: Weighted nutrient analysis of menu and meal production data for one week between September 1998 and May 1999.

Exhibit A.12

Percentage of Schools That Satisfied NSLP Standards and NRC Recommendations for Lunch, by Menu Planning System
High Schools

	Menu Planning System			
	Traditional Food-Based	NSMP/ ANSMP	Enhanced Food-Based	All Systems
	Percentage of Schools			
Defined NSLP Standards				
Calories	11%	26%	13%	16%
Protein	100	100	100	100
Vitamin A	60	70	74	67
Vitamin C	65	81	78	74
Calcium	87	80	91	85
Iron	64	63	61	64
Percentage of Calories from Total Fat	13	16	14	14
Percentage of Calories from Saturated Fat	10	18	17	14
NRC Recommendations				
Percentage of Calories from Carbohydrate	10	18	15	13
Cholesterol	96	99	97	97
Sodium	<1	1	0	<1
Number of Schools (Unweighted)	142	85	99	338

Notes: Data for NSMP and ANSMP were combined because of small sample size for ANSMP (7 schools).

Data for 12 schools that reported use of some other menu planning system are not presented separately because of small sample size. These schools are included in the "All Systems" column.

None of the differences between the traditional food-based system and NSMP/ANSMP or between the traditional and enhanced food-based systems is statistically significant.

Source: Weighted nutrient analysis of menu and meal production data for one week between September 1998 and May 1999.

Exhibit A.13

Percentage of Schools That Satisfied NSLP Standards and NRC Recommendations for Lunch, by Relative Fat Content of Average Lunch Served

	Relative Amount of Fat in Average Lunch, as Served[1]			
	Low	Moderate	High	Highest
Standard/Recommendation	Percentage of Schools			
Defined NSLP Standards				
Calories	52%	55%	39%	55%
Protein	100	100	100	100
Vitamin A	91	89	84	75
Vitamin C	89	88	74	74
Calcium	97	96	95	90
Iron	94	86	69	68
Percentage of Calories from Total Fat	100	0	0	0
Percentage of Calories from Saturated Fat	53	9	1	0
NRC Recommendations				
Percentage of Calories from Carbohydrate	71	7	0	0
Cholesterol	100	99	97	93
Sodium	2	<1	0	<1
Number of Schools (Unweighted)	206	527	200	142

[1] Low-fat is defined as no more than 30 percent of calories from fat; moderate-fat as more than 30 percent up to 34 percent; high-fat as more than 34 percent up to 38 percent; and highest-fat as more than 38 percent. Schools in the low-fat group met the NSLP standard for percentage of calories from fat.

Source: Weighted nutrient analysis of menu and meal production data for one week between September 1998 and May 1999.

Exhibit A.14

Mean Nutrient and Calorie Content of Lunches, Using Alternative Methodology for Unweighted Analysis
Elementary Schools

	Standard/ Recommendation	Weighted (Served)	Unweighted (Offered)	Percent Difference (Weighted vs. Unweighted)
		Mean		Mean
Mean Percentage of RDA				
Calories	33%	35%	38%	-8%**
Protein	33%	105	109	-4**
Vitamin A	33%	67	75	-11**
Vitamin C	33%	59	80	-26**
Calcium	33%	58	61	-5**
Iron	33%	44	45	-2*
Mean Percentage of Calories from...				
Total Fat	≤30%	33.1%	33.5%	-1
Saturated Fat	< 10%	11.9	11.9	0
Carbohydrate	> 55%[1]	51.4	51.5	0
Mean Amount				
Cholesterol (mg)	≤100[1]	65	68	-4**
Sodium (mg)	≤800[1]	1,259	1,287	-2*
Number of Schools (Unweighted)		398		

[1] NRC recommendation, not NSLP standard.

* Difference between weighted and unweighted analyses is statistically significant at the .01 level.

** Difference between weighted and unweighted analyses is statistically significant at the .001 level.

Source: Weighted and unweighted nutrient analyses of menu and meal production data for one week between September 1998 and May 1999.

Exhibit A.15

Percentage of Schools That Satisfied NSLP Standards and NRC Recommendations for Lunch Based on Weighted and Unweighted Analyses, Using Alternative Methodology for Unweighted Analysis
Elementary Schools

Standard/Recommendation	Weighted (Served)	Unweighted (Offered)	Percent Difference (Weighted vs. Unweighted)
	Percentage of Schools		
Defined NSLP Standards			
Calories	68%	82%	-17%**
Protein	100	100	0
Vitamin A	98	99	-1
Vitamin C	86	94	-9**
Calcium	100	100	0
Iron	93	96	-3
Percentage of Calories from Fat	21	16	+31
Percentage of Calories from Saturated Fat	15	14	+7
NRC Recommendations			
Percentage of Calories from Carbohydrate	18	19	-5
Cholesterol	99	94	+5
Sodium	1	1	0
Number of Schools (Unweighted)	398		

** Difference between weighted and unweighted analyses is statistically significant at the .001 level.

Source: Menu and meal production data for one week between September 1998 and May 1999.

Exhibit A.16

Mean Nutrient and Calorie Content of Lunches, Using Alternative Methodology for Unweighted Analysis
Secondary Schools

	Standard/ Recommendation	Weighted (Served)	Unweighted (Offered)	Percent Difference (Weighted vs. Unweighted)
		Mean		Mean
Mean Percentage of RDA				
Calories	33%	30%	33%	-9**
Protein	33%	64	69	-7**
Vitamin A	33%	43	57	-25**
Vitamin C	33%	54	78	-31**
Calcium	33%	40	45	-11**
Iron	33%	35	37	-5**
Mean Percentage of Calories from...				
Total Fat	≤ 30%	34.5%	33.9%	+2**
Saturated Fat	< 10%	12.1	11.9	+2**
Carbohydrate	> 55%[1]	50.0	51.1	-2**
Mean Amount				
Cholesterol (mg)	≤ 100[1]	68	76	-11**
Sodium (mg)	≤ 800[1]	1,382	1,501	-8**
Number of Schools (Unweighted)		677		

[1] NRC recommendation, not NSLP standard.

* Difference between weighted and unweighted analyses is statistically significant at the .01 level.

** Difference between weighted and unweighted analyses is statistically significant at the .001 level.

Source: Weighted and unweighted nutrient analyses of menu and meal production data for one week between September 1998 and May 1999.

Exhibit A.17

Percentage of Schools That Satisfied NSLP Standards and NRC Recommendations for Lunch Based on Weighted and Unweighted Analyses, Using Alternative Methodology for Unweighted Analysis
Secondary Schools

Standard/Recommendation	Weighted (Served)	Unweighted (Offered)	Percent Difference (Weighted vs. Unweighted)
	Percentage of Schools		
Defined NSLP Standards			
Calories	20%	45%	-56%**
Protein	100	100	0
Vitamin A	65	90	-28**
Vitamin C	79	93	-15**
Calcium	86	100	-14**
Iron	60	70	-14**
Percentage of Calories from Fat	14	19	-26**
Percentage of Calories from Saturated Fat	13	15	-13
NRC Recommendations			
Percentage of Calories from Carbohydrate	14	21	-33**
Cholesterol	96	90	+7**
Sodium	<1	<1	0
Number of Schools (Unweighted)	677		

** Difference between weighted and unweighted analyses is statistically significant at the .001 level.

Source: Menu and meal production data for one week between September 1998 and May 1999.

Appendix B
Supplementary Exhibits: Nutrient Content of SBP Breakfasts

Exhibit B.1

Mean Calorie and Nutrient Content of Average Breakfasts Served to Students in SY 1998-99

	Elementary Schools		Secondary Schools		Middle Schools		High Schools		All Schools	
	Mean Amount (S.E.)									
Total Calories	447	(5.7)	483	(6.3)	465	(7.4)	501	(7.6)	459	(4.9)
Total Fat (gm)	13	(0.3)	15	(0.3)	14	(0.4)	16	(0.4)	14	(0.3)
Saturated Fat (gm)	5	(0.1)	6	(0.1)	5	(0.1)	6	(0.2)	5	(0.1)
Carbohydrate (gm)	68	(1.0)	71	(1.1)	70	(1.3)	73	(1.3)	69	(0.8)
Protein (gm)	15	(0.2)	16	(0.2)	16	(0.2)	17	(0.3)	15	(0.2)
Percentage of Calories from:										
Fat (%)	26.5	(0.4)	28.3	(0.4)	27.4	(0.5)	29.1	(0.5)	27.1	(0.3)
Saturated Fat (%)	10.1	(0.2)	10.5	(0.2)	10.1	(0.2)	10.8	(0.3)	10.2	(0.2)
Carbohydrate (%)	61.5	(0.5)	59.2	(0.5)	60.2	(0.6)	58.2	(0.6)	60.7	(0.4)
Vitamin A (mcg RE)	254	(4.4)	226	(4.9)	227	(6.0)	225	(5.7)	244	(3.9)
Vitamin C (mg)	37	(1.1)	39	(1.0)	39	(1.1)	38	(1.4)	38	(0.9)
Calcium (mg)	354	(4.5)	350	(5.3)	346	(6.0)	355	(6.6)	353	(3.9)
Iron (mg)	3.8	(0.1)	3.8	(0.1)	3.7	(0.1)	3.9	(0.1)	3.8	(0.1)
Cholesterol (mg)	43	(2.9)	55	(2.2)	50	(2.6)	59	(3.0)	47	(2.2)
Sodium (mg)	574	(10.5)	672	(12.8)	621	(12.7)	723	(17.9)	607	(9.5)
Number of Schools (Unweighted)	317		487		245		242		804	

Source: Weighted nutrient analysis of menu and meal production data for one week between September 1998 and May 1999.

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Exhibit B.2

Mean Percentage of Recommended Dietary Allowances in Average Breakfasts Served to Students in SY 1998-99

	Elementary Schools		Secondary Schools		Middle Schools		High Schools		All Schools	
	Mean (S.E.)									
Total Calories	23%	(0.3)	20%	(0.3)	20%	(0.3)	20%	(0.3)	22%	(0.2)
Protein	52	(0.7)	34	(0.5)	35	(0.5)	34	(0.6)	46	(0.6)
Vitamin A	39	(0.7)	25	(0.5)	25	(0.7)	25	(0.6)	34	(0.6)
Vitamin C	81	(2.5)	72	(1.9)	78	(2.2)	67	(2.4)	78	(1.9)
Calcium	43	(0.6)	29	(0.4)	29	(0.5)	30	(0.5)	38	(0.5)
Iron	37	(0.7)	28	(0.7)	28	(0.9)	29	(0.8)	34	(0.6)
Number of Schools (Unweighted)	317		487		245		242		804	

Source: Weighted nutrient analysis of menu and meal production data for one week between September 1998 and May 1999.

Exhibit B.3

Percentage of Schools in Which the Average Breakfast Served to Students Met the Nutrition Standards Defined in Current SBP Regulations

	Elementary Schools	Secondary Schools		All Schools
	Minimum Standard	Minimum Standard	Optional Standard	Minimum Standard
	Percentage of Schools			
Total calories	8%	20%	8%	12%
Protein	98	100	93	98
Vitamin A	85	60	47	77
Vitamin C	96	97	94	96
Calcium	94	90	78	93
Iron	78	72	57	76
Number of Schools (Unweighted)	317	487		804

Note: Minimum standards cover grades K-12. The optional standards cover grades 7-12.

Source: Weighted nutrient analysis of menu and meal production data for one week between September 1998 and May 1999.

Exhibit B.4

Distribution of Cholesterol and Sodium in Average Breakfasts Served to Students in SY 1998–99

	Elementary Schools	Secondary Schools	All Schools
	Percentage of Schools		
Cholesterol			
≤75.0 mg	90%	76%	85%
75.1-100.0 mg	5	16	9
>100.0 mg	5	9	6
Sodium			
≤600.0 mg	63%	42%	56%
600.1-750.0 mg	28	31	29
>750.0 mg	9	28	15
Number of Schools (Unweighted)	317	487	804

Notes: Highlighted rows show NRC recommendations (equivalent to one-fourth of recommended maximum daily intake for cholesterol and sodium).

Columns may not sum to 100 percent due to rounding.

Source: Weighted nutrient analysis of menu and meal production data for one week between September 1998 and May 1999.

Exhibit B.5

Percentage of Schools That Satisfied SBP Standards and NRC Recommendations for Breakfast, by Menu Planning System
Elementary Schools

	Menu Planning System			
	Traditional Food-Based	NSMP/ ANSMP	Enhanced Food-Based	All Systems
	Percentage of Schools			
Defined SBP Standards				
Calories	23%	11%	30%	22%
Protein	100	100	100	100
Vitamin A	96	94	93	95
Vitamin C	97	98	100	98
Calcium	99	100	100	99
Iron	96	91	90	93
Percentage of Calories from Total Fat	70	82	72	75
Percentage of Calories from Saturated Fat	39	74**	59	54
NRC Recommendations				
Percentage of Calories from Carbohydrate	77	85	83	82
Cholesterol	86	93	92	90
Sodium	59	73	61	63
Number of Schools (Unweighted)	128	83	93	317

Notes: Data for NSMP and ANSMP were combined because of small sample size for ANSMP (4 schools).

Data for 13 schools that reported use of some other menu planning system are not presented separately because of small sample size. These schools are included in the "All Systems" column.

** Difference between the traditional food-based system and NSMP/ANSMP is statistically significant at the .001 level.

Source: Weighted nutrient analysis of menu and meal production data for one week between September 1998 and May 1999.

Exhibit B.6

Percentage of Schools That Satisfied SBP Standards and NRC Recommendations for Breakfast, by Menu Planning System
Secondary Schools

	Menu Planning System			
	Traditional Food-Based	NSMP/ ANSMP	Enhanced Food-Based	All Systems
	Percentage of Schools			
Defined SBP Standards				
Calories	7%	12%	6%	8%
Protein	97	93	93	95
Vitamin A	45	55	40	48
Vitamin C	97	92	94	95
Calcium	83	70	76	78
Iron	53	73*	46	57
Percentage of Calories from Total Fat	55	69	71	64
Percentage of Calories from Saturated Fat	36	54	56	46
NRC Recommendations				
Percentage of Calories from Carbohydrate	67	74	78	72
Cholesterol	71	79	78	76
Sodium	33	46	49	42
Number of Schools (Unweighted)	220	121	128	487

Notes: Data for NSMP and ANSMP were combined because of small sample size for ANSMP (10 schools).

Data for 18 schools that reported use of some other menu planning system are not presented separately because of small sample size. These schools are included in the "All Systems" column.

* Difference between the traditional food-based system and NSMP/ANSMP is statistically significant at the .01 level.

Source: Weighted nutrient analysis of menu and meal production data for one week between September 1998 and May 1999.

Exhibit B.7

Mean Nutrient Profile of Average Breakfasts Served in SY 1998-99, by Menu Planning System, Compared to SBP Standards and NRC Recommendations
All Schools

		Menu Planning System			
	Standard/ Recommendation	**Traditional Food-Based**	**NSMP/ ANSMP**	**Enhanced Food-Based**	**All Systems**
Mean Percentage of RDA	[redacted]				
Total Calories	[redacted]	22%	21%*	22%	22%
Protein	[redacted]	48	44	47	46
Vitamin A	[redacted]	34	35	33	34
Vitamin C	[redacted]	78	77	81	78
Calcium	[redacted]	38	37	39	38
Iron	[redacted]	34	36	33	34
Mean Percentage of Calories from...	[redacted]				
Total Fat	[redacted]	28.4%	25.2%**	27.1%	27.1%
Saturated Fat	[redacted]	10.9	9.3**	10.1	10.2
Carbohydrate	[redacted]	59.3	62.7*	60.7	60.7
Mean Amount	[redacted]				
Cholesterol (mg)	[redacted]	54	42	42	47
Sodium (mg)	[redacted]	636	578	597	607
Number of Schools (Unweighted)		348	204	221	804

[1]NRC recommendation, not SBP standard.

Notes: Data for NSMP and ANSMP were combined because of small sample size for ANSMP (15 schools).

Data for 31 schools that reported use of some other menu planning system are not presented separately because of small sample size. These schools are included in the "All Systems" column.

** Difference between the traditional food-based system and NSMP/ANSMP is statistically significant at the .001 level.

* Difference between the traditional food-based system and NSMP/ANSMP is statistically significant at the .01 level.

Source: Weighted nutrient analysis of meal and menu production data for one week between September 1998 and May 1999.

Exhibit B.8

Percentage of Schools That Satisfied SBP Standards and NRC Recommendations for Breakfast, by Menu Planning System
All Schools

	Menu Planning System			
	Traditional Food-Based	**NSMP/ ANSMP**	**Enhanced Food-Based**	**All Systems**
	Percentage of Schools			
Defined SBP Standards				
Calories	18%	12%	22%	17%
Protein	99	98	98	98
Vitamin A	79	81	75	79
Vitamin C	97	96	98	97
Calcium	93	90	92	92
Iron	82	85	75	81
Percentage of Calories from Total Fat	65	77	72	71
Percentage of Calories from Saturated Fat	38	67**	58†	52
NRC Recommendations				
Percentage of Calories from Carbohydrate	73	82	81	79
Cholesterol	81	88	87	85
Sodium	50	63	57	56
Number of Schools (Unweighted)	348	204	221	804

Notes: Data for NSMP and ANSMP were combined because of small sample size for ANSMP (13 schools).

Data for 31 schools that reported use of some other menu planning system are not presented separately because of small sample size. These schools are included in the "All Systems" column.

** Difference between the traditional food-based system and NSMP/ANSMP is statistically significant at the .001 level.

† Difference between the traditional and enhanced food-based systems is statistically significant at the .01 level.

Source: Weighted nutrient analysis of menu and meal production data for one week between September 1998 and May 1999.

Exhibit B.9

Mean Nutrient Profile of Average Breakfasts Served in SY 1998-99, by Menu Planning System, Compared to SBP Standards and NRC Recommendations
Middle Schools

	Standard/ Recommendation	Menu Planning System			
		Traditional Food-Based	NSMP/ ANSMP	Enhanced Food-Based	All Systems
Mean Percentage of RDA	[redacted]				
Total Calories	[redacted]	21%	20%	19%	20%
Protein	[redacted]	36	34	33	35
Vitamin A	[redacted]	25	27	24	25
Vitamin C	[redacted]	79	77	78	78
Calcium	[redacted]	30	29	28	29
Iron	[redacted]	27	32	24	28
Mean Percentage of Calories from...	[redacted]				
Total Fat	[redacted]	29.0%	25.0%*	27.5%	27.4%
Saturated Fat	[redacted]	10.8	9.2*	10.0	10.1
Carbohydrate	[redacted]	58.5	62.8*	60.1	60.2
Mean Amount	[redacted]				
Cholesterol (mg)	[redacted]	55	49	45	50
Sodium (mg)	[redacted]	655	595	596	621
Number of Schools (Unweighted)		111	62	63	245

[1] NRC recommendation, not SBP standard.

Notes: Data for NSMP and ANSMP were combined because of small sample size for ANSMP (4 schools).

Data for 9 schools that reported use of some other menu planning system are not presented separately because of small sample size. These schools are included in the "All Systems" column.

* Difference between the traditional food-based system and NSMP/ANSMP is statistically significant at the .01 level.

Source: Weighted nutrient analysis of meal and menu production data for one week between September 1998 and May 1999.

Exhibit B.10

Percentage of Schools That Satisfied SBP Standards and NRC Recommendations for Breakfast, by Menu Planning System
Middle Schools

	Menu Planning System			
	Traditional Food-Based	NSMP/ ANSMP	Enhanced Food-Based	All Systems
	Percentage of Schools			
Defined SBP Standards				
Total Calories	9%	7%	7%	8%
Protein	97	92	98	96
Vitamin A	48	53	37	48
Vitamin C	99	97	96	98
Calcium	82	73	70	77
Iron	53	72	38	54
Percentage of Calories from Total Fat	62	81	73	71
Percentage of Calories from Saturated Fat	41	69*	55	52
NRC Recommendations				
Percentage of Calories from Carbohydrate	73	84	81	79
Cholesterol	75	85	86	81
Sodium	39	64	63	53
Number of Schools (Unweighted)	111	62	63	245

Notes: Data for NSMP and ANSMP were combined because of small sample size for ANSMP (4 schools).

Data for 9 schools that reported use of some other menu planning system are not presented separately because of small sample size. These schools are included in the "All Systems" column.

* Difference between the traditional food-based system and NSMP/ANSMP is statistically significant at the .01 level.

Source: Weighted nutrient analysis of menu and meal production data for one week between September 1998 and May 1999.

Exhibit B.11

Mean Nutrient Profile of Average Breakfasts Served in SY 1998-99, by Menu Planning System, Compared to SBP Standards and NRC Recommendations
High Schools

	Standard/ Recommendation	Menu Planning System			
		Traditional Food-Based	NSMP/ ANSMP	Enhanced Food-Based	All Systems
Mean Percentage of RDA					
Total Calories	25%	20%	20%	20%	20%
Protein	25%	35	34	33	34
Vitamin A	25%	24	26	24	25
Vitamin C	25%	67	61	70	67
Calcium	25%	30	29	30	30
Iron	25%	28	31	26	29
Mean Percentage of Calories from...					
Total Fat	≤30%	30.7%	28.2%	27.7%	29.1%
Saturated Fat	<10%	11.7	10.3	9.9[††]	10.8
Carbohydrate	>55%[1]	56.3	59.2	59.7	58.2
Mean Amount					
Cholesterol (mg)	≤75[1]	62	57	58	59
Sodium (mg)	≤600[1]	736	767	675	723
Number of Schools		109	59	65	242

[1] NRC recommendation, not SBP standard.

Notes: Data for NSMP and ANSMP were combined because of small sample size for ANSMP (5 schools). Data for 9 schools that reported use of some other menu planning system are not presented separately because of small sample size. These schools are included in the "All Systems" column.

[††] Difference between the traditional and enhanced food-based systems is statistically significant at the .001 level.

Source: Weighted nutrient analysis of meal and menu production data for one week between September 1998 and May 1999.

Exhibit B.12

Percentage of Schools That Satisfied SBP Standards and NRC Recommendations for Breakfast, by Menu Planning System
High Schools

	Menu Planning System			
	Traditional Food-Based	NSMP/ ANSMP	Enhanced Food-Based	All Systems
	Percentage of Schools			
Defined SBP Standards				
Calories	5%	16%	5%	8%
Protein	97	95	88	94
Vitamin A	41	57	43	47
Vitamin C	95	86	91	92
Calcium	84	68	82	79
Iron	53	75	53	59
Percentage of Calories from Total Fat	47	55	69	57
Percentage of Calories from Saturated Fat	30	39	56	40
NRC Recommendations				
Percentage of Calories from Carbohydrate	61	63	75	66
Cholesterol	67	73	69	70
Sodium	26	26	36	30
Number of Schools (Unweighted)	109	59	65	242

Notes: Data for NSMP and ANSMP were combined because of small sample size for ANSMP (5 schools).

Data for 9 schools that reported use of some other menu planning system are not presented separately because of small sample size. These schools are included in the "All Systems" column.

None of the differences between the traditional food-based system and NSMP/ANSMP or between the traditional and enhanced food-based systems is statistically significant.

Source: Weighted nutrient analysis of menu and meal production data for one week between September 1998 and May 1999.

Exhibit B.13

Percentage of Schools That Satisfied SBP Standards and NRC Recommendations for Breakfast, by Relative Fat Content of Average Breakfast Served

	Relative Amount of Fat in Average Breakfast, as Served[1]	
	Low	Higher
Standard/Recommendation	Percentage of Schools	
Defined SBP Standards		
Calories	15%	23%
Protein	98	99
Vitamin A	83	69
Vitamin C	97	96
Calcium	93	90
Iron	83	76
Percentage of Calories from Total Fat	100	0
Percentage of Calories from Saturated Fat	69	8
NRC Recommendations		
Percentage of Calories from Carbohydrate	98	31
Cholesterol	91	72
Sodium	65	33
Number of Schools (Unweighted)	549	255

[1] Low-fat is defined as no more than 30 percent of calories from fat. Schools in this group met the SBP standard for percentage of calories from fat. All schools not included in the low-fat group are included in the higher-fat group.

Source: Weighted nutrient analysis of menu and meal production data for one week between September 1998 and May 1999.

Exhibit B.14

Mean Nutrient and Calorie Content of Breakfasts, Using Alternative Methodology for Unweighted Analysis
Elementary Schools

		Weighted (Served)	Unweighted (Offered)	Percent Difference (Weighted vs. Unweighted)
	[redacted]	Mean		
Mean Percentage of RDA	[redacted]			
Total Calories	[redacted]	23%	23%	0%
Protein	[redacted]	52	53	-2
Vitamin A	[redacted]	39	41	-5**
Vitamin C	[redacted]	81	86	-6**
Calcium	[redacted]	43	45	-4**
Iron	[redacted]	37	40	-8**
Mean Percentage of Calories from	[redacted]			
Total Fat	[redacted]	26.5%	26.0%	+2
Saturated Fat	[redacted]	10.1	10.0	+1
Carbohydrate	[redacted]	61.5	61.8	<1
Mean Amount	[redacted]			
Cholesterol (mg)	[redacted]	43	39	+10
Sodium (mg)	[redacted]	574	561	+2
Number of Schools (Unweighted)		317		

[1] NRC recommendation, not SBP standard.

* Difference between weighted and unweighted analyses is statistically significant at the .01 level.

** Difference between weighted and unweighted analyses is statistically significant at the .001 level.

Source: Weighted and unweighted nutrient analyses of menu and meal production data for one week between September 1998 and May 1999.

Exhibit B.15

Percentage of Schools That Satisfied SBP Standards and NRC Recommendations for Breakfast Based on Weighted and Unweighted Analyses, Using Alternative Methodology for Unweighted Analysis
Elementary Schools

Standard/Recommendation	Weighted (Served)	Unweighted (Offered)	Percent Difference (Weighted vs. Unweighted)
	Percentage of Schools		
Defined SBP Standards			
Calories	22%	19%	+16%
Protein	100	100	0
Vitamin A	95	99	-4
Vitamin C	98	98	0
Calcium	99	100	-1
Iron	93	87	+7
Percentage of Calories from Fat	75	77	-3
Percentage of Calories from Saturated Fat	54	53	+2
NRC Recommendations			
Percentage of Calories from Carbohydrate	82	90	-9*
Cholesterol	90	95	-5*
Sodium	63	69	-9
Number of Schools (Unweighted)	317		

* Difference between weighted and unweighted analyses is statistically significant at the .01 level.

Source: Menu and meal production data for one week between September 1998 and May 1999.

Exhibit B.16

Mean Nutrient and Calorie Content of Breakfasts, Using Alternative Methodology for Unweighted Analysis
Secondary Schools

	Standard & Recommendation	Weighted (Served)	Unweighted (Offered)	Percent Difference (Weighted vs. Unweighted)
		Mean		
Mean Percentage of RDA				
Total Calories	25%	20%	20%	0%
Protein	25%	34	34	0
Vitamin A	25%	25	29	-14**
Vitamin C	25%	72	75	-4*
Calcium	25%	29	32	-9**
Iron	25%	28	30	-7*
Mean Percentage of Calories from				
Total Fat	≤30%	28.3%	26.4%	+7**
Saturated Fat	<10%	10.5	10.0	+5**
Carbohydrate	>55%[1]	59.2	61.0	-3**
Mean Amount				
Cholesterol (mg)	≤75[1]	55	47	+17**
Sodium (mg)	≤600[1]	672	607	+11**
Number of Schools (Unweighted)		487		

[1] NRC recommendation, not SBP standard.

* Difference between weighted and unweighted analyses is statistically significant at the .01 level.

** Difference between weighted and unweighted analyses is statistically significant at the .001 level.

Source: Weighted and unweighted nutrient analyses of menu and meal production data for one week between September 1998 and May 1999.

Exhibit B.17

Percentage of Schools That Satisfied SBP Standards and NRC Recommendations for Breakfast Based on Weighted and Unweighted Analyses, Using Alternative Methodology for Unweighted Analysis
Secondary Schools

Standard/Recommendation	Weighted (Served)	Unweighted (Offered)	Percent Difference (Weighted vs. Unweighted)
	Percentage of Schools		
Defined SBP Standards			
Calories	8%	4%	+100%**
Protein	95	99	-4**
Vitamin A	48	69	-30**
Vitamin C	95	98	-3
Calcium	78	100	-22**
Iron	57	65	-12*
Percentage of Calories from Fat	64	75	-15**
Percentage of Calories from Saturated Fat	46	52	-12*
NRC Recommendations			
Percentage of Calories from Carbohydrate	72	84	-14**
Cholesterol	76	89	-15**
Sodium	42	55	-24**
Number of Schools (Unweighted)	487		

* Difference between weighted and unweighted analyses is statistically significant at the .01 level.

** Difference between weighted and unweighted analyses is statistically significant at the .001 level.

Source: Menu and meal production data for one week between September 1998 and May 1999.

Appendix C
Study Implementation

This appendix describes the protocols and instruments used to collect data for the SNDA-II study. Two different survey efforts were used to collect data: a telephone interview of SFA directors and a mail survey of cafeteria managers. The two surveys were implemented concurrently. The following paragraphs describe the survey instruments, the data collection schedule, and the procedures used to encourage participation and submission of complete data. Copies of all instruments are included at the back of this appendix.

Data Collection Schedule and Instruments

Data collection began in September 1998. The initial plan called for data collection to be completed by the end of December 1998. However, because many schools were unable to participate in the study or to complete data collection requirements during this time frame, the data collection period was extended and ran through May 1999.

Data collection instruments were carefully designed and went through two rounds of pretesting to ensure that instruments and protocols facilitated the uniform reporting of data and minimized response burden. In addition, survey materials used to collect information on meals served in school food service programs were designed to be comparable to those used in the first SNDA study (SNDA-I) so that nutrient analysis results for the two studies could be compared.

Telephone Interview of SFA Directors

The SFA director interview was used to collect basic descriptive information about school food service operations. Information was collected about operations at the SFA level as well as about selected characteristics of the specific schools participating in the study. Items included in the interview covered participation in the SBP and NSLP, enrollment, numbers of students approved for free and reduced-price meal benefits, menu planning practices, selected food purchasing practices, strategies used in setting prices for reimbursable meals and *a la carte* foods, use of foods from commercial vendors, and use of food service management companies.

The interview included 26 questions, most of which were asked about each sampled school, and took an average of 19 minutes to complete. Interviewers in Abt's telephone survey center in Amherst, Massachusetts conducted the interviews using computer-assisted personal interview (CAPI) technology.

Appointments for the interview were scheduled with SFA directors when they were contacted by phone, approximately six weeks before data collection was to begin, to remind them about the study and the upcoming data collection. This telephone contact was also used to schedule a target week for the mail survey of cafeteria managers, as described in a subsequent section. As a followup, respondents received a letter that confirmed the date and time of the appointment. The letter also included a hard copy of the few survey items that required data from administrative records. SFA directors were encouraged to record needed information on the hard copy form prior to the interview. This included, for each of the selected schools in the district, information on enrollment, average daily attendance, numbers of students not eligible to participate in breakfast or lunch programs, and numbers of students approved for free and reduced-price meals.

Respondents who missed the scheduled appointment or were not able to complete it at the appointed time were recontacted until the interview was completed. Respondents who failed to complete the interview after 30 or more contact attempts were referred to the project director for followup. No respondent was considered a final refusal until the project director was unsuccessful in contacting him or her and/or in securing participation.

Mail Survey of Cafeteria Managers

Cafeteria managers in sampled schools (or other respondents designated by the SFA director) were asked to complete a self-administered survey that included a number of different data collection instruments and forms. The primary focus of the survey was to collect detailed information on breakfasts and lunches served during a specified five-day period, referred to as the target week. For this reason, all survey forms were bound together into a booklet which was referred to as the menu survey. In turn, the menu survey booklet was packaged with other materials and response aids designed to facilitate collection of uniform data, reduce confusion, and minimize response burden.

Menu survey packets contained all materials needed by cafeteria managers to record required information on the foods and beverages served to students during the target week. In addition to data collection forms, the packet included an instruction manual that provided detailed guidelines for completing each form as well as sample completed forms and three laminated reference guides. The reference guides provided instructions on how to describe foods adequately and completely, how to collect package labels, and how to organize data collection activities each day of the target week. Zip-loc bags were provided for storing collected package labels. Each packet was presented in a large accordion folder with labeled pockets designed to assist respondents in locating and organizing materials. Color-coded forms, color printing, tabs, and other special formatting features were used to create an attractive, user-friendly package.

Menu Survey Forms

The menu survey booklet included several different forms designed to collect specific types of information about meals served during the target week.

- **The Everyday Reimbursable Foods Form** was used to describe foods and beverages offered to students as part of a USDA-reimbursable meal every day (i.e., each day of the target week). This form alleviated the need for respondents to record these foods multiple times on forms used to collect information on daily offerings (see below). Separate forms were completed for breakfast and for lunch.

  The form was designed to collect detailed information needed to complete an accurate nutrient analysis, including complete descriptions of each food item (e.g., full and brand names, method of cooking, use of salt and/or added fat); the grades served; the portion size, including, if applicable, different portions for different grades; and the number of portions served in *reimbursable* meals. Respondents were cautioned to record *only* foods included in USDA-reimbursable meals (i.e., to exclude foods offered only *a la carte* or served only to adults) and, for foods served in both reimbursable meals and as an *a la carte* item, to exclude *a la carte* servings when reporting the number of portions served.

- A **Daily Menu Form** was used, each day, to describe foods and beverages offered as part of a reimbursable meal, with the exception of those items already recorded on the Everyday Reimbursable Foods Form. A separate Daily Menu Form was completed each day. Separate forms were completed for breakfast and lunch. The information recorded on the Daily Menu Form was identical to the Everyday Reimbursable Foods Form.

- The **Recipe Form** was used to list and describe ingredients, yield, and preparation information for items identified as "recipes" on the Daily Menu Forms or the Everyday Reimbursable Foods Form — that is, foods prepared from scratch or by combining two or more foods or ingredients. To minimize burden and promote submission of complete data, cafeteria managers were encouraged to attach copies of recipes in lieu of re-copying recipes onto recipe forms.

- Respondents were asked to provide package labels for most foods and to ensure that the label included nutrition information or, at a minimum, a list of ingredients and a portion size. The **Nutrition Information Form** was used to record product nutrition information or manufacturer's contact information when package labels with nutrition information could not be provided (i.e., label did not include nutrition information, label was difficult to remove, or label was not available).

Other Data Collection Forms Included in the Menu Survey Booklet

Three other data collection instruments were included in the menu survey booklet. These instruments were clearly separated from the menu survey forms by labeled tabs. Instructions for completing each form were provided in the instruction manual.

- The **Daily Meal Counts Form** was used to report the number of USDA-reimbursable breakfasts and lunches served, by reimbursement category, each day of the target week. The form also requested information on total *a la carte* sales (breakfast and lunch combined) for the target week.

- The ***A la Carte* Foods Checklist** was used to identify foods and beverages offered *a la carte*. Respondents simply checked off foods and beverages that were available for *a la carte* purchase on one specific day during the target week. Space was also provided for respondents to write in items that did not appear on the checklist. Each school was randomly assigned an "*a la carte* day" on which this form was to be completed. The form was identical to the one used in SNDA-I.

- The **Meal Service Questionnaire** was a separate self-administered questionnaire that gathered descriptive information on characteristics of food service programs in each participating school. Information was collected on the prices charged for full- and reduced-price meals, the types of meal service offered, alternative sources of food available to students, implementation of menu changes to address the *Dietary Guidelines for Americans*, and the perceived impact of these changes on meal acceptability. The questionnaire included 19 items. Respondents were told they could complete the questionnaire any time prior to or during the target week.

The estimated response burden for completing the entire menu survey booklet (including the Daily Meal Counts Form, the Meal Service Questionnaire, and the *A la Carte* Foods Checklist) was approximately 8-10 hours, depending on the complexity of the menu.

Procedures Used to Implement the Menu Survey

A number of procedures were used to promote cooperation with the menu survey, to ensure that respondents understood how to fill out survey forms, and to assist respondents, however necessary, in completing all survey materials.

As noted previously, each SFA was assigned a specific target week for the menu survey. All participating schools in an SFA were expected to complete the menu survey during the same week. SFAs were randomly assigned to a specific target week with two potential backups. Final decisions about target week dates for each SFA were made with the SFA director.

Reminder calls were made to all SFA directors and cafeteria managers approximately three weeks before the target week. Target week dates were confirmed and rescheduled if necessary. SFA directors were advised about the expected delivery date of menu survey packets and were encouraged to review data collection requirements with cafeteria managers prior to the target week (materials arrived at least two weeks before the target week). Finally, both SFA directors and cafeteria managers were informed about the availability of technical assistance and were provided with a toll-free number. (The toll-free number was also prominently displayed in several places in the menu survey materials).

After this initial reminder, several followup contacts were made with cafeteria managers and SFA directors, as described below.

- One week prior to the target week, specially trained technical assistance staff called SFA directors to confirm receipt of survey materials, encourage review of materials with cafeteria managers if this had not yet taken place, answer questions regarding the materials or the study in general, and reconfirm the SFA's commitment to participating in the study.

- On Tuesday of the target week, technical assistance staff called cafeteria managers to confirm that they had begun the menu survey and to provide clarification and guidance as needed. Because this call was placed after cafeteria managers had completed one day of the menu survey, technical assistance staff were able to provide valuable assistance.

  In addition to answering questions posed by cafeteria managers, technical assistance staff reviewed general data collection requirements as well as specific issues identified as particularly problematic during the pretests, such as how to handle milk counts, separating *a la carte* servings from reimbursable servings, when to complete a Recipe Form, and when and how to use Nutrition Information Forms. Additional review points were added as the study progressed and knowledge accumulated about other potentially problematic issues.

Cafeteria managers were encouraged to call the toll-free telephone number at any time during or after the target week and were asked to return completed survey materials no later than one week after the target week.

- Two weeks after the target week, project staff contacted cafeteria managers who had not returned completed survey materials. If the survey had not been completed, a new target week was assigned and, if necessary, another set of survey materials was shipped.

  Subsequent calls were made, approximately every other week or in other intervals surrounding target dates for completion identified by respondents, to assess progress on completion of survey materials. Because many schools needed a substantial amount of time to complete the materials, considerable leeway was given to schools that appeared to be sincerely interested in cooperating. SFA directors were asked to intervene after lengthy delays in schools where managers appeared to be less interested in cooperating.

- Cafeteria managers who were particularly reluctant were referred to the project director for followup. These managers were contacted by phone and every attempt was made to facilitate the school's participation in the study. In some cases, cafeteria managers were permitted to send local food production records, computer printouts, or SMI audit reports that provided most of the information needed. Missing information was collected via followup telephone calls. In other cases, intensive technical assistance was provided. This intensive assistance ran the gamut from daily telephone support to situations where Abt staff actually completed portions of the survey forms for respondents. In the latter case, respondents sent copies of their menus to Abt and Abt returned partially completed menu survey booklets along with a detailed list of questions to be answered and supporting information to be provided. Respondents were free to provide outstanding information in whatever format was most convenient; Abt staff integrated information and made call-backs as needed.

No respondent was considered a final refusal until the project director was unsuccessful in securing his or her participation or until it was clear that long-promised materials were never going to arrive.

After the data collection period was officially over, letters of thanks and personalized certificates of appreciation from USDA were sent to all cafeteria managers who completed the menu survey and to associated SFA directors.

Detailed information on how menu survey materials were used to assess the nutrient content of school meals is provided in Appendix E.

SFA Director Interview

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Form Approved
OMB Number-0584-0481
Expiration Date 5/31/2000

School Nutrition Dietary Assessment Study - II

Survey of Directors of School Food Authorities (SFAs)

Telephone Questionnaire

SFA Name ______________________________

SFA ID Number |___|___|___|

SFA Director's Name ______________________________

SFA Phone Number (___) _____ - ________

Time	Phone Contacts (DD/MM/YY)
___:___	___/___/___/___/___/___
___:___	___/___/___/___/___/___
___:___	___/___/___/___/___/___
___:___	___/___/___/___/___/___

Interviewer ______________________

Start Time ____:____ End Time ____:____

Public reporting burden of this collection of information is estimated to average 19 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. An agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a currently valid OMB control number. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to: Department Clearance Officer, OIRM, AG Box 7630, Washington, DC 20250.

Hello, this is __________________ from Abt Associates. We are very pleased that NAME OF SCHOOL FOOD AUTHORITY has agreed to participate in the second School Nutrition Dietary Assessment Study, which is sponsored by the US Department of Agriculture.

Our interview today will begin with a series of questions about the schools participating in this study: READ SCHOOL NAMES. I will also ask you about food service operations in your district overall.

Before we begin, do you have any questions about the study? ANSWER QUESTIONS.

These first questions ask for some basic information about each school.

INTERVIEWER ASK QUESTIONS 1 THROUGH 9 INDIVIDUALLY FOR EACH SCHOOL. READ ACROSS.

	NAME OF SCHOOL	NAME OF SCHOOL	NAME OF SCHOOL
1. What grades attend NAME OF SCHOOL? CIRCLE ALL THAT APPLY.	Preschool .... 20 Kindergarten .... 21 First .... 01 Second .... 02 Third .... 03 Fourth .... 04 Fifth .... 05 Sixth .... 06 Seventh .... 07 Eighth .... 08 Ninth .... 09 Tenth .... 10 Eleventh .... 11 Twelfth 12	Preschool .... 20 Kindergarten ... 21 First .... 01 Second .... 02 Third .... 03 Fourth .... 04 Fifth .... 05 Sixth .... 06 Seventh ...... 07 Eighth .... 08 Ninth .... 09 Tenth .... 10 Eleventh ...... 11 Twelfth 12	Preschool .... 20 Kindergarten ... 21 First .... 01 Second .... 02 Third .... 03 Fourth .... 04 Fifth .... 05 Sixth .... 06 Seventh ...... 07 Eighth .... 08 Ninth .... 09 Tenth .... 10 Eleventh ...... 11 Twelfth 12
2. As of October 1, 1998, how many students were enrolled in NAME OF SCHOOL?	__, ____ STUDENTS	__, ____ STUDENTS	__, ____ STUDENTS
3. As of October 1, 1998, what was the average daily attendance at NAME OF SCHOOL?	___ % OR __, ____ STUDENTS	___ % OR __, ____ STUDENTS	___ % OR __, ____ STUDENTS

	NAME OF SCHOOL	NAME OF SCHOOL	NAME OF SCHOOL
4. Are there any students enrolled at NAME OF SCHOOL who are not eligible to receive school lunches or breakfasts, such as kindergartners who are not in session at meal times?	Yes . . . . 1 No . . . . 2 IF YES, ASK Q4A AND 4B. IF NO, GO TO NEXT SCHOOL.	Yes . . . . 1 No . . . . 2 IF YES, ASK Q4A AND 4B. IF NO, GO TO NEXT SCHOOL.	Yes . . . . 1 No . . . . 2 IF YES, ASK Q4A AND 4B. IF NO, GO TO Q5.
4A. How many students are not eligible to receive school lunches at NAME OF SCHOOL?	|__|__|__| STUDENTS	|__|__|__| STUDENTS	|__|__|__| STUDENTS
4B. IF SCHOOL HAS BREAKFAST PROGRAM. . . How many students are not eligible to receive school breakfasts at NAME OF SCHOOL.	|__|__|__| STUDENTS Not applicable 1	|__|__|__| STUDENTS Not applicable 1	|__|__|__| STUDENTS Not applicable 1
5. How many students are certified eligible for a *free school lunch* at NAME OF SCHOOL?	|__|, |__|__|__| STUDENTS	|__|, |__|__|__| STUDENTS	|__|, |__|__|__| STUDENTS
6. How many students are certified eligible for a *reduced-price lunch* at NAME OF SCHOOL?	|__|, |__|__|__| STUDENTS	|__|, |__|__|__| STUDENTS	|__|, |__|__|__| STUDENTS

The next questions focus on the National School Lunch Program. I will ask about menu planning, food purchasing, and food preparation at each school.

	NAME OF SCHOOL	NAME OF SCHOOL	NAME OF SCHOOL
7. Is the lunch menu for NAME OF SCHOOL planned at the district level, at an off-site kitchen serving the school, or at the school? CIRCLE ALL THAT APPLY.	District level ...... 1 Off-site kitchen ... 2 This school .... 3 Other SPECIFY ..... 6 __________ __________ __________	District level ..... 1 Off-site kitchen .. 2 This school ...... 3 Other SPECIFY .... 6 __________ __________ __________	District level ..... 1 Off-site kitchen .. 2 This school ...... 3 Other SPECIFY .... 6 __________ __________ __________

INTERVIEWER IF MENU PLANNED AT DISTRICT LEVEL, ASK Q8. OTHERWISE, SKIP TO Q9.

8. Do you or your staff have access to a computer for use in menu planning?

Yes 1
No 2

9. IF MENU PLANNED AT ANY OTHER LEVEL . . . Do food service professionals have access to a computer for use in menu planning at the kitchen for NAME OF SCHOOL?	Yes .... 1 No 2	Yes .... 1 No 2	Yes .... 1 No 2

INTERVIEWER ASK QUESTIONS 10 THROUGH 12 FOR EACH SCHOOL. READ ACROSS.

	NAME OF SCHOOL	NAME OF SCHOOL	NAME OF SCHOOL
10. Which of the following menu planning options is currently used for NAME OF SCHOOL? READ LIST. CIRCLE ONE ANSWER.	NuMenus . . . . 1 Assisted NuMenus . 2 New Food Based Menus (Enhanced Food Based Menus) . . . . 3 Traditional Meal Pattern . . . . 4 Other approach SPECIFY . . . . 6 __________ __________ __________ IF USING NUMENUS OR ASSISTED NUMENUS, SKIP TO Q12. OTHERWISE, ASK Q11.	NuMenus . . . . 1 Assisted NuMenus . . 2 New Food Based Menus (Enhanced Food Based Menus) . . . . . 3 Traditional Meal Pattern . . . . 4 Other approach SPECIFY . . . . 6 __________ __________ __________ IF USING NUMENUS OR ASSISTED NUMENUS, SKIP TO Q12. OTHERWISE, ASK Q11.	NuMenus . . . . 1 Assisted NuMenus . 2 New Food Based Menus (Enhanced Food Based Menus) 3 Traditional Meal Pattern . . . . 4 Other approach SPECIFY . . . . 6 __________ __________ __________ IF USING NUMENUS OR ASSISTED NUMENUS, SKIP TO Q12. OTHERWISE, ASK Q11.
11. Is a computer-based system used to analyze the nutritional content of the menus at NAME OF SCHOOL?	Yes . . . . 1 No . . . . 2 SKIP TO Q13.	Yes . . . . 1 No . . . . 2 SKIP TO Q13.	Yes . . . . 1 No . . . . 2 SKIP TO Q13.

	NAME OF SCHOOL	NAME OF SCHOOL	NAME OF SCHOOL
12. IF USING NUMENUS OR ASSISTED NUMENUS . . . Do you or your staff perform a *weighted* nutrient analysis of the menu for NAME OF SCHOOL? IF NECESSARY, PROBE: A weighted analysis involves basing the nutrient contributions of individual menu items on how frequently they are chosen.	Yes . . . . 1 No . . . . 2 IF YES, ASK Q12A-C. IF NO, ASK Q12B,C.	Yes . . . . 1 No . . . . 2 IF YES, ASK Q12A-C. IF NO, ASK Q12B,C.	Yes . . . . 1 No . . . . 2 IF YES, ASK Q12A-C. IF NO, ASK Q12B,C.
12A. Are nutritional analyses performed using *projected* numbers of servings, *actual* numbers of servings, or both?	Projected . . . . 1 Actual . . . . 2 Both 3	Projected . . . . 1 Actual . . . . 2 Both 3	Projected . . . . 1 Actual . . . . 2 Both 3
12B. IF SCHOOL HAS A BREAKFAST PROGRAM . . . Are breakfast and lunch menus analyzed separately or combined for analysis?	Separately . . . . 1 Combined . . . . 2 Analyze lunch only . 3 Analyze breakfast only 4	Separately . . . . 1 Combined . . . . 2 Analyze lunch only . 3 Analyze breakfast only 4	Separately . . . . 1 Combined . . . . 2 Analyze lunch only 3 Analyze breakfast only 4
12C. What age or grade groupings are used when performing nutrient analyses?	Grades: Preschool . . . . 01 K-3 . . . . 02 K-6 . . . . 03 7-12 . . . . 04 Age: 3-6 . . . . 05 7-10 . . . . 06 11-13 . . . . 07 14 and above . . . . . 08 Other SPECIFY . . . . 10 __________ __________ __________	Grades: Preschool . . . . 01 K-3 . . . . 02 K-6 . . . . 03 7-12 . . . . 04 Age: 3-6 . . . . 05 7-10 . . . . 06 11-13 . . . . 07 14 and above . . . . . 08 Other SPECIFY . . . . 10 __________ __________ __________	Grades: Preschool . . . . 01 K-3 . . . . 02 K-6 . . . . 03 7-12 . . . . 04 Age: 3-6 . . . . 05 7-10 . . . . 06 11-13 . . . . 07 14 and above . . . . 08 Other SPECIFY . . . 10 __________ __________ __________

13. INTERVIEWER SEE Q9. IS MENU PLANNING DONE AT THE DISTRICT LEVEL?

Yes .... 1 ASK Q13A-D.

No .... 2 ASK Q13E-H FOR EACH SCHOOL.

13A. In planning menus, does your district use information provided by the State Child Nutrition Program about the nutritional content of foods served?

Yes 1

No 2

INTERVIEWER IF RESPONDENT SAYS "NO STATE INFORMATION AVAILABLE," NOTE BELOW.

Information not available 3

13B. Does your district use USDA Quantity Recipes for School Food Service in menu planning?

Yes 1

No 2

13C. Does your district use USDA's New School Lunch and Breakfast Recipes from "A Tool Kit for Healthy School Meals" in menu planning?

Yes 1

No 2

13D. Does your school district use either of the following types of staff to plan menus?

	YES	NO	
A registered dietitian	1	2	
A trained nutritionist	1	2	GO TO Q14.

	NAME OF SCHOOL	NAME OF SCHOOL	NAME OF SCHOOL
13E. Is information provided by the State Child Nutrition Program about the nutritional content of foods served used to plan menus at NAME OF SCHOOL? IF RESPONDENT SAYS "NO STATE INFORMATION AVAILABLE," NOTE THIS.	Yes . . . . 1 No . . . . 2 Information not available 3	Yes . . . . 1 No . . . . 2 Information not available 3	Yes . . . . 1 No . . . . 2 Information not available 3
13F. Are USDA Quantity Recipes for School Food Service used to plan menus for NAME OF SCHOOL?	Yes . . . . 1 No 2	Yes . . . . 1 No 2	Yes . . . . 1 No 2
13G. Are USDA's New School Lunch and Breakfast Recipes from "A Tool Kit for Healthy School Meals" used to plan menus for NAME OF SCHOOL?	Yes . . . . 1 No 2	Yes . . . . 1 No 2	Yes . . . . 1 No 2
13H. At NAME OF SCHOOL does . . . a registered dietitian plan menus? a trained nutritionist plan menus?	 Yes . . . . 1 No . . . . 2 Yes . . . . 1 No 2	 Yes . . . . 1 No . . . . 2 Yes . . . . 1 No 2	 Yes . . . . 1 No . . . . 2 Yes . . . . 1 No 2

INTERVIEWER ASK QUESTIONS 14-16 FOR EACH SCHOOL. READ ACROSS.

	NAME OF SCHOOL	NAME OF SCHOOL	NAME OF SCHOOL
14. Is food purchasing for lunch at NAME OF SCHOOL done at the district level, at an off-site kitchen serving the school, at the school, or primarily at the district level with some items purchased locally? CIRCLE ALL THAT APPLY.	District level . . . . . . 1 Off-site kitchen . . . 2 This school . . . . 3 District level with local purchasing . . . 4 Other SPECIFY . . . . . 6 __________ __________ __________	District level . . . . . 1 Off-site kitchen . . 2 This school . . . . . . 3 District level with local purchasing . . 4 Other SPECIFY . . . . 6 __________ __________ __________	District level . . . . . 1 Off-site kitchen . . 2 This school . . . . . . 3 District level with local purchasing . . 4 Other SPECIFY . . . . 6 __________ __________ __________
15. Does NAME OF SCHOOL offer a la carte at lunch?	Yes . . . . 1 No . . . . 2 IF YES, ASK Q16A,B. IF NO, ASK Q16B.	Yes . . . . 1 No . . . . 2 IF YES, ASK Q16A,B. IF NO, ASK Q16B.	Yes . . . . 1 No . . . . 2 IF YES, ASK Q16A,B. IF NO, ASK Q16B.
16. Are foods from commercial vendors such as McDonald's, Pizza Hut, Domino's, Subway, Taco Bell, or local commercial vendors used at NAME OF SCHOOL . . .			
A. for a la carte items?	Yes . . . . 1 No 2	Yes . . . . 1 No 2	Yes . . . . 1 No 2
B. for reimbursable lunch?	Yes . . . . 1 No . . . . 2 IF YES, ASK Q16C. IF NO, GO TO NEXT SCHOOL.	Yes . . . . 1 No . . . . 2 IF YES, ASK Q16C. IF NO, GO TO NEXT SCHOOL.	Yes . . . . 1 No . . . . 2 IF YES, ASK Q16C. IF NO, GO TO Q17.

	NAME OF SCHOOL	NAME OF SCHOOL	NAME OF SCHOOL
16C. IF YES FOR REIMBURSABLE LUNCH . . . Have the menu items purchased from the commercial vendor(s) been modified or reformulated to meet requirements for reimbursement?	Yes . . . . 1 No 2	Yes . . . . 1 No 2	Yes . . . . 1 No 2

The next questions focus on school breakfast.

	NAME OF SCHOOL	NAME OF SCHOOL	NAME OF SCHOOL
17. INTERVIEWER SEE FACE SHEET. DOES SCHOOL PARTICIPATE IN THE SCHOOL BREAKFAST PROGRAM?	Yes .... 1 No .... 2 IF NO, SKIP Q18 AND Q19 FOR THIS SCHOOL.	Yes .... 1 No .... 2 IF NO, SKIP Q18 AND Q19 FOR THIS SCHOOL.	Yes .... 1 No .... 2 IF NO, SKIP Q18 AND Q19 FOR THIS SCHOOL.
18. Is the breakfast menu for NAME OF SCHOOL planned at the district level, at an off-site kitchen serving the school, or at the school? CIRCLE ALL THAT APPLY.	District level .... 1 Off-site kitchen .... 2 This school .... 3 Other SPECIFY ..... 6 __________ __________ __________	District level ..... 1 Off-site kitchen .. 2 This school ...... 3 Other SPECIFY ... 6 __________ __________ __________	District level ..... 1 Off-site kitchen .. 2 This school ...... 3 Other SPECIFY ... 6 __________ __________ __________
19. Is food purchasing for breakfast at NAME OF SCHOOL done at the district level, at an off-site kitchen serving the school, at the school, or primarily at the district level with some items purchased locally? CIRCLE ALL THAT APPLY.	District level .... 1 Off-site kitchen .... 2 This school .... 3 District level with local purchasing .... 4 Other SPECIFY ..... 6 __________ __________ __________	District level ..... 1 Off-site kitchen .. 2 This school ...... 3 District level with local purchasing .. 4 Other SPECIFY ... 6 __________ __________ __________	District level ..... 1 Off-site kitchen .. 2 This school ...... 3 District level with local purchasing .. 4 Other SPECIFY ... 6 __________ __________ __________

	NAME OF SCHOOL	NAME OF SCHOOL	NAME OF SCHOOL
20. Does NAME OF SCHOOL offer a la carte at breakfast?	Yes ... 1 No ... 2 IF YES, GO TO Q21A. IF NO, GO TO Q21B.	Yes ... 1 No ... 2 IF YES, GO TO Q21A. IF NO, GO TO Q21B.	Yes ... 1 No ... 2 IF YES, GO TO Q21A. IF NO, GO TO Q21B.
21. Are foods from commercial vendors such as McDonald's, Pizza Hut, Domino's, Subway, Taco Bell, or local commercial vendors used at NAME OF SCHOOL . . .			
A. for a la carte items at breakfast?	Yes ... 1 No ... 2	Yes ... 1 No ... 2	Yes ... 1 No ... 2
B. for reimbursable breakfast?	Yes ... 1 No ... 2 Not applicable ... 3 IF YES, ASK Q21C. IF NO, GO TO NEXT SCHOOL.	Yes ... 1 No ... 2 Not applicable ... 3 IF YES, ASK Q21C. IF NO, GO TO NEXT SCHOOL.	Yes ... 1 No ... 2 Not applicable ... 3 IF YES, ASK Q21C. IF NO, GO TO Q22.
21C. IF YES FOR REIMBURSABLE BREAKFAST . . . Have the menu items purchased from the commercial vendor(s) been modified or reformulated to meet requirements for reimbursement?	Yes ... 1 No ... 2	Yes ... 1 No ... 2	Yes ... 1 No ... 2

Now, I'd like to ask you some general food service questions about your district.

22. Does your school district currently use a food service management company to perform any food service functions?

Yes 1
No .... 2 GO TO Q23.

22A. I'm going to read a list of food service functions. Please tell me if each function is performed by the school district or by the food service management company, or if the responsibility for the function is shared.

	DISTRICT	MANAGEMENT COMPANY	SHARED	NOT APPLICABLE
Preparing reimbursement claims	1	2	3	4
Accounting and financial recordkeeping ..	1	2	3	4
Planning menus	1	2	3	4
Preparing USDA-reimbursable breakfasts	1	2	3	4
Serving USDA-reimbursable breakfasts ..	1	2	3	4
Preparing USDA-reimbursable lunches ..	1	2	3	4
Serving USDA-reimbursable lunches	1	2	3	4
Providing a la carte service	1	2	3	4
Providing equipment for food preparation	1	2	3	4
Cafeteria clean-up	1	2	3	4
Purchasing food	1	2	3	4
Making arrangements for using donated commodities	1	2	3	4
Selling lunch tickets and collecting lunch money	1	2	3	4

23. Do you purchase all, some, or no food through a cooperative for schools in your district?

All	1	ASK Q23A.
Some	2	ASK Q23A.
None	3	GO TO Q24.

23A. Does the use of a purchasing cooperative limit, expand, or have no effect on your ability to purchase the food items you want?

Limit	1
Expand	2
No effect	3

24. Which of the following methods are used to set unit prices for USDA-reimbursable meals in your school district?

	YES	NO
An actual pricing method which considers all costs of buying, producing, and serving the food	1	2
Food-cost-percentage markup where the same markup percentage is added to every item	1	2
Unit prices are reset only to offset financial loss	1	2
Is any other method used to set unit prices for reimbursable meals? SPECIFY ____________ ____________	1	2
Don't know	8	8

25. INTERVIEWER SEE Q15 (AND Q20, IF NECESSARY). DOES DISTRICT OFFER A LA CARTE AT ANY OF THE SCHOOLS?

Yes .... 1 GO TO Q26.
No .... 2 ASK Q25A.

25A. Do any schools in your district offer a la carte?

Yes .... 1 ASK Q26.
No .... 2 SKIP TO Q27.

26. Which of the following methods are used to set unit prices for a la carte items in your school district?

	YES	NO
An actual pricing method which considers all costs of buying, producing, and serving the food	1	2
Food-cost-percentage markup where the same markup percentage is added to every item	1	2
Group pricing—for example, all vegetables at same price per portion; all similar-size cookies at same price	1	2
Is any other method used to set unit prices for a la carte items? SPECIFY .... ________________ ________________	1	2
Don't know	8	8

26A. IF YES TO FOOD-COST-PERCENTAGE MARKUP . . . You just told me your district uses the food-cost-percentage method for pricing a la carte items. What percentage markup from wholesale cost do you use to calculate the sales price for the following types of foods?

VERIFY THAT ANSWER IS EXPRESSED AS A PERCENTAGE.

Milk	____________%	Not applicable...........1
Items on reimbursable menu	____________%	Not applicable...........1
Other a la carte items	____________%	

CLOSING

Thank you very much for your time and for your help. I want to remind you that the target week(s) for this study are READ TARGET DATES. We will send the menu survey materials for you to distribute to your school cafeteria managers. Do you have any other questions about the study and these materials? ANSWER QUESTIONS.

Thank you again for your help.

INTERVIEWER NOTES OR COMMENTS

Everyday Reimbursable Foods Form

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PAGE

EVERYDAY REIMBURSABLE FOODS FORM

SCHOOL NAME ______________________________ MEAL BREAKFAST LUNCH *Circle one.*

Shaded areas for Abt staff use only

A Menu Item with Complete Description • *Specify full name. Note the addition of fat and salt.* • *For foods other than milk, fresh meats, and fresh produce, include manufacturer and brand names and product code (if available).* • *Refer to* FOOD DESCRIPTION GUIDE *for necessary descriptions.* • *If recipe, complete* Recipe Form.	B Menu Item Type 1 = Commodity 2 = Pre-prepared 3 = Recipe 4 = Other *Circle one number for each menu item.*	C Size of Portion Served *Include Units*	Grades	D Number of Portions Served *Reimbursable Only* Mon	Tue	Wed	Thu	Fri	E
	1 2 3 4								
	1 2 3 4								
	1 2 3 4								
	1 2 3 4								
	1 2 3 4								
	1 2 3 4								
	1 2 3 4								
	1 2 3 4								

NOTE: You do not need to list these foods again on the *Daily Menu Forms.*

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Daily Menu Form

BLANK

PAGE

DAILY MENU FORM

SCHOOL NAME ______________________________ **DAY** MON TUE WED THU FRI *Circle one.*

MEAL BREAKFAST LUNCH *Circle one.*

A **Menu Item with Complete Description** • *Specify full name. Note the addition of fat and salt.* • *For foods other than milk, fresh meats, and fresh produce, include manufacturer and brand names and product code (if available).* • *Refer to* FOOD DESCRIPTION GUIDE *for necessary descriptions.* • *If recipe, complete* Recipe Form.	B **Menu Item Type** **1 = Commodity** **2 = Pre-prepared** **3 = Recipe** **4 = Other** *Circle one number for each menu item.*	C **Size of Portion Served** *Include Units*	**Grades**	D **Number of Portions Served** *Reimbursable Only*	E **Abt Staff Use Only**	
	1 2 3 4					
	1 2 3 4					
	1 2 3 4					
	1 2 3 4					
	1 2 3 4					
	1 2 3 4					
	1 2 3 4					
	1 2 3 4					
	1 2 3 4					
	1 2 3 4					
	1 2 3 4					
	1 2 3 4					
	1 2 3 4					
	1 2 3 4					
	1 2 3 4					

Recipe Form

RECIPE FORM
(SIDE 1)

SCHOOL NAME ____

NAME OF RECIPE/FOOD ____
Please use the same name that you used on the Everyday Reimbursable Foods Form or Daily Menu Form.

DAY   ALL DAYS   MON   TUE   WED   THU   FRI   *Circle all that apply.*

MEAL   BREAKFAST   LUNCH   *Circle one.*

Check (✓) the box beside the option you selected for the recipe or food listed above.

☐ **Option 1 - *Recipe Form* Completed (*SIDE 1* and *SIDE 2*)**

☐ **Option 2 - Copy of Recipe Attached**

Staple or clip recipe to this page. Turn to SIDE 2 to complete Preparation Information.

YIELD INFORMATION

Number of Servings Prepared __________   **Portion Size** ____________________
Examples: 1/2 cup, 4 fluid oz, #16 scoop

INGREDIENT INFORMATION

A **Ingredient with Complete Description** • *Specify full name.* • *For foods other than milk, fresh meats, and fresh produce, include manufacturer and brand names and product code (if available).* • *Refer to FOOD DESCRIPTION GUIDE for necessary descriptions.* • *If ingredient is prepared from a separate recipe, complete separate RECIPE FORM.*	B **Ingredient Type** 1 = Commodity 2 = Pre-prepared 3 = Recipe 4 = Other *Circle one number for each ingredient.*	C **Amount in Recipe** *Include Units*
	1 2 3 4	
	1 2 3 4	
	1 2 3 4	
	1 2 3 4	
	1 2 3 4	
	1 2 3 4	
	1 2 3 4	
	1 2 3 4	
	1 2 3 4	
	1 2 3 4	
	1 2 3 4	

OVER →

RECIPE FORM
(SIDE 2)

PREPARATION INFORMATION
Please check (✓) the boxes below to describe the procedures used in preparing this recipe.

1. If recipe was cooked, what cooking method did you use?

☐ Bake/roast ☐ Broil/grill ☐ Pan fry/saute ☐ Boil
☐ Oven heat ☐ Braise ☐ Deep fry ☐ Steam
☐ Flour and fry ☐ Coat in batter and fry ☐ Other SPECIFY ________
☐ Does not apply to recipe

2. If recipe contains meat, poultry, fish, or shellfish, was amount measured raw or cooked?

☐ Raw ☐ Cooked ☐ Does not apply to recipe

3. If recipe contains meat or poultry did you . . .
Check all that apply.

Trim the visible fat?	☐ Yes	☐ No	☐ Does not apply to recipe
Drain fat after cooking?	☐ Yes	☐ No	☐ Does not apply to recipe
Rinse with hot water, drain fat and rinse again?	☐ Yes	☐ No	☐ Does not apply to recipe
Remove skin before cooking?	☐ Yes	☐ No	☐ Does not apply to recipe

4. If recipe contains noodles/pasta, rice, or vegetables, did you add salt to the cooking water?

Noodles/pasta or rice	☐ Yes	☐ No	☐ Does not apply to recipe
Vegetables	☐ Yes	☐ No	☐ Does not apply to recipe

5. If recipe contains canned vegetables or canned fruit, did you drain off all of the liquid?

☐ Yes ☐ No ☐ Does not apply to recipe

COMMENTS

Nutrition Information Form

NUTRITION INFORMATION FORM

SCHOOL NAME ______________________________

NAME OF FOOD ______________________________

Please use the same name that you used on the Daily Menu Form or any other forms where this food is listed.

DAY ALL DAYS MON TUE WED THU FRI *Circle all that apply.*

MEAL BREAKFAST LUNCH *Circle one.*

Check (✓) the box beside the option you selected for the food listed above.

☐ **OPTION 1 - Nutrition information not available**

Please provide manufacturer and product information below.

Complete name of food ______________________________
Include brand name and product code, if available

Manufacturer's name ______________________________

Manufacturer's address ______________________________
city *state* *zip*

Manufacturer's telephone number ______________________________
area code *number*

Weight or measure (volume) of one serving ______________________________
Examples: 5 oz. pizza, 11.6 fluid oz. Gatorade

☐ **OPTION 2 - Information sheet from manufacturer attached**

Staple copy of nutrition information sheet provided by manufacturer or distributor.

☐ **OPTION 3- Information copied from label**

Turn over form and fill in the requested information.

OVER →

OPTION 3 *Continued*

1. **Please copy the following information from the package or label:**

   Complete name of food ______________________________
   Include brand name and product code, if available

   Manufacturer's name ______________________________

   Manufacturer's address ______________________________
   city *state* *zip*

   Manufacturer's telephone number ______________________________
   area code *number*

   Weight or measure (volume) of one serving ______________________________
   Examples: 5 oz. Pizza, 11.6 fluid oz. Gatorade

2. **If the label has a *Nutrition Facts* or Nutrition Information section, please record the following information per serving:**

NUTRITION FACTS

Serving Size __________ (________)

Amount per Serving:

Calories	______	
Total Fat	______	g
Saturated Fat	______	g
Cholesterol	______	mg
Sodium	______	mg
Total Carbohydrate	______	g
Dietary Fiber	______	g
Protein	______	g
Vitamin A	______	%
Vitamin C	______	%
Calcium	______	%
Iron	______	%

3. **If the label does not have nutrition information, please list the *first* five ingredients.**

____

____

____

Daily Meal Counts Form

DAILY MEAL COUNTS FORM

SCHOOL NAME ____

Refer to front cover of Menu Survey booklet

Please record the total number of USDA ***reimbursable meals*** served in your school each day of the target week. Provide separate numbers for lunches and for breakfasts, if breakfasts are served. If your school offers full priced meals at more than one price—for example, higher prices for larger portions or lower prices for weekly meal ticket discounts, write the number of meals served at each price. Do *not* include meals for which you do not claim reimbursement—for example, second lunches sold to students on an a la carte basis. However, please record your total (breakfast and lunch) a la carte sales for the target week.

Number of Reimbursable Lunches Served

Day of Week	Free	Reduced Price	Full Price			Total
			Standard Price $____	Price 2 $____	Price 3 $____	
MONDAY						
TUESDAY						
WEDNESDAY						
THURSDAY						
FRIDAY						

Number of Reimbursable Breakfasts Served

Day of Week	Free	Reduced Price	Full Price			Total
			Standard Price $____	Price 2 $____	Price 3 $____	
MONDAY						
TUESDAY						
WEDNESDAY						
THURSDAY						
FRIDAY						

Total a la carte sales for the target week $______________

A la Carte Foods Checklist

SCHOOL NUTRITION DIETARY ASSESSMENT STUDY - II

A LA CARTE FOODS CHECKLIST

Attach School ID Label

Instructions

1. Complete this form for the one day of the week specified on above label.
2. Place a check in the box next to each food your cafeteria sold on an a la carte basis - at breakfast and/or at lunch - on the specified day. If you sometimes sell a food, but did not sell it on the specified day, *do not* check the box.
3. If your cafeteria offered a la carte food or beverages that are not included in the list, please write in the names of these foods and beverages on the last page of the checklist.
4. If you have any questions, call Abt's toll-free number: 1-800-649-9560.

A LA CARTE FOODS CHECKLIST

Check (✓) box if food was offered a la carte on specified day

A. Beverages

1. Carbonated soft drinks (Cola-sweetened, cola-diet, non-cola-sweetened, diet) ☐
2. Coffee ☐
3. Hot chocolate ☐
4. Juice (100% juice) ☐
5. Juice (50% juice) ☐
6. Juice drinks (10% juice) (Cranberry drink, fruit blends, Hi-C, lemonade, punch) ☐
7. Milk shake or malt ☐
8. Mineral water ☐
9. Tea ☐

B. Baked Goods—Desserts

1. Cake-type (Cupcakes, brownies, Twinkies) ☐
2. Cookies ☐
3. Pastries (Pies, turnovers) ☐
4. Other baked goods—desserts ☐

A la Carte Foods Checklist
(continued)

Check (✓) box if food was offered a la carte on specified day

C. Bread or Grain Products

1. Regular bread (Bread, roll, bagel) ☐
2. Other bread (Biscuits, croissants, hot pretzels) ☐
3. Muffins ☐
4. Tortilla ☐
5. Other grain products (Crackers, granola bar, pretzels) ☐

D. Candy

1. With chocolate ☐
2. Without chocolate ☐

E. Frozen Desserts

1. Frozen non-dairy (Frozen fruit bar, Jello Pop, Popsicle) ☐
2. Ice cream (Bars, Fudgesicles, Scoop, sundaes) ☐
3. Low-fat frozen desserts (Frozen yogurt, ice milk, sherbet) ☐

F. Fruit

1. Canned, cooked fruit ☐
2. Fresh fruit ☐
3. Fruit salad ☐

Check (✓) box if food was offered a la carte on specified day

G. Meat and Meat Alternate/Entrees

Beef

1. Hamburger or cheeseburger ☐
2. Chili or burrito ☐
3. Other beef ☐

Poultry

4. Chicken patty (breaded) ☐
5. Chicken (other) ☐
6. Turkey ☐

Other Meat

7. Hot dog (Corn dog, franks and beans) ☐
8. Cold cuts (Bologna, salami, and similar cuts) ☐
9. Sausage or pork ☐

Meat Alternate

10. Cheese sandwich ☐
11. Other cheese ☐
12. Beans or peas (Chick peas, garbanzo beans, kidney beans, refried beans) ☐
13. Eggs (Hard cooked, egg salad, scrambled, fried) ☐
14. Fish ☐
15. Nuts and seeds (Peanuts, peanut butter, sunflower seeds, other nuts) ☐

A LA CARTE FOODS CHECKLIST
(continued)

Check (✓) box if food was offered a la carte on specified day

Mixed Dishes

16. Chef salad ☐
17. Lasagna ☐
18. Macaroni and cheese ☐
19. Pizza (No meat) ☐
20. Pizza (With meat) ☐
21. Spaghetti ☐
22. Soup with meat or beans (Bean, chicken, clam chowder, minestrone) ☐
23. Mexican food (Other) ☐
24. Chinese food ☐
25. Other SPECIFY ☐

____

____

____

H. Vegetables

1. Fried potatoes (Including pre-fried, oven baked, french fries, Tater Tots) ☐
2. Salad (Tossed salad, potato salad, three bean salad, raw vegetables) ☐
3. Vegetable (Other cooked) ☐
4. Vegetable (soup) ☐

A LA CARTE FOODS CHECKLIST
(continued)

	Check (✓) box if food was offered a la carte on specified day
I. Snacks	
1. Chips (Corn, potato, puffed cheese, tortilla)	☐
2. Nuts and seeds (Almonds, peanuts, pistachios, sunflower seeds, trail mix)	☐
3. Popcorn	☐
4. Other snacks	☐
J. Yogurt	
1. Yogurt	☐

On the next page, please list any food or beverage that is not listed on pages 1 through 5 of this checklist and that your cafeteria offered a la carte on specified day.

K. Other A La Carte Items SPECIFY

Abt
only

Meal Service Questionnaire

Form Approval
OMB Number - 0584-0481
Expiration Date - 5/31/2000

SCHOOL NUTRITION DIETARY ASSESSMENT STUDY - II

MEAL SERVICE QUESTIONNAIRE

ATTACH SCHOOL ID LABEL

If you have questions or need assistance, please call Abt's toll-free number: 1-800-649-9560

Public reporting burden of this collection of information is estimated to average 8.5 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. An agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a currently valid OMB control number. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to: Department Clearance Officer, OIRM, AG Box 7630, Washington, DC 20250.

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INSTRUCTIONS FOR COMPLETING THE MEAL SERVICE QUESTIONNAIRE

This short questionnaire asks for information on the lunch and breakfast programs at your school. Please follow these instructions when filling in your answers. *Please write clearly.*

Recording Answers

There are a few different ways to indicate your answer to a question.

1. ***Circle the number next to the appropriate answer category.***

   Example

   A4. Not including milk, do you usually sell food items from the USDA-reimbursable lunch on an a la carte or supplemental sale basis? That is, do you sell individual food items priced separately?

   Yes 1

   No 2

2. ***Write your answer in the boxes or on the lines provided.***

   Example

   A1. What is the price of a USDA-reimbursable lunch for students who pay the *reduced price*?

   $_.3 5

3. ***Instructions to SPECIFY.*** Circle the number next to the SPECIFY category; write your answer on the lines provided.

   Example

   A3. Which of the following types of meal service are offered at lunch?
   CIRCLE YES OR NO FOR EACH.

	YES	NO	IF YES: How many days per week? DAYS PER WEEK
A hot meal which changes daily	1	2	5
A cold meal, such as a sandwich or salad plate	1	2	5
A hot sandwich such as a hamburger, hot dog, or pizza	1	2	3
A salad bar	1	2	
A la carte or supplemental sale items that are not part of the USDA meal and are priced separately	1	2	5
Other types of meal service SPECIFY	1	2	4

Taco bar

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A. THE SCHOOL LUNCH PROGRAM

A1. What is the price of a USDA-reimbursable lunch for students who pay the *reduced price*?

$__.____

A2. What is the price of a USDA-reimbursable lunch for students who pay the *full price*? Record more than one answer if your cafeteria offers lunch at different prices (for example, a higher price for larger portions or a discount for a weekly meal ticket).

$__.____	Standard Full Price	
$__.____	Other Full Price	SPECIFY________________
$__.____	Other Full Price	SPECIFY________________

A3. Which of the following types of meal service are offered at lunch?
CIRCLE YES OR NO FOR EACH.

	YES	NO	IF YES: How many days per week? DAYS PER WEEK
A hot meal which changes daily	1	2	__
A cold meal, such as a sandwich or salad plate	1	2	__
A hot sandwich such as a hamburger, hot dog, or pizza	1	2	__
A salad bar	1	2	__
A la carte or supplemental sale items that are not part of the USDA meal and are priced separately	1	2	__
Other types of meal service SPECIFY	1	2	__

____

____

A4. Not including milk, do you usually sell food items from the USDA-reimbursable lunch on an a la carte or supplemental sale basis? That is, do you sell individual food items priced separately?

Yes	1
No	2

A5. Which of the following options are available to students during school hours?
CIRCLE YES OR NO FOR EACH.

	YES	NO
Vending machines in or near the cafeteria	1	2
Vending machines in a different part of the school	1	2
A school store, snack bar, or canteen	1	2
Are there other ways that students may obtain food at school every day? IF YES, SPECIFY ______________________	1	2

A6. Are students permitted to leave school for lunch?

Yes	1
No	2

A7. Does your school routinely publicize or post information on the nutrient content of USDA-reimbursable meals?

Yes	1
No	2

A8. Have you (or your school district) made any changes in the lunches offered to students in order to meet the recent requirement that meals comply with the Dietary Guidelines for Americans?

Yes	1	→ CONTINUE
No	2	→ PLEASE SKIP TO SECTION B (PAGE 4)

A9. In comparison to how students ate before school lunches were required to comply with the Dietary Guidelines for Americans, have you noticed any changes in the amount of food students throw away (do not eat) at lunch time? (PLEASE CHECK ONE BOX FOR EACH FOOD.)

	Students waste more	Students waste less	No change	Don't know
Milk	□1	□2	□3	□4
Main dish/entree	□1	□2	□3	□4
Bread or bread alternate	□1	□2	□3	□4
Salad/raw vegetables	□1	□2	□3	□4
Cooked vegetables (other than French fries)	□1	□2	□3	□4
Fruit	□1	□2	□3	□4
Desserts	□1	□2	□3	□4

A10. In your opinion, how do students feel about the lunches offered since schools were required to comply with the Dietary Guidelines for Americans compared to the lunches offered before this requirement? (PLEASE CHECK ONE BOX.)

Students like these lunches much better than the old lunches .... □1

Students like these lunches somewhat better than the old lunches .... □2

Students like these lunches about the same as the old lunches .... □3

Students like these lunches somewhat less than the old lunches .... □4

Students like these lunches much less than the old lunches .... □5

Don't know .... □8

B. THE SCHOOL BREAKFAST PROGRAM

B1. Does your school participate in USDA's School Breakfast Program?

Yes .... 1 → CONTINUE
No .... 2 → PLEASE SKIP TO Q.B9 (PAGE 6)

B2. What is the price of a USDA-reimbursable breakfast for students who pay the *reduced price*?

$|__|.|__|__|

B3. What is the price of a USDA-reimbursable breakfast for students who pay the *full price*? Record more than one answer if your cafeteria offers breakfast at different prices (for example, a higher price for larger portions or a discount for a weekly meal ticket).

$|__|.|__|__| Standard Full Price

$|__|.|__|__| Other Full Price SPECIFY________________

B4. Which of the following types of meal service are offered at breakfast?
CIRCLE YES OR NO FOR EACH.

	YES	NO	IF YES: How many days per week? DAYS PER WEEK
A hot breakfast	1	2	|__|
A cold breakfast	1	2	|__|
A la carte or supplemental sale items for breakfast that are not part of the USDA meal and are priced separately	1	2	|__|

B5. Not including milk, do you usually sell food items from the USDA-reimbursable breakfast on an a la carte or supplemental sale basis?

Yes 1
No 2

B6. Have you (or your school district) made any changes in the breakfasts offered to students in order to meet the recent requirement that meals comply with the Dietary Guidelines for Americans?

Yes .... 1 →CONTINUE

No .... 2 →PLEASE SKIP TO B9 (PAGE 6)

B7. In comparison to how students ate before school breakfasts were required to comply with the Dietary Guidelines for Americans, have you noticed any changes in the amount of food students throw away (do not eat) at breakfast time? (PLEASE CHECK ONE BOX FOR EACH FOOD.)

	Students waste more	Students waste less	No change	Don't know
Milk	☐1	☐2	☐3	☐4
Hot breakfast entrees	☐1	☐2	☐3	☐4
Cereal, toast, or bread alternates	☐1	☐2	☐3	☐4
Fruit	☐1	☐2	☐3	☐4
Juice	☐1	☐2	☐3	☐4

B8. In your opinion, how do students feel about the breakfasts offered since schools were required to comply with the Dietary Guidelines for Americans compared to the breakfasts offered before this requirement? (PLEASE CHECK ONE BOX.)

Students like these breakfasts much better than the old breakfasts .... ☐1

Students like these breakfasts somewhat better than the old breakfasts .... ☐2

Students like these breakfasts about the same as the old breakfasts .... ☐3

Students like these breakfasts somewhat less than the old breakfasts .... ☐4

Students like these breakfasts much less than the old breakfasts .... ☐5

Don't know .... ☐8

29. **Other than the School Breakfast Program, is there a morning snack program or some other program providing food to students in the morning after they get to school? Please do not include vending machines.**

Yes 1

No.. 2

Thank you very much for your assistance!

Appendix D
Sample Design and Calculation of Sample Weights

This appendix describes how SFAs and schools were sampled for the SNDA-II study and how SFAs were recruited. Response rates, at the point of recruitment and following data collection, are also reported. The final section of the appendix describes the methodology that was used in calculating sample weights.

Sample Design

The primary objective of the sample design for the SNDA-II study was to provide national probability samples of public elementary schools, middle schools, and high schools participating in the NSLP in the 48 contiguous states plus the District of Columbia. Although data were collected exclusively by mail and telephone, Hawaii and Alaska were excluded from the sampling frame to maintain comparability with the SNDA-I study.

The sampling frame was obtained from Quality Education Data, Inc. (QED). The frame differed from the one used in SNDA-I because it included only public schools. This variation was specified by FNS because the number of non-public schools participating in the NSLP is so small. The frame was assembled, and the sample was selected, in the spring of 1997. However, because FNS made a decision to postpone the study for one year to allow schools more time to implement the *Dietary Guidelines*, SFAs and schools were not recruited until the spring of 1998.

Sample selection occurred in two stages. SFAs, considered to be analogous to school districts, were selected first and then schools were selected within sampled SFAs. Before selecting SFAs, supervisory unions and subdistricts were combined so that the combined group included elementary schools, middle schools, and high schools. Next, very small districts (those with fewer than 10 children per grade) were removed from the frame. Finally, each school was designated as an elementary school, middle school, or high school using the classification rules used in SNDA-I.[1]

The resulting frame was sorted by FNS region, metropolitan status, and size (total enrollment) and a stratified sample of 597 SFAs was selected using PPS sampling. Three schools were then selected for each district "hit" (in PPS sampling, some districts may be selected more than once). To the extent possible, one school of each type was randomly selected in each sampled SFA. If the SFA had fewer than three schools, all schools were selected. This procedure yielded a sample of 602 elementary schools, 526 middle schools, and 576 high schools.

1 Elementary schools: lowest grade less than fourth or lowest grade less than sixth and highest grade less than eighth. Middle schools: not elementary schools and lowest grade less than tenth. High schools: not elementary or middle schools or highest grade equal twelfth.

Because sampling goals were somewhat lower than these numbers (approximately 525 schools of each type), a second sampling procedure was used to decrease the number of selected schools. A random number was assigned to each school and the list of sampled schools was sorted by SFA and by school type. Next, the first 525 elementary schools and the first 525 high schools were selected and all 526 of the middle schools were selected. This resulted in a sample of 1,576 schools in 597 SFAs.

Sample Recruitment

Sample recruitment began with the process of notifying FNS regional offices and State Child Nutrition (CN) Agencies. FNS regional office liaisons were notified about the states and SFAs in their region that had been selected for the study. Likewise, State CN Agencies were notified about the SFAs that had been selected in their State. State directors were asked to provide contact information for SFAs in their State and to encourage all sampled SFAs to participate.

After contact information for sampled SFAs had been assembled, introductory letters and study overviews were sent to directors of all sampled SFAs. Senior project staff made followup phone calls to recruit districts, and the sampled schools within those districts, into the study. Direct contact was not attempted with the sampled schools. The SFA director agreed or declined for each of the schools sampled in his/her SFA. SFAs were permitted to agree to partial participation in the study (i.e., to agree to have some, but not all, of the sampled schools participate in the study).

Project staff answered SFA directors' questions about the study and responded to any concerns raised. Reluctant SFA directors were referred to the project director for additional followup. The project director recontacted all of these SFA directors and attempted to secure cooperation.

Results of recruitment efforts are summarized in Exhibit D.1. A total of 478 SFAs (1,232 schools) agreed to participate in the study. Most (450) of these SFAs agreed to have all sampled schools participate. The remaining 28 SFAs declined participation for one or more of the sampled schools. Overall levels of cooperation (81.3% for SFAs and 79.5% for schools) and the sample sizes available for data collection were consistent with expectations outlined in the study's sampling plan and OMB clearance package.

Completion Rates for Data Collection Components

All of the SFAs and schools that agreed to participate in the study in the spring of 1998 were recontacted in late summer to initiate participation and to prepare for the fall data collection. As described in Appendix C, numerous methods were used to encourage full cooperation in the study at both the SFA and school level. Nonetheless, as evidenced by the protracted data collection period, many schools found it difficult to complete the menu survey. In some cases, concerns about the menu survey component of the study affected completion of the SFA director interview.

Exhibit D.1

SFA- and School-Level Cooperation at the Time of Recruitment

Sample				
SFAs				
Agreed to participate			478	
Refused			110	
Ineligible			9	
Total			597	
Percent Cooperating (excludes ineligibles)			81.3%	
Schools	**Elementary Schools**	**Middle Schools**	**High Schools**	**All Schools**
Agreed to participate	435	390	407	1,232
Refused (SFA director)	84	126	108	318
Ineligible	6	10	10	26
Total	525	526	525	1,576
Percent Cooperating (excludes ineligibles)	83.8%	75.6%	79.0%	79.5%

Note: Ineligible schools (and in some cases entire SFAs) included sampled schools that turned out to be residential facilities or some other non-public schools, schools that did not offer the NSLP, and schools that were no longer in existence at the time of recruitment due to closings, mergers, and reorganizations.

Exhibits D.2 - D.5 show completion rates for the various components of the data collection. Completion rates for the non–menu survey components of the mail survey of cafeteria managers were slightly lower than for the menu survey because some of the schools that were able to complete the menu survey by providing local data forms or through receipt of intense technical assistance never completed the other survey components.

For the menu survey, the vast majority of respondents (89%) provided lunch data for five days. Ten percent provided four days of data, most often because there was a holiday or other school closing during the target week. Less than one percent provided data for three days.

Exhibit D.2

Completion Rate for the SFA Director Interview Among Cooperating SFAs

Status	
Completed	430
Refused	47
Ineligible	1
Total	478
Percent Completed (excludes ineligibles)	90.1%

Note: The one ineligible SFA identified during data collection was a residential facility.

Exhibit D.3

Completion Rate for the School-Level Data Component of the SFA Director Interview Among Cooperating Schools

Status	Elementary Schools	Middle Schools	High Schools	All Schools
Completed	376	371	362	1,109
Refused	57	15	43	115
Ineligible	2	4	2	8
Total	435	390	407	1,232
Percent Completed (excludes ineligibles)	86.8%	96.1%	89.4%	90.6%

Note: Ineligible schools include two schools in the ineligible (residential) SFA and six schools that were either closed, merged, or not offering the NSLP.

Exhibit D.4

Completion Rate for the Menu Survey Among Cooperating Schools

Status	Elementary Schools	Middle Schools	High Schools	All Schools
Completed	365	360	350	1,075
Refused	68	26	55	149
Ineligible	2	4	2	8
Total	435	390	407	1,232
Percent Completed (excludes ineligibles)	**84.3%**	**93.3%**	**86.4%**	**87.8%**

Note: Ineligible schools include two schools in the ineligible (residential) SFA and six schools that were either closed, merged, or not offering the NSLP.

Exhibit D.5

Completion Rate for the Meal Service Questionnaire and *A la Carte* Checklist Among Cooperating Schools

Status	Elementary Schools	Middle Schools	High Schools	All Schools
Completed	352	345	339	1,036
Refused	81	41	66	188
Ineligible	2	4	2	8
Total	435	390	407	1,232
Percent Completed (excludes ineligibles)	**81.3%**	**89.4%**	**83.7%**	**84.6%**

Note: Ineligible schools include two schools in the ineligible (residential) SFA and six schools that were either closed, merged, or not offering the NSLP.

Development of Sample Weights

Sample weights were developed to adjust survey data for differences between the analysis samples (SFAs and schools that completed the various data collection components) and the reference population (sample frame of public schools). Differences between the analysis sample and the reference population are attributable to effects of the sample design as well as to differential rates of response among sampled SFAs and schools. Sample weights were used to adjust survey data so they could be used to meet the objective of the study — to produce nationally representative estimates of the characteristics of public schools participating in the NSLP.

Four different weights were developed for use with the four principal sources of data:

- SFA-level data obtained from the SFA director interview;
- school-level data obtained from the SFA director interview;
- menu survey data; and
- other school-level data (the non-menu survey instruments — Meal Service Questionnaire, *A la Carte* Foods Checklist, and Daily Meal Counts Form).

SFA Weight

An SFA weight was developed for use in the analysis of the SFA-level responses from the SFA director interview. The first step in calculating this weight was to obtain a base sampling weight for each unique sampled school district. The base sampling weight equals the sum of the district measure of size for all eligible districts in the population divided by 617 times the measure of size of the i-th district selection. 617 is the number of district selections in the initial sample (a total of 597 districts were selected, but 20 districts were selected more than once). If a district was selected with certainty, it was assigned a base sampling weight of one.

Each sampled district was assigned a final status code of ineligible, refusal, or completed. The next step in the process was to use the initial sampling frame of 12,590 public school districts to produce frequencies on metropolitan status, region, and district size, the variables that were used to stratify the sample. These frequencies formed the control totals used in creating sampling weights. Both completed and ineligible SFAs were included in the sampling weights to reflect the fact that the sampling frame included some ineligible districts. A convergence criterion of 1.0 was used in creating a final weight (SFA Weight).

School-Level Weights

Three different school-level weights were developed — one for each of the sources of school-level data:

- school-level data obtained from the SFA Director Interview: SFA_Sch Weight
- menu survey data: Nut Weight

- non-menu survey instruments included in the mail survey of cafeteria managers (Daily Meal Counts Form, *A la Carte* Foods Checklist, Meal Service Questionnaire): Menu Weight.

The same procedure was used in calculating each of these weights. The first step in the process was to compute a base sampling weight. This is equivalent to the reciprocals of the multistage selection probabilities of units in the selected sample. The calculation divides the total number of schools in a district within a stratum (elementary, middle, and high) by the number of schools sampled from that same stratum in that district.

Control totals were obtained from the sampling frame of 76,339 public schools included in the 12,590 public school districts. Frequencies were generated for size, metropolitan area, school type, and region. These frequencies were used as control totals in creating sampling weights. Again, both completed and ineligible schools were included to reflect the fact that the sampling frame included ineligible schools. A convergence criterion of 1.0 was used in creating a separate weight for each of the three school-level analysis files. Because the number of participating schools varies somewhat across the three school-level analysis files, the sum of the final school-level weights varies slightly. However, the sum of the weights of the participating and ineligible schools in each of the three files adds to 76,339.

School Reclassifications

As described in the section on sample design, schools in the sampling frame, and therefore all sampled schools, were designated as elementary schools, middle schools, or high schools, using the classification rules used in SNDA-I. During both the recruiting and data collection phases, situations were encountered in which the actual grade configuration was inconsistent with the school type that had been assigned during sampling. This may have been due to errors in the sampling frame or to changes in school configuration between the time the sample was drawn and recruitment and data collection were completed.

For purposes of calculating response rates and sample weights, all schools needed to retain the status that was assigned during the sampling process. For all analyses, however, schools were reassigned to the correct school type. A total of 66 schools were reclassified. The most common reclassifications involved middle schools and high schools that were reclassified to elementary schools. Thus, final analysis samples were slightly lower for middle schools and high schools and higher for elementary schools.

Appendix E
Determining Nutrient Content of School Meals

This appendix describes methods used to determine the average nutrient content of NSLP and SBP meals. Initial sections describe the procedures used to review and process the menu surveys that were completed by cafeteria managers. Later sections detail how these data were analyzed to produce both weighted and unweighted estimates of the nutrient content of average school meals. Information is also provided on the food grouping scheme used in analyzing the types of food offered in school meals.

Review and Processing of Completed Menu Surveys

Completed menu surveys were logged into an ACCESS database as they were received at Abt Associates' data management center. The ACCESS database was used to track each step in the data processing and entry procedure. All data processing and entry was done by nutrition coders who completed a series of targeted training sessions that focused on specific aspects of the data processing protocol. Most coders were completing undergraduate studies in nutrition. All training sessions were conducted by senior project nutritionists and/or the project director.

The first step in the process was a detailed editing procedure. Each completed menu survey booklet was systematically examined to identify instances where needed information was missing, ambiguous or not internally consistent (e.g., the reported number of entree servings exceeded the reported number of reimbursable meals). Coders completed comprehensive call-back forms that listed, by day and by meal, all of the information that was missing or that needed clarification. In order to ensure that call-backs were made as soon as possible after the menu survey was received, lead nutrition coders managed the flow of menu surveys into the editing process on the basis of receipt date.

After call-back forms were complete, coders called cafeteria managers and, in some cases, other individuals in the SFA (e.g., SFA directors, managers of central kitchens, or other central office staff) to obtain needed information. Calls were also made to vendors or food manufacturers when the information available to or provided by respondents was insufficient to allow for appropriate coding of a particular item.

Entering Data into the Computerized Nutrient Analysis System

The second stage of the data processing protocol was entry of menu survey information into the nutrient analysis system. After all issues related to missing or unclear data were resolved, a case was considered complete and ready for data entry. The nutrient analysis system used was NUTRIKIDS (LunchByte Systems, Inc. — version 8.0), a USDA-approved NSMP software system that was selected by FNS. The software included release 3 of the Child Nutrition Database (CN-3 Database), the version that was the most up-to-date at the time data were being processed, as well as an expanded database of brand name foods developed by LunchByte Systems.

Foods not available in the database were entered by LunchByte Systems staff or lead nutrition coders using information provided on package labels or in nutrition information summaries provided by vendors or manufacturers. Information obtained from these sources was reviewed for reasonableness prior to entry into the database. When information for a particular product was not available from the school, SFA, vendor or manufacturer, nutrition coders selected the most comparable item in the database, based on the product description and, if available, a list of ingredients. When data were missing for a particular nutrient, a value was imputed based on the most comparable product or, when several options were available, a mean value.

The NUTRIKIDS software was modified by LunchByte Systems staff to meet the special needs of this study. Numerous modifications were made to accommodate the number of schools involved in the study and the need to create school-specific versions of the same recipe (e.g., the recipe used for mashed potatoes varied from one school to the next). In addition, the software was modified to incorporate both weighted and unweighted nutrient analyses. Finally, to permit more detailed food group analysis, an expanded list of food groups was incorporated. The nutrient analysis and food group functions are described later in this appendix.

Entry Procedures

Nutrition coders entered the information required for nutrient analysis using prescribed entry procedures and the screens included in the NUTRIKIDS software. Items described in the menu survey were matched with the most appropriate food item in the database or with items specifically added to the database, as described above. Coders entered complete recipes for traditional recipe items (e.g., cookies or soup made from scratch), as well as for items prepared by combining two or more individual ingredients (e.g., peanut butter sandwiches). Information on portion sizes and the number of portions served was also entered for every menu item.

Self-Serve Foods and Missing Portion Sizes

When portion size information was missing or foods were offered self-serve (and the respondent was unable or unwilling to provide information on the size of the standard serving utensil or some other estimate of portion size), coders entered defined default portions. Default portions were based on those used in the SNDA-I study but were modified slightly to reflect current program emphases on larger portions of fruits and vegetables and more servings of breads and grains. Default portions for selected breads and grains were also adjusted for breakfast menus.

Default portions for lunch and breakfast menus are shown in Exhibits E.1 and E.2, respectively. Default portions were also defined for four different types of accompaniments: condiments, spreads, toppings, and salad dressings. These defaults, shown in Exhibit E.3, were based on those used in SNDA-I.

Salad Bars and Other Self-Serve Theme Bars

Respondents provided information on all foods offered on salad bars and other self-serve bars. For bars that were served on multiple days, respondents were asked to provide information only for the first day the bar was offered. The salad (or other) bar recipe created using this information was incorporated into the daily menu for each day the bar was offered.

Exhibit E.1

Default Portion Sizes for Food Items Not Included in Salad Bars or Other Self-Serve Food Bars

LUNCH MENUS

Food Group/Food	Elementary	Secondary
Milk as Beverage	8 fl oz	8 fl oz
Meat/Meat Alternates		
Meat, poultry, fish, cheese (edible portion)	2 oz	2 oz
Mixtures with meat, poultry, fish, egg	1/2 cup	1/2 cup
Egg	1 large	1 large
Cooked dry beans or peas	1/2 cup	1/2 cup
Peanut butter, almond butter, other nut or seed butters	4 Tbsp	4 Tbsp
Peanuts, soynuts, tree nuts, or seeds (as 1/2 meat alternate requirement)	1 oz	1 oz
Fruits and Vegetables		
Fruit: fresh, dried, and cooked	3/8 cup or 1 medium	1/2 cup or 1 medium
Vegetables: raw and cooked	3/8 cup	1/2 cup
French fries	1/2 cup	1/2 cup
Fruit and vegetable juice (full-strength)	3/8 cup	1/2 cup
Pasta sauce; not as meat alternate	1/4 cup	1/4 cup
Salads composed primarily of fruit and/or vegetables	3/8 cup	1/2 cup
Bread and Grain Products		
Bread	1 slice	2 slices
Roll, biscuit, muffin	1 oz	2 oz
Cooked rice, grits, and other cereal grains	1/2 cup	1/2 cup
Spaghetti, noodles, macaroni	1 cup	1 cup
Other Menu Items		
Soup	1 cup	1 cup
Saltine crackers; not as bread alternate	2 crackers	2 pkg of 2 crackers each
Snack chips	1 oz	1 oz
Jello with or without fruit	1/2 cup	1/2 cup
Pudding	1/2 cup	1/2 cup

Exhibit E.2

Default Portion Sizes for Food Items Not Included in Salad Bars or Other Self-Serve Food Bars

BREAKFAST MENUS

Food Group/Food	Elementary	Middle and High
Milk as Beverage, on Cereal, or Both	8 fl oz	8 fl oz
Meat/Meat Alternates		
Meat, poultry, fish, cheese (edible portion) as 1/2 entree requirement	1 oz	1 oz
Egg as 1/2 entree requirement	1/2 large	1/2 large
Cooked dry beans or peas as meat alternate and 1/2 entree requirement	4 Tbsp	4 Tbsp
Peanut butter, almond butter, other nut or seed butters as meat alternate and 1/2 entree requirement	2 Tbsp	2 Tbsp
Peanuts, soynuts, tree nuts, or seeds as meat alternate and 1/2 entree requirement	1 oz	1 oz
Fruits/Vegetables/Fruit and Vegetable Juice		
Vegetables: raw and cooked	1/2 cup	1/2 cup
Fruit: fresh, dried and cooked	1/2 cup or 1 medium	1/2 cup or 1 medium
Fruit and vegetable juice (full-strength)	1/2 cup	1/2 cup
Salads composed primarily of fruit and/or vegetables	1/2 cup	1/2 cup
Bread and Grain Products		
Bread as 1/2 entree requirement	1 slice	1 slice
Roll, biscuit, muffin, as 1/2 entree requirement	1 oz	1 oz
Cereal, hot and cold, as 1/2 entree requirement	3/4 cup or 1 oz	3/4 cup or 1 oz

Exhibit E.3

Default Portion Sizes for Accompaniments

Condiments/Spreads	Portion Size	Toppings	Portion Size
Barbecue sauce	1 Tbsp	Bacon bits	3/4 Tbsp
Butter	1 pat (1 each)	Cheese sauce*	2 Tbsp
Cranberry sauce	1 Tbsp	Cheese, shredded*	3/4 Tbsp
Cream cheese	1 Tbsp	Chili*	1/8 cup
Honey	1 Tbsp	Croutons	3/4 Tbsp
Hot sauce	1 tsp	Dates	3/4 Tbsp
Jam, jelly	1 Tbsp	Eggs, chopped*	1 Tbsp
Ketchup/catsup	1 Tbsp	Gravy	2 Tbsp (1 fl oz)
Margarine	1 pat (1 tsp)	Lettuce and/or tomato	1/4 cup
Mayonnaise	1 Tbsp	Nuts, seeds*	3/4 Tbsp
Mustard	2 tsp	Onions, chopped	2 tsp
Olives, sliced	3/4 Tbsp	Peppers (hot), pimentos	3/4 Tbsp
Pancake syrup	3 Tbsp	Raisins	1 Tbsp
Peanut butter*	1 Tbsp	Whipped cream/topping	2 Tbsp
Pickles	3 slices or 1 spear		
Relish	2 tsp	**Salad Dressings**	
Salsa/taco sauce	2 Tbsp	All types	3/4 Tbsp
Sour cream	2 Tbsp	Dips for raw vegetables	3/4 Tbsp
Sweet and sour sauce	1 Tbsp		
Tartar sauce	1 Tbsp		

* Not as meat alternate.

Although portions were available for some items (e.g., the average size of a potato used on a potato bar or the portion of pasta served on a pasta bar where students were allowed only to self-serve sauces and other toppings), portions were not specified for most self-serve bars. The procedures used to enter information for salad bars and other self-serve theme bars — in order to define an average serving from the bar — were based on the approach used in the SNDA-I study. This approach assumes that students are offered everything on the bar and assigns default portions to individual items on the bar based on the minimum portions required in food-based meal patterns or, for non-pattern items such as condiments, defined default portions (as shown in Exhibit E.3).

SNDA-I defaults for self-serve theme bars were modified to reflect current program emphases on larger portions of fruits and vegetables and smaller portions of meat and meat alternates for secondary school students and more servings of grains and breads for all students. Coding rules are summarized in Exhibit E.4. These general rules were also used for coding all other self-serve theme bars, with the exception of potato bars. Self-serve bars did not necessarily include all the components defined in the coding rules. Coding rules were applied to whichever foods were present on the bar.

Potato bars were handled essentially the same way they were handled in SNDA-I. Average toppings were added to a potato depending on what was offered. All meat/meat alternate toppings were averaged together to equal one serving of meat. All non-meat toppings were averaged together and one average serving of non-meat toppings was added to the potato. This composite was used to determine the nutrient content of one serving (entree) from the potato bar.

To ensure consistency in approach and appropriate handling of complex situations, all salad and theme bar recipes were entered by lead nutrition coders and checked by another lead coder or the project director.

Linking Menu Items and Accompaniments

For purposes of the unweighted nutrient analysis (described below), coders had to link some menu items together after a menu had been entered. Rules for linking foods were based on the procedures used in the SNDA-I study.

Accompaniments were classified into four groups — condiments, spreads, toppings, and salad dressings (see Exhibit E.3). The following rules were used to link accompaniments to menu items:

- Salad dressings were always linked to salads.
- Toppings that were not part of a salad/theme bar (e.g., shredded cheese or salsa for tacos) were linked to the appropriate entree(s). When more than one topping was offered, the coder indicated whether the linking should use an *average* topping (when students had the option to select among toppings) or include multiple toppings (when more than one topping was routinely served with a given food).
- Condiments and spreads were only linked to specific menu items when the link between a single condiment or spread and a single menu item was obvious and unambiguous.

Exhibit E.4

Coding Rules for Salad Bars

Elementary Schools	Secondary Schools
Fruits/Vegetables	
3/8 cup vegetable, half of which is lettuce, plus 3/8 cup fruit If no fruit, 3/4 cup vegetable, half of which is lettuce	1 cup vegetable, half of which is lettuce, plus ½ cup fruit If no fruit, 1 ½ cup vegetable, half of which is lettuce
Bread/Grain Products	
2 average servings	2 average servings
Meat/Meat Alternate	
2 ounces	2 ounces
Toppings	
Up to 3 average servings	Up to 3 average servings
Salad Dressing	
1 average serving	1 average serving
Other (Soup, Dessert, Snack Item)	
1 average serving	1 average serving

The other group of menu items that sometimes had to be linked was separate bread or grain items such as rice or particular types of bread/rolls. If the information provided by cafeteria managers indicated that a bread/grain item was offered along with another menu item, as opposed to being available to all students, the items were linked for purposes of the unweighted analysis. Examples of this situation include rice served with stir-fried chicken and vegetables, a roll served with chicken nuggets, and garlic bread served with spaghetti.

Breakfast Menus

Entry rules for breakfast menus were essentially the same as those for lunch menus; however, an additional step was required to ensure that the unweighted nutrient analysis of breakfast menus was done correctly. This extra step involved specifying the number of bread/grain and/or meat/meat alternate servings included in breakfast menu items. The CN database included this information for individual ingredients as well as for recipe items included in the master recipe file but it had to be added for all new ingredients and all newly created recipes.

In keeping with USDA guidance for food-based menu planning, a serving of bread/grain was equivalent to one slice of bread or an equivalent portion of cereal or other grain products. USDA guidance was used to define volume or weight of equivalent portions (USDA, FNS 1998). Cakes, pies, brownies, and cookies were not counted as bread/grain equivalents.

Quality Control Procedures

During the initial phases of coding, each coder's work was carefully reviewed by the senior project nutritionist or a lead coder to ensure that coding rules were followed, that menu items were appropriately matched to items in the nutrient database, and that portion sizes and other information were entered correctly. Each coder received one-on-one feedback on his or her work for the first three menu surveys entered. If problems were noted after three reviews, the coder continued to receive detailed review and feedback until performance reached an acceptable level.

In addition to this initial review, lead coders conducted quality review checks, reviewing entered records for 20 percent of all menu surveys. "Coder Alert" bulletins were issued as needed to reinforce coding rules or to clarify issues that appeared to be problematic. Coders were required to read and keep a copy of all "Coder Alert" bulletins and to revisit their work as necessary to ensure that coding rules were implemented appropriately.

Lead nutrition coders were available at each shift to consult with coders about questions or issues that arose during coding and entry. The senior project nutritionist and lead coders met with the project director weekly to review progress on data entry and to discuss the need for additional/revised coding guidelines.

Entry Verification

As entry of menu surveys was winding down, a 100 percent manual verification process was instituted. This step was necessary because of numerous complications experienced with the software during data entry. It was determined that some of these problems, which resulted from modifications made to the software to accommodate the volume of data associated with the study, had introduced errors into electronic menu records. For example, entered menu items were sometimes "lost" and the nutrients associated with those items were not included in the analysis of nutrient content.

Nutrition coders completed line-by-line reviews comparing electronic menu records with hard copy menu surveys. Coders verified that every menu item was present, that it had been entered correctly, and that a complete nutrient record accompanied each item. To provide an opportunity for additional quality control and cross-checking, coders did not review their own work.

Data Cleaning

After all data were entered, SAS data files were created and a detailed series of cleaning runs was done to check for coding errors. The first set of cleaning runs was meant to identify problems that could be corrected in the NUTRIKIDS files and included the following types of checks:

- **Basic data integrity.** Each daily menu record was checked to be sure that place holders for incomplete or missing foods no longer existed. The record for each menu item was checked to be sure it included a portion size, information on the number of portions served, an associated number of servings to be used in the unweighted nutrient analysis (entered automatically by the modified NUTRIKIDS software, as described below), and complete nutrient information.

- **Over-reporting of portions served.** Daily menu records were checked to be sure that the total number of servings reported for any major food group (except for fruits and vegetables) did not exceed the total number of meals. Instances where this did occur were checked against hard copy menu surveys and editing and data retrieval logs to determine if a correction was needed. (In rare cases, the number of milks or entrees did exceed the total number of meals because schools allowed students to take seconds).

- **Out-of-range menu items.** An extensive series of range checks was done, using the number of calories per serving in more than 70 minor food groups (described in a subsequent section), to identify menu items that exceeded the 95th percentile or fell below the 5th percentile. All of these items were checked against hard copy menu surveys to ensure that the data provided were reasonable and that items had been entered correctly. Corrections were made as necessary.

- **Bread/grain and meat/meat alternate equivalents assigned to breakfast items.** One hundred percent of the bread/grain and meat/meat alternate items included in breakfast menus were reviewed to ensure that serving equivalents were assigned appropriately.

- **Appropriate major and minor food group assignments.** Complete listings of all menu items assigned to each major and minor food group (see below) were generated. Lists were manually reviewed to ensure that all foods had been assigned to appropriate groups.

After this initial set of cleaning runs was completed and all necessary corrections were made, a second set of runs was done to check for out-of-range menu items. In this pass, the focus was on calories, sodium, and fat content per serving for all minor food groups within the major food groups of meat/meat alternate, bread/grain, entree, and extras (the food group classification scheme is discussed later in this appendix).

Finally, after all item-level cleaning runs were completed, a third set of cleaning runs was used to check for out-of-range nutrient values at the menu level. Daily menus that exceeded the 95th or 5th percentile for calories, fat, or sodium — for either the unweighted or weighted nutrient analysis (as described in the next section) — were identified and checked.

Computing the Average Nutrient Content of School Meals

The modified NUTRIKIDS software used in this study computed the total nutrient content of each daily menu as well as an average for the five-day (or, for some schools, four- or three-day) menu. Breakfast and lunch menus were analyzed separately. In addition to calories, the following nutrients and food components were analyzed: protein, total fat, saturated fat, carbohydrate, vitamin A, vitamin C, calcium, iron, cholesterol, and sodium.

For each menu, data on average calorie and nutrient content were compared to customized RDA standards that reflected the range of grades participating in the NSLP and SBP.[1] Weighted RDA standards for grade groupings that covered more than one established RDA group (1-3 years; 4-6 years; 7-10 years; 11-14 years; and 15-18 years) were computed using the methodology developed by USDA and incorporated into all NSMP software systems. This methodology gives equal weight to each age group included in the customized grouping. For example, the weighted RDA standard for an elementary school that encompasses kindergarten (5-year-olds) through grade 6 (11-year-olds) is a weighted average that considers the RDA for each of the component age groups: 5-year-olds, 6- year-olds, 7-year-olds, 8-year-olds, 9-year-olds, 10-year-olds, and 11-year-olds.[2] The RDA standards for each nutrient would therefore be derived as follows: [(4–6-year-olds RDA *.286) + (7–10-year-olds RDA *.571) + (11–14-year-olds RDA *.143)]

NSMP standards require schools that encompass a broad range of grades (e.g., K-8, K-12, or 6-12) to complete separate analyses for younger and older children because their needs vary so widely. Because each school could be included in the study data base only once, RDA standards for lunch analyses were set equal to grades K-6 (or 1-6) for schools with K-8, K-12, or similar grade spans and to grades 7-12 for schools with 5-12, 6-12 or similar grade spans. For breakfast analyses, the actual grade spans were used because SBP nutrition standards are designed to cover grades K-12.

As described elsewhere in this report, the average nutrient content of school meals was measured using both weighted and unweighted nutrient analyses. The weighted analysis reflects current program regulations for menus planned using NSMP or ANSMP as well as program monitoring requirements for menus planned using the other menu planning options. The unweighted analysis was carried out primarily to permit comparison of data from this study to data from the SNDA-I study (all nutrient analyses in SNDA-I were unweighted). In addition, policy makers were interested in determining whether the choice of nutrient analysis approach (weighted versus unweighted) influences conclusions about the nutritional quality of school meals.

Weighted Nutrient Analysis

A *weighted* nutrient analysis takes into account the number and type of foods actually served to students, giving greater weight to the nutrient value of foods that are served more frequently. USDA-approved computer software programs for NSMP, such as the NUTRIKIDS software used in this study, are designed to compute the *weighted* average nutrient content of a meal (menu). For each menu item offered on a given day, the analysis computes the total amount of calories and nutrients included in the foods *served* to/*selected* by students (e.g., calories and nutrients in a portion of the food * number of portions served). These values are totaled for all menu items offered. The resulting composite is then divided by the total number of reimbursable meals served to determine the nutrient content of the average meal *served* to/*selected* by students each day.

1 Some schools that included preschool or kindergarten reported serving meals only to students in first grade or higher.

2 RDAs for 11–14-year-olds and 15–18-year-olds specify separate standards for males and females. The NSMP analysis uses an average of the male and female standards.

Unweighted Nutrient Analysis

In contrast to a weighted nutrient analysis, an *unweighted* analysis does not incorporate information on student selection patterns. Thus, rather than providing a picture of the nutrient content of the average meal *served* to students, an unweighted analysis provides information on the nutrient content of the average meal *offered* to students. An unweighted analysis includes an average serving of every type of food offered.

The methodology used in computing unweighted nutrient averages was based on the approach used in the SNDA-I study and earlier studies of the NSLP and SBP. The basic algorithm is built around the food-based meal patterns. So, for lunch, an unweighted average includes the following:

- An average serving of milk
- One average entree or meat/meat alternate
- Two average servings of vegetables and/or fruit
- An average serving of grain or bread, if offered separately from entrees
- An average serving of dessert or other extra items (if offered)
- An average serving of unlinked condiments.

As noted previously, salad dressings were always linked to salads, toppings were linked to appropriate food items, and breads/grains were linked to entrees or meat/meat alternates, as appropriate.

For breakfast, the unweighted average includes an average serving of milk; an average serving of fruit and/or vegetable or juice; and two average servings of bread and/or meat equivalents.

These assumptions were largely replicated in the unweighted analysis of SNDA-II data. However, because the data clearly indicated that some schools were offering more than two servings of fruits and vegetables (in keeping with current program emphases), information from the weighted analysis was used to define expectations for fruit and vegetable servings in the unweighted analysis. If the weighted analysis indicated that students were allowed to select more than two servings of fruit and vegetables at lunch, the unweighted analysis assumed the increased number of servings.

To produce unweighted nutrient analyses for each daily menu, the software used a base of 1,000 for the number or reimbursable meals served. Unweighted serving projections were assigned to each menu item, assuming an equal distribution across comparable food items. For example, if four types of milk were offered, 250 servings were assumed for each type of milk. Numbers that did not divide evenly into 1,000 were rounded (e.g., 334, 333, 333 for three choices).[3] To avoid systematic bias, larger serving estimates were randomly distributed across choices within a day and across days within the week. For example, if

3 CN guidance, issued after the time the NUTRIKIDS software was modified for use in this study, suggests use of a base of 900 (which is divisible by all numbers up to 6, as well as by 8, 9, and 10) to minimize the need for rounding.

three milk choices were offered every day, the 334 servings were assigned to a different type of milk each day.

The content of salad bars, food bars, and other multi-component items was also taken into consideration when serving projections were assigned. For example, if a food bar or sack lunch (entered into the analysis as a recipe) included an entree, fruit/vegetables, and a dessert, the number of food bar servings was subtracted from the base when unweighted servings were assigned to fruit/vegetables and desserts in order to avoid double counting.

Exhibit E.5 illustrates weighted and unweighted servings for a sample high school menu offered in a school that did not use the traditional meal pattern. Unweighted serving assignments assume one serving of milk (even though the information provided for the weighted analysis clearly indicates that many children do not take milk) and one entree. Because the weighted projections suggest that students may take more than two servings of fruits and vegetables (2.8 servings per reimbursable meal, excluding the food bar), the unweighted serving assignments assume three servings of fruits and vegetables per meal. The base of 1,000 meals is reduced by 167 because the food bar, a separate serving line, already includes fruits and vegetables. Therefore, with a base of 833 meals * 3 servings, the total number of unweighted fruit and vegetable servings is 2,499. To determine the number of unweighted servings to assign to each fruit and vegetable, the modified base of 2,499 is divided by the total number of fruit and vegetable choices (five). This translates into approximately 500 servings for each choice.

In addition, while an unweighted analysis normally assumes 1,000 servings for desserts and other extras as well as for additional breads/grains, unweighted serving assumptions in this example are adjusted downward to account for the fact that the brownie is already included in the food bar as well as the fact that the garlic bread is served with the lasagna.

Finally, since the condiments are offered self-serve and not linked to specific entrees, an average serving of condiments (500 servings of each) is included in the analysis. The salad dressing is linked to the tossed salad.

The NUTRIKIDS software was modified to automatically assign most of the serving assumptions needed for the unweighted analysis. This automated approach required that each individual food on the menu be classified into a major food group (described below) so the 1,000 unweighted servings (2,000 or more servings for fruits and vegetables) could be appropriately distributed across the available options. The linking procedures described previously were used to account for situations where an accompaniment or a grain/bread item was served only with a specific menu item. Finally, manual entries were made as needed for menus that included theme bars or sack lunches that contained other menu items such as dessert.

Because assumptions included in the SNDA-I methodology do not reflect how NSMP/ANSMP menus are structured and marketed to students, a separate analysis was completed in which the unweighted analysis for NSMP/ANSMP sites was modified to reflect the basic differences in menu structure. This analysis assumed an average serving of milk, an average entree, some number of average "sides" (all menu items offered other than milk and entrees) and an average serving of condiments. The number of side dishes included in the analysis was based on the meal production data. As noted in Chapter Five,

Exhibit E.5

Comparison of Assumptions for Weighted and Unweighted Nutrient Analyses

	Weighted Analysis	Unweighted Analysis
Number of Reimbursable Meals	1,655	1,000
Menu Item	**Number of Portions Served**	**Projected Servings**
1% chocolate milk	695	250
Skim milk	25	250
2% milk (white)	300	250
Whole milk	150	250
Deli sandwich line	155	166
Chicken nuggets (w/BBQ sauce)	175	167
Cheeseburger	85	166
Lasagna	175	167
Pizza	965	167
Food bar (includes vegetables, fruit, and brownie)	100	167
Tossed salad	900	500
French fries	1,575	500
Fruit cocktail	650	499
Orange juice	480	500
Canned peaches	675	500
Garlic bread	175	167
Chocolate chip cookie	750	833
Catsup (self-serve condiment bar)	1,625	500
Salad dressing	925	500
Mayonnaise (self-serve condiment bar)	228	500

Note: Information for weighted analysis provided by cafeteria manager. Projections for unweighted analysis assigned by NUTRIKIDS software.

incorporation of the revised unweighted analysis for NSMP/ANSMP sites had no material effect on the results. Thus, a decision was made to use only one version of the unweighted analysis — the version that essentially replicated SNDA-I — in this report.

Food Group Codes

Food codes in the CN-3 nutrient database do not include an imbedded food group classification system. The standard NUTRIKIDS software included only a simple classification system, built around the major meal components used in the food-based NSLP and SBP meal patterns. This system was too limited to meet the needs of the SNDA-II study. Therefore, an expanded set of food groups was developed, in consultation with USDA, and incorporated into the modified NUTRIKIDS software. Nutrition coders assigned major and minor food group codes to all menu items.

The food group system was further expanded during the analysis phase of the contract. In the end, the classification system used for food group analyses included seven major food groups and 81 minor food groups. The first four major food groups are identical to the NSLP and SBP meal patterns. The latter three major groups allowed for combination foods and additional items not considered in the meal patterns. The food group classification system is summarized in Exhibit E.6.

Exhibit E.6

Major and Minor Food Groups

Code	Long Description	Examples
MILK		
MILK1	whole, unflavored	whole milk with no added flavoring
MILK2	lowfat, unflavored (1%)	1% milk with no added flavoring
MILK3	skim and 1/2%, unflavored	nonfat or skim milk with no added flavoring
MILK4	lowfat, flavored (1%)	1% chocolate milk, 1% strawberry milk, 1% coffee milk
MILK5	skim and 1/2%, flavored	nonfat chocolate milk, nonfat strawberry milk, nonfat coffee milk
MILK6	whole, flavored	chocolate whole milk, coffee whole milk, strawberry whole milk
MILK7	2% lowfat, unflavored	2% milk with no added flavoring
MILK8	2% lowfat, flavored	2% chocolate milk, 2% strawberry milk, 2% coffee milk
MILK9	milkshake	milkshake or thick shake (any flavor)
FRUITS AND VEGETABLES		
CNDFR	canned fruit	*canned* fruit of any kind, including *canned* fruit cocktail or fruit salad
COMFR	combination of fresh, canned, frozen, and/or dried fruits	fruit salad made with both fresh and canned fruits
DRYFR	dried fruit	raisins, dates, figs, trail mix
FSHFR	fresh fruit	*fresh* fruit of any kind, including fruit salad made with only fresh fruits
FRZFR	frozen fruit	*frozen* fruit of any kind, including frozen fruit mixtures, frozen juice bars
JUICC	full-strength citrus juice, including juice blends w/ citrus (100% juice only)	orange, grapefruit, pineapple-orange juice
JUICO	full-strength non-citrus juice (100% juice only) including vegetable juice	apple, grape, pineapple, non-citrus blends, V-8 juice, tomato juice
CKVEG	cooked vegetables other than potatoes and French fries	any vegetable that is served *cooked*, whether made from fresh, frozen, or canned vegetables
DFPOT	French fries and other processed potatoes (deep fried)	French fries, shoestring fries, curly fries, tater tots, hash browns specified as deep-fried
OFPOT	French fries and other processed potatoes (oven fried)	French fries, shoestring fries, curly fries, tater tots, hash browns specified as oven-fried or not specified as either deep-fried or oven-fried

Code	Long Description	Examples
FRUITS AND VEGETABLES, Cont'd		
POTAT	potatoes other than French fries or comparable processed potato products (includes sweet potatoes)	mashed or whipped potato, baked potato, boiled potatoes, baked sweet potatoes, AuGratin, scalloped, or O'Brien potatoes
LETOM	lettuce and/or tomato served as a vegetable choice for all students	lettuce and/or tomato slices, chopped lettuce and/or tomato
SALAD	green salad, non-entree salad bars (no meat/meat alternates)	tossed salad, garden salad, lettuce salad, side salad bars
OTHSA	other types of non-entree salads	carrot and raisin salad, cole slaw, Waldorf salad, 3-bean salad, potato salad
RWVEG	fresh, raw vegetables, other than green salads, lettuce and tomato, or other salads	raw vegetable sticks or pieces
LEGUM	legumes (counted as vegetables)	baked beans, refried beans, lima beans, any "non-green" beans or peas not counted as meat alternate
OTVEG	vegetable soups and vegetable mixtures/casseroles	tomato soup, minestrone soup, broccoli cheese casserole, creamed corn, green bean casserole
MEAT/MEAT ALTERNATES (offered as entree, but not included in combination entree)		
CHS	cheese	cottage cheese, slice of cheese (American, cheddar, mozzarella, etc.)
CHX	breaded/fried chicken nuggets, patties, and similar products	chicken cutlets, patties, filets, nuggets, similar products - with breading
EGGS	eggs	scrambled egg, hard-cooked egg, fried egg, omelet, egg salad
MPF	plain (unbreaded and not fried) meat/poultry/fish	chicken, fish, turkey, beef, ham that is unbreaded and not fried (includes Canadian bacon, meatballs, meatloaf)
MPFBD	breaded, processed and/or fried meat/poultry/fish other than chicken nuggets, patties, and similar products	fish sticks, pork fritters, fried fish, fried chicken parts, country fried steak, turkey fritters
MPFGM	meat/poultry/fish with mayonnaise or gravy	tuna salad, chicken salad, diced turkey and gravy, salisbury steak
MTLEG	legume as meat alternate (including peanuts and peanut butter) NOTE: With the exception of peanuts and peanut butter, these items are usually counted as vegetables	peanuts, peanut butter, baked beans, refried beans, or other "non-green" beans or peas counted as a meat alternate
SAUS	sausage, frankfurters, and cold cuts	sausage pattie/links, Italian/Polish sausage, bologna, hot dog, salami
YOGRT	yogurt	fruited, flavored or plain yogurt (including nonfat or lowfat)

Code	Long Description	Examples
BREAD/GRAINS		
BREAD	breads, rolls, bagels, and other plain breads (includes soft pretzels)	sandwich bread, pita bread, English muffin, dinner rolls, French bread, sandwich buns/rolls
CCER	cold cereal	any type of cold cereal: Cheerios, Rice Krispies, Golden Grahams, etc.
CRACK	crackers and pretzels (hard)	saltines, butter (Ritz), wheat, rye, oyster, or graham or animal crackers, hard pretzels, rice cakes
BISC	biscuits and other bread alternates that are higher in fat than plain bread	biscuit, croissant, cornbread, corn (hard) taco shells, nacho/tortilla chips, corn chips, hush puppies, seasoned bread sticks, stuffing
BRDFT	breads or bread alternates with added fat	garlic bread, pre-buttered rolls, buttered toast, bagels with cream cheese
HCER	hot cereal	any type of cooked, hot cereal such as oatmeal, Cream of Wheat, grits
MUFF	muffins (excludes English muffins), sweet/quick breads, cereal/granola bars	blueberry muffin, banana bread, granola bars
PANC	pancakes, waffles, French toast	pancakes, waffles, French toast, French toast sticks, French toast bagels
PASTA	pasta	macaroni, noodles, spaghetti - not included in combination entree - or macaroni salad, pasta salad, macaroni and cheese, ravioli as a side dish
PSTRY	pastries and sweet rolls	donut, Danish, cinnamon bun, sweet roll, turnovers, coffee cake, toaster pastries
RICE	rice	any type of rice not included in combination entree
ENTREES		
BRKSW	breakfast sandwich	sausage, egg, and cheese on a biscuit; ham and cheese bagel sandwich; breakfast burrito; cheese toast or other "sandwich" served at breakfast
HAMB	hamburger, similar beef/pork sandwiches	hamburger on a bun, including double burgers or burgers with bacon or other additions, Sloppy Joe sandwich, barbeque beef or pork on a bun, Rib-b-que sandwich, steak sandwich, meatball sub
CHAMB	cheeseburger, similar beef/pork sandwiches with cheese	cheeseburger on a bun, steak and cheese
HOTDG	hot dog, corn dog, similar sausage products	any type of hot dog on a bun, corn dog, or sausage with wrapping (bun or pancake)
LNSW	sandwich with lean meat, turkey, chicken, ham (includes turkey ham) (no cheese)	sliced turkey sandwich, deli roast beef sandwich, ham sandwich, grilled chicken or turkey sandwich
PBJSW	peanut butter sandwich	any sandwich with peanut butter, with or without jelly or fluff

Code	Long Description	Examples
ENTREES, Cont'd		
CHCCS	sandwich with cheese and/or cold cuts	cheese sandwich, grilled cheese, Italian or American subs, bologna and cheese, ham and cheese, roast beef and cheese, any sandwich made with cheese (other than those included in CHAMB)
MAYSW	sandwich with mayonnaise-based meat salads	egg salad sandwich, turkey salad sandwich, chicken salad sandwich, tuna salad sandwich
FRYSW	sandwich with breaded/fried meat, poultry, or fish (no cheese)	breaded chicken patty sandwich, fishwich, breaded veal or pork cutlet sandwich, chicken fried steak sandwich
PIZZA	pizza or calzone - without meat	any slice, individual or pocket pizza that is plain cheese or vegetarian
PIZZM	pizza or calzone - with meat	any slice, individual or pocket pizza that includes sausage, pepperoni, hamburger, ham or other meat
SPAG	mixtures with a pasta or noodle base	spaghetti w/ sauce and/or meat, lasagna, ravioli, macaroni and cheese, turkey tetrazzini
TACO	Mexican-style entree	taco, enchilada, burrito, nachos, tamale, fajitas, quesadillas
MIX	other mixtures with meat, grain, and possibly vegetables	beef or chicken stir fry, chop suey, beef stew, shepherd's pie, chicken pot pie, quiche, chili (with or without meat), baked potato with cheese
CHFSL	Chef's salad or other salad plate	Chef's salad, chicken Caesar salad, tuna salad plate, cottage cheese and fruit plate
SANBR	sandwich bar/deli bar	sandwich bar
THMBR	other entree theme bar	potato bar, pasta bar, taco bar
SALBE	entree salad bar - elementary school	entree salad bar in elementary school
SALBS	entree salad bar - secondary school	entree salad bar in secondary school
BAGML	bag or sack meals	pre-packaged lunches or breakfasts
EXTRAS		
BKDES	baked desserts (cakes, cookies, brownies)	chocolate cake, oatmeal cookie, brownies, peanut butter bars
CHIPS	snack chips (including popcorn, but not pretzels, corn chips or plain tortilla chips)	potato chips, Doritos, Funyons, cheese curls
DESFR	dessert item containing fruit or juice	fruited gelatin, fruit cobblers, fruit pies, fruit crisps
OTDES	other desserts (non-fruited gelatin, ice cream, sherbet, pudding)	jello w/topping, vanilla ice cream, butterscotch pudding
FTDRK	fruit drinks (not 100% juice)	fruit punch, orange drink, cranberry juice drink

Code	Long Description	Examples
EXTRAS, OTHER		
SOUP	non-vegetable/non-entree soups and cream soups	chicken noodle soup, cream of mushroom soup, clam chowder
OTHBV	other beverages	coffee, tea, iced tea
OTHER	other miscellaneous menu items	bacon, other miscellaneous side dishes
ACCOMPANIMENTS		
LCOND	fat-free/lowfat condiments	barbecue sauce, honey, ketchup, mustard, pickles, relish, salsa
COND	higher-fat condiments	tartar sauce, mayonnaise
LSLDG	fat-free/lowfat salad dressings	any dressing or vegetable dip that is nonfat, lowfat, or low calorie
SLDRG	regular salad dressings	Italian dressing, ranch dressing, French dressing, all regular dressings and vegetable dips
LSPRD	fat-free/lowfat spreads	cranberry sauce, jam, jelly, syrup, sugar, fruit sauces, fat-free/lowfat cream cheese, fat-free/lowfat sour cream
SPRDS	higher-fat spreads	butter, regular cream cheese, margarine, regular sour cream
TOPPG	toppings	cheese sauce, gravies, chili, grated cheese, onions, olives, bacon, bacon bits, hot peppers, other items used as toppings

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than the entire state population has. For example, suppose a state had experienced stable FSP and UI Program participation and rising per capita income. Our regression estimator would predict a stable or declining percentage of eligible infants and children, implying that a sample estimate showing a large increase in WIC eligibles is too high. The regression estimate will be lower than the sample estimate for such a state. On the other hand, if the sample data for a state show a much smaller increase in eligible infants and children than expected in light of the observed changes in FSP and UI Program participation and per capita income, the regression estimate for that state will be higher than the sample estimate.

5. Using "shrinkage" methods, average the sample estimates of change and the predictions of change.

As noted, the limitation of the sample estimator is imprecision. The limitation of the regression estimator is called "bias." Some states really have larger or smaller increases in WIC eligibles than we expect (and predict with the regression estimator) based on changes in FSP and UI Program participation and per capita income. Such errors in regression estimates reflect bias.

These limitations arise for the following reasons. The sample estimator uses only sample data for one state to obtain an estimate for that state. It does not use sample data for other states or administrative records data. Although the regression estimator borrows strength, using data from all the states and administrative records data, it makes no further use of the sample data after estimating the regression line. It assumes that the entire difference between the sample and regression estimates is sampling error, that is, error in the sample estimate. No allowance is made for prediction error, that is, error in the regression estimate. Although not all, if any, true state values lie on the regression line, the regression estimator assumes they do.

Using all of the information at hand, a shrinkage estimator addresses the limitations of the sample and regression estimators by combining the sample and regression estimates, striking a compromise. As illustrated in Figure II.3, a shrinkage estimator takes a weighted average of the

FIGURE II.3

SHRINKAGE ESTIMATION

More Precise Sample Estimate, Worse Fitting Regression Line

⇒ More Weight on Sample Estimate

• ------------ • -- •

Sample Estimate 4%	Shrinkage Estimate 5%		Regression Estimate 8%

Less Precise Sample Estimate, Better Fitting Regression Line

⇒ Less Weight on Sample Estimate

• --- • -------------- •

Sample Estimate 4%		Shrinkage Estimate 7%	Regression Estimate 8%

sample and regression estimates. Generally, the more precise the sample estimate for a state, the closer the shrinkage estimate will be to it. The larger samples drawn in large states support more precise sample estimates, so shrinkage estimates tend to be closer to the sample estimates for large states. Given the precision of the sample estimate for a state, the weight given to the regression estimate depends on how well the regression line "fits." If the regression estimator cannot find good predictors reflecting why some states have larger increases in WIC eligibles than other states, we say that the regression line "fits poorly." The shrinkage estimate will be farther from the regression estimate and closer to the sample estimate when the regression line fits poorly. In contrast, the shrinkage estimate will be closer to the regression estimate and farther from the sample estimate when the regression line fits well. Striking a compromise between the sample and regression estimators, the shrinkage estimator strikes a compromise between imprecision and bias. The sample and regression estimates are optimally weighted to improve accuracy by minimizing a measure of error that reflects both imprecision and bias. By accepting a little bias, the shrinkage estimator may be substantially more precise than the sample estimator. By sacrificing a little precision, the shrinkage estimator may be substantially less biased than the regression estimator.

Table II.2 presents state shrinkage estimates of the change between 1989 and 1992 in the percentage of infants and children who were income eligible for WIC. Table II.2 also displays the sample and regression estimates from Steps 3 and 4.

6. **Add the shrinkage estimate of the change between 1989 and 1992 to the census estimate of the percentage eligible in 1989 to get a shrinkage estimate of the percentage eligible in 1992.**

Table II.3 presents census estimates of the percentage eligible in 1989 from Step 1, shrinkage estimates of the change in the percentage eligible between 1989 and 1992 from Step 5, and shrinkage estimates of the percentage eligible in 1992 from this step. The shrinkage estimate of change added to the census estimate for 1989 gives the shrinkage estimate for 1992. In other words, where a state starts plus how much it changes tells us where the state ends up. For example, 28.543 percent of

TABLE II.3

PERCENTAGES OF INFANTS AND CHILDREN INCOME ELIGIBLE:
CENSUS AND SHRINKAGE ESTIMATES

State	1989 (Census)	Shrinkage Estimate of Change Between 1989 and 1992	Shrinkage Estimate for 1992
Alabama	46.302	2.506	48.808
Alaska	41.367	8.238	49.605
Arizona	45.474	6.336	51.810
Arkansas	52.206	3.977	56.183
California	37.760	8.619	46.379
Colorado	36.057	0.133	36.190
Connecticut	21.200	9.044	30.244
Delaware	28.543	6.788	35.331
District of Columbia	46.241	12.032	58.273
Florida	40.021	10.907	50.928
Georgia	40.615	4.785	45.400
Hawaii	36.821	7.325	44.146
Idaho	46.808	2.020	48.828
Illinois	33.183	4.638	37.821
Indiana	35.470	6.221	41.691
Iowa	36.846	2.634	39.480
Kansas	36.760	0.620	37.380
Kentucky	48.123	2.409	50.532
Louisiana	52.651	0.977	53.628
Maine	34.528	10.510	45.038
Maryland	24.246	8.268	32.514
Massachusetts	25.087	1.596	26.683
Michigan	37.172	4.331	41.503
Minnesota	29.362	1.454	30.816
Mississippi	57.544	2.436	59.980
Missouri	38.929	5.911	44.840
Montana	46.639	2.366	49.005
Nebraska	38.100	0.191	38.291
Nevada	34.353	7.788	42.141
New Hampshire	20.531	7.436	27.967
New Jersey	22.446	6.509	28.955
New Mexico	53.995	6.123	60.118
New York	35.136	6.917	42.053
North Carolina	39.911	4.608	44.519
North Dakota	42.554	-0.184	42.370
Ohio	37.048	2.522	39.570
Oklahoma	47.638	5.145	52.783
Oregon	39.879	4.830	44.709
Pennsylvania	33.428	3.904	37.332
Rhode Island	29.823	10.390	40.213
South Carolina	43.847	6.717	50.564
South Dakota	47.214	-1.148	46.066
Tennessee	44.004	7.873	51.877
Texas	45.835	6.306	52.141
Utah	39.999	0.227	40.226
Vermont	31.164	9.442	40.606
Virginia	31.369	3.033	34.402
Washington	34.764	3.041	37.805
West Virginia	51.603	4.868	56.471
Wisconsin	34.094	2.413	36.507
Wyoming	41.211	1.212	42.423
United States	37.789	5.590	43.379

infants and children were income eligible in Delaware in 1989, and that figure rose by 6.788 percentage points between 1989 and 1992 according to our shrinkage estimator. Therefore, we estimate that 28.543 + 6.788 = 35.331 percent of infants and children were income eligible in Delaware in 1992.

7. Multiply the shrinkage estimate of the percentage eligible by the state population of infants and the state population of children to get preliminary shrinkage estimates of the numbers of eligible infants and children.

To obtain separate estimates for infants and children, we have assumed that the percentage of infants who were income eligible in a state is the same as the percentage of children who were income eligible. Our estimate of that percentage was obtained in Step 6.

To obtain estimated numbers from estimated percentages, we require state population estimates for both infants and children. The population estimates we used pertain to the resident population on July 1, 1992 and were developed by the U.S. Bureau of the Census from census and administrative records (mainly vital statistics) data. These estimates are often called "independent" estimates because they are not based on CPS or other sample data. In broad terms, they were derived by subtracting from census counts persons "exiting" the population between April 1, 1990 and July 1, 1992 (due to death or net out-migration) and adding persons "entering" the population (due to birth or net in-migration). Because infants in the July 1, 1992 population had not yet been born on April 1, 1990, census data have no bearing on the population estimates for infants. Those estimates are based entirely on vital statistics data and other administrative records data needed to account for migration. Likewise, census data are irrelevant to the population estimates for children age 1 and some children age 2. (The population estimates for children ages 1 through 4 were obtained by summing estimates for each year in that range.)

Table II.4 displays preliminary shrinkage estimates of the number of infants and the number of children who were income eligible for WIC in 1992. It also shows shrinkage estimates of the percentages eligible from Step 6 and state population estimates for infants and children developed

TABLE II.4

PRELIMINARY SHRINKAGE ESTIMATES OF THE NUMBERS OF INFANTS AND CHILDREN INCOME ELIGIBLE IN 1992

State	Shrinkage Estimate of Percentage Eligible	Population		Preliminary Shrinkage Estimate of Number Eligible	
		Infants	Children	Infants	Children
Alabama	48.808	61,680	236,274	30,105	115,321
Alaska	49.605	11,513	45,998	5,711	22,817
Arizona	51.810	65,911	254,228	34,148	131,716
Arkansas	56.183	34,457	135,906	19,359	76,356
California	46.379	592,244	2,169,211	274,677	1,006,058
Colorado	36.190	53,589	209,645	19,394	75,871
Connecticut	30.244	46,580	189,045	14,088	57,175
Delaware	35.331	10,769	41,456	3,805	14,647
District of Columbia	58.273	8,321	31,688	4,849	18,466
Florida	50.928	190,419	751,682	96,977	382,817
Georgia	45.400	109,227	422,780	49,589	191,942
Hawaii	44.146	19,608	71,900	8,656	31,741
Idaho	48.828	17,069	67,048	8,334	32,738
Illinois	37.821	188,287	713,032	71,212	269,676
Indiana	41.691	82,321	323,759	34,320	134,978
Iowa	39.480	37,743	155,417	14,901	61,359
Kansas	37.380	36,797	150,458	13,755	56,241
Kentucky	50.532	52,901	206,213	26,732	104,204
Louisiana	53.628	70,356	270,028	37,731	144,811
Maine	45.038	15,595	66,707	7,024	30,043
Maryland	32.514	75,832	302,839	24,656	98,465
Massachusetts	26.683	86,239	340,993	23,011	90,987
Michigan	41.503	138,700	575,590	57,565	238,887
Minnesota	30.816	64,757	269,688	19,956	83,107
Mississippi	59.980	42,485	160,775	25,483	96,433
Missouri	44.840	74,623	301,457	33,461	135,173
Montana	49.005	11,367	46,728	5,570	22,899
Nebraska	38.291	22,833	95,834	8,743	36,696
Nevada	42.141	21,921	84,581	9,238	35,643
New Hampshire	27.967	15,487	66,256	4,331	18,530
New Jersey	28.955	117,976	455,968	34,160	132,026
New Mexico	60.118	27,816	105,955	16,722	63,698
New York	42.053	281,522	1,079,972	118,388	454,161
North Carolina	44.519	101,190	393,791	45,049	175,312
North Dakota	42.370	8,722	36,102	3,696	15,296
Ohio	39.570	164,409	634,255	65,057	250,975
Oklahoma	52.783	47,301	185,746	24,967	98,042
Oregon	44.709	41,279	169,723	18,455	75,881
Pennsylvania	37.332	162,326	649,572	60,600	242,498
Rhode Island	40.213	14,579	56,348	5,863	22,659
South Carolina	50.564	55,711	217,352	28,170	109,902
South Dakota	46.066	11,029	43,857	5,081	20,203
Tennessee	51.877	72,929	281,056	37,833	145,803
Texas	52.141	317,748	1,183,890	165,677	617,292
Utah	40.226	36,513	141,484	14,688	56,913
Vermont	40.606	7,532	32,366	3,058	13,143
Virginia	34.402	95,568	371,646	32,877	127,854
Washington	37.805	78,349	312,585	29,620	118,173
West Virginia	56.471	21,856	86,392	12,342	48,786
Wisconsin	36.507	69,318	289,261	25,306	105,601
Wyoming	42.423	6,718	27,626	2,850	11,720
United States	43.379	4,000,022	15,512,163	1,737,837	6,721,734

by the Census Bureau. According to Table II.4, there were 10,769 infants and 41,456 children living in Delaware in 1992. Our shrinkage estimate is that 35.331 percent of those infants and children were income eligible. Therefore, our preliminary shrinkage estimates of the numbers eligible are $(35.331 \div 100) \times 10{,}769 = 3{,}805$ infants and $(35.331 \div 100) \times 41{,}456 = 14{,}647$ children.

8. Control the preliminary state shrinkage estimates of the numbers of eligible infants and children to sum to the national totals for eligible infants and children obtained from the CPS.

The preliminary state shrinkage estimates derived in Step 7 sum to 1,737,837 eligible infants and 6,721,734 eligible children nationwide. According to the March 1993 CPS, there were 1,717,743 eligible infants and 6,925,815 eligible children in the entire U.S. The most recent national sample estimates are typically used to develop the budget for the WIC Program. To obtain final shrinkage estimates for states that sum (aside from rounding error) to the national totals from the most rêcent CPS (March 1993), we multiply each of the preliminary state shrinkage estimates for infants by $1{,}717{,}743 \div 1{,}737{,}837$ (≈ 0.9884) and each of the preliminary state shrinkage estimates for children by $6{,}925{,}815 \div 6{,}721{,}734$ (≈ 1.0304). This ensures that the estimates used to allocate funds are consistent with the estimates generally used to determine total program funding. The final shrinkage estimates are presented in the next chapter.

III. STATE ESTIMATES OF WIC ELIGIBLES FOR 1992

Table III.1 presents our final state shrinkage estimates of the number of infants and the number of children who were income eligible for WIC in 1992. The strength of these estimates is that they are timely relative to census estimates and precise relative to CPS estimates. As documented in the appendix, the shrinkage estimates have much smaller standard errors and narrower confidence intervals than the CPS sample estimates. Table III.2 displays approximate 90-percent confidence intervals showing the uncertainty remaining after using shrinkage estimation. One interpretation of a 90-percent confidence interval is that there is a 90 percent chance that the true value--that is, the true number of eligibles--lies in the estimated interval. A wide interval means that we are very uncertain about the true value. According to our calculations, a shrinkage confidence interval is, on average, only about 39 percent as wide as the corresponding sample confidence interval. Thus, shrinkage substantially reduces our uncertainty.

The Food and Consumer Service (FCS) of the U.S. Department of Agriculture used the final shrinkage estimates of infants and children income-eligible for WIC in 1992 to determine state WIC food grants for fiscal year 1995. From the final shrinkage estimates in Table III.1, FCS calculated each state's "fair share" of total fiscal year 1995 WIC food funds. A state's fair share is its percentage share of the national number of eligible infants and children. Thus, for example, Delaware--which has about 0.2 percent [(3,761 + 15,092) ÷ (1,717,746 + 6,925,819)] of all eligible infants and children--has a fair share of about 0.2 percent of total WIC food funds.

According to the WIC food funding formula (7 C.F.R. §246.16), a state's WIC food grant is determined by comparing the fair share amount to the prior year food grant. If the prior year grant equals or exceeds the fair share amount, the state is entitled to receive only the prior year amount, adjusted for inflation (if total food funds are adequate to provide inflation increases to all states). If the prior year grant is below the fair share amount, the state is entitled to received an inflation

TABLE III.1

FINAL SHRINKAGE ESTIMATES OF THE NUMBERS OF INFANTS AND CHILDREN INCOME ELIGIBLE IN 1992

State	Infants	Children
Alabama	29,757	118,822
Alaska	5,645	23,510
Arizona	33,754	135,715
Arkansas	19,135	78,674
California	271,501	1,036,604
Colorado	19,170	78,174
Connecticut	13,925	58,911
Delaware	3,761	15,092
District of Columbia	4,793	19,026
Florida	95,855	394,439
Georgia	49,016	197,770
Hawaii	8,556	32,705
Idaho	8,238	33,732
Illinois	70,389	277,864
Indiana	33,924	139,077
Iowa	14,729	63,222
Kansas	13,596	57,949
Kentucky	26,423	107,367
Louisiana	37,294	149,207
Maine	6,942	30,956
Maryland	24,371	101,455
Massachusetts	22,745	93,750
Michigan	56,899	246,140
Minnesota	19,725	85,630
Mississippi	25,188	99,361
Missouri	33,074	139,277
Montana	5,506	23,594
Nebraska	8,642	37,810
Nevada	9,131	36,725
New Hampshire	4,281	19,092
New Jersey	33,765	136,034
New Mexico	16,529	65,632
New York	117,020	467,950
North Carolina	44,528	180,635
North Dakota	3,653	15,761
Ohio	64,304	258,595
Oklahoma	24,678	101,019
Oregon	18,242	78,185
Pennsylvania	59,899	249,861
Rhode Island	5,795	23,347
South Carolina	27,844	113,239
South Dakota	5,022	20,817
Tennessee	37,396	150,230
Texas	163,761	636,034
Utah	14,518	58,641
Vermont	3,023	13,542
Virginia	32,497	131,735
Washington	29,277	121,761
West Virginia	12,200	50,268
Wisconsin	25,013	108,807
Wyoming	2,817	12,076
United States	1,717,746	6,925,819

TABLE III.2

APPROXIMATE 90-PERCENT CONFIDENCE INTERVALS
FOR SHRINKAGE ESTIMATES

State	Number of Eligible Infants		Number of Eligible Children	
	Lower Bound	Upper Bound	Lower Bound	Upper Bound
Alabama	27,266	32,248	108,874	128,770
Alaska	5,135	6,155	21,386	25,634
Arizona	30,835	36,673	123,977	147,453
Arkansas	17,845	20,425	73,371	83,977
California	257,990	285,012	985,020	1,088,188
Colorado	17,073	21,267	69,621	86,727
Connecticut	12,073	15,777	51,077	66,745
Delaware	3,357	4,165	13,470	16,714
District of Columbia	4,337	5,249	17,215	20,837
Florida	89,771	101,939	369,404	419,474
Georgia	44,622	53,410	180,042	215,498
Hawaii	7,598	9,514	29,042	36,368
Idaho	7,614	8,862	31,176	36,288
Illinois	64,462	76,316	254,466	301,262
Indiana	31,037	36,811	127,240	150,914
Iowa	13,577	15,881	58,278	68,166
Kansas	12,214	14,978	52,058	63,840
Kentucky	24,375	28,471	99,045	115,689
Louisiana	34,423	40,165	137,719	160,695
Maine	6,305	7,579	28,116	33,796
Maryland	21,706	27,036	90,363	112,547
Massachusetts	18,691	26,799	77,041	110,459
Michigan	52,016	61,782	225,018	267,262
Minnesota	17,135	22,315	74,385	96,875
Mississippi	23,610	26,766	93,137	105,585
Missouri	30,141	36,007	126,927	151,627
Montana	5,065	5,947	21,703	25,485
Nebraska	7,765	9,519	33,975	41,645
Nevada	8,281	9,981	33,307	40,143
New Hampshire	3,788	4,774	16,892	21,292
New Jersey	30,561	36,969	123,128	148,940
New Mexico	15,214	17,844	60,411	70,853
New York	109,312	124,728	437,125	498,775
North Carolina	41,469	47,587	168,227	193,043
North Dakota	3,263	4,043	14,078	17,444
Ohio	59,538	69,070	239,427	277,763
Oklahoma	23,016	26,340	94,216	107,822
Oregon	16,713	19,771	71,632	84,738
Pennsylvania	54,319	65,479	226,586	273,136
Rhode Island	5,210	6,380	20,989	25,705
South Carolina	25,848	29,840	105,123	121,355
South Dakota	4,548	5,496	18,852	22,782
Tennessee	34,165	40,627	137,249	163,211
Texas	151,491	176,031	588,377	683,691
Utah	13,063	15,973	52,763	64,519
Vermont	2,711	3,335	12,146	14,938
Virginia	28,850	36,144	116,951	146,519
Washington	26,514	32,040	110,269	133,253
West Virginia	11,283	13,117	46,492	54,044
Wisconsin	22,368	27,658	97,300	120,314
Wyoming	2,497	3,137	10,706	13,446

increase plus additional funds for program growth (if program growth funds are available after providing all states with inflation increases). In the initial fiscal year 1995 fund allocation, 19 states were below fair share and received program growth funds. Eight Indian Tribal Organizations (ITOs), which are authorized to participate in the WIC Program as state agencies, were also identified as below fair share. The eligibles estimates used to determine WIC food grants for ITOs were derived from 1990 decennial census data and March 1993 CPS data, but were not developed using the shrinkage estimation procedure described in Chapter II.

Using the shrinkage estimator described in Chapter II, we are able to substantially reduce our uncertainty about the numbers of infants and children who were eligible for WIC. In the future, there may be an opportunity to reduce uncertainty even further by enhancing our shrinkage estimator to use still more data. The estimator now uses census estimates for the "base" year (1989) and CPS estimates for the "current" year (1992 in this report--the year for which we are developing shrinkage estimates). Estimates for intervening years are not used, although CPS data for obtaining such estimates are available. With each intervening year, we are ignoring more information that could be relevant. An unusually large increase in WIC eligibles over three years, for example, would be more plausible if it appeared to consist of a series of modest increases rather than two small decreases followed by one enormous jump. An advantage of shrinkage methods is that they are powerful enough to allow such information to be taken into account in a systematic, rather than an ad hoc, way. Although the estimation procedure would be more complicated, an enhanced shrinkage estimator would be conceptually the same as the current estimator and might yield even better state estimates of WIC eligibles.

Accuracy might also be improved by using data that incorporate an adjustment for the census undercount. Before CPS data are released, they are made consistent with Census Bureau population estimates. When 1992 eligibles estimates were needed for calculating fiscal year 1995 WIC grants, the available CPS data were consistent with population estimates based on unadjusted decennial census data (as well as vital statistics and other administrative records data). CPS data released subsequently are consistent with adjusted population estimates. Therefore, it is expected that future estimates of WIC eligibles will reflect an adjustment for the census undercount.

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APPENDIX

THE ESTIMATION PROCEDURE: ADDITIONAL TECHNICAL DETAILS

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This appendix provides additional information and technical details for several of the steps in our estimation procedure. For Step 2, we discuss how we calculated sample estimates and their standard errors. For Step 4, we provide complete definitions and data for calculating values for the three predictor variables in our regression model. We also list the other variables that we considered as potential predictors. For Step 5, we present the equations used to calculate shrinkage estimates and their standard errors. We also discuss at the end of this Appendix how we derived confidence intervals. For some steps, we provide, as needed, few or no additional details.

1. **From the most recent census (1990), derive state estimates of the percentage of infants and children who were income eligible.**

2. **From the most recent CPS (March 1993), derive state sample estimates of the percentage of infants and children who were income eligible.**

Table A.1 displays sample estimates and estimated standard errors. We obtained CPS sample eligibility estimates with the same methodology used by the Census Bureau to calculate poverty estimates for individuals except (1) we compared a family's income to 185 percent, rather than 100 percent, of the applicable poverty guideline; (2) we used the poverty guidelines shown in Table A.2, rather than the poverty thresholds developed by the Census Bureau for official government statistical (as opposed to administrative) purposes; and (3) we counted secondary individuals under age 15 (if they fell in the age ranges for infants and children) as poor/eligible, rather than excluding them.[1] An infant or child is income eligible for WIC if his or her family's income is less than or equal to 185 percent of the poverty guideline for that family.

The WIC poverty guidelines for 1992 in Table A.2 were obtained by averaging "HHS" poverty guidelines for 1991 and 1992. We averaged poverty guidelines for consecutive calendar years because the WIC program year runs from July 1 of one calendar year to June 30 of the following calendar

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[1]Previous research suggests that most of these young secondary individuals are foster children. For determining WIC eligibility, a foster child who is the legal responsibility of a court or state welfare agency is a family of one individual. Although the CPS does not collect income data for a secondary individual under age 15, it is likely that such a person has little, if any, income.

TABLE A.1

PERCENTAGES OF INFANTS AND CHILDREN INCOME ELIGIBLE

State	1989 Estimate (Census)	1992 (CPS)		Change Between 1989 and 1992	
		Estimate	Standard Error	Estimate	Standard Error
Alabama	46.302	44.476	8.422	-1.826	8.422
Alaska	41.367	41.355	5.330	-0.012	5.330
Arizona	45.474	42.802	5.673	-2.672	5.673
Arkansas	52.206	53.929	7.405	1.723	7.405
California	37.760	46.573	1.687	8.813	1.687
Colorado	36.057	36.754	6.631	0.697	6.631
Connecticut	21.200	34.766	9.040	13.566	9.040
Delaware	28.543	32.065	5.814	3.522	5.814
District of Columbia	46.241	67.187	13.154	20.946	13.154
Florida	40.021	49.457	2.446	9.436	2.446
Georgia	40.615	40.193	6.443	-0.422	6.443
Hawaii	36.821	46.620	6.187	9.799	6.187
Idaho	46.808	46.822	5.548	0.014	5.548
Illinois	33.183	40.696	3.736	7.513	3.736
Indiana	35.470	47.088	5.924	11.618	5.924
Iowa	36.846	41.081	3.207	4.235	3.207
Kansas	36.760	34.028	5.389	-2.732	5.389
Kentucky	48.123	53.568	8.401	5.445	8.401
Louisiana	52.651	55.899	11.137	3.248	11.137
Maine	34.528	47.455	11.215	12.927	11.215
Maryland	24.246	37.928	3.610	13.682	3.610
Massachusetts	25.087	27.620	3.700	2.533	3.700
Michigan	37.172	39.026	4.613	1.854	4.613
Minnesota	29.362	41.236	9.009	11.874	9.009
Mississippi	57.544	59.956	8.670	2.412	8.670
Missouri	38.929	59.946	7.180	21.017	7.180
Montana	46.639	53.704	14.153	7.065	14.153
Nebraska	38.100	32.261	4.824	-5.839	4.824
Nevada	34.353	38.135	7.787	3.782	7.787
New Hampshire	20.531	30.094	4.184	9.563	4.184
New Jersey	22.446	31.036	2.461	8.590	2.461
New Mexico	53.995	54.170	8.942	0.175	8.942
New York	35.136	44.364	2.461	9.228	2.461
North Carolina	39.911	45.196	3.412	5.285	3.412
North Dakota	42.554	42.977	9.617	0.423	9.617
Ohio	37.048	39.171	3.114	2.123	3.114
Oklahoma	47.638	52.280	7.244	4.642	7.244
Oregon	39.879	44.718	7.123	4.839	7.123
Pennsylvania	33.428	33.162	2.952	-0.266	2.952
Rhode Island	29.823	38.819	6.903	8.996	6.903
South Carolina	43.847	52.130	5.999	8.283	5.999
South Dakota	47.214	40.561	8.148	-6.653	8.148
Tennessee	44.004	60.352	4.692	16.348	4.692
Texas	45.835	51.141	4.981	5.306	4.981
Utah	39.999	32.884	7.756	-7.115	7.756
Vermont	31.164	29.180	12.009	-1.984	12.009
Virginia	31.369	33.635	4.942	2.266	4.942
Washington	34.764	34.242	4.757	-0.522	4.757
West Virginia	51.603	60.589	9.573	8.986	9.573
Wisconsin	34.094	29.870	5.630	-4.224	5.630
Wyoming	41.211	36.873	11.290	-4.338	11.290
United States	37.789	43.580	0.795	5.791	0.795

TABLE A.2

WIC POVERTY GUIDELINES FOR 1992
(Dollars)

State and Family Size	HHS Poverty Guidelines 1991	HHS Poverty Guidelines 1992	WIC Poverty Guidelines 1992
Alaska			
One-person family	8,290	8,500	8,395
Each extra person	2,820	2,980	2,900
Hawaii			
One-person family	7,610	7,830	7,720
Each extra person	2,600	2,740	2,670
Other States and DC			
One-person family	6,620	6,810	6,715
Each extra person	2,260	2,380	2,320

NOTE: The WIC poverty guidelines are simple arithmetic averages of the HHS poverty guidelines.

year. Therefore, eligibility workers determined a family's eligibility for WIC using the 1991 HHS poverty guidelines during the first six months of 1992 and the 1992 HHS poverty guidelines during the last six months of 1992. The Office of the Secretary, Department of Health and Human Services, is responsible for developing the HHS poverty guidelines. The HHS poverty guidelines are derived from the Census Bureau poverty thresholds (Fisher 1992).

We estimated standard errors for our sample estimates using the jackknife estimator proposed by Rao, Wu, and Yue (1992), treating CPS rotation groups as clusters. A rotation group, about one-eighth of a monthly CPS sample, consists of a group of households that begin the CPS at the same time. They are in the CPS for four months, rotate out for eight months, and rotate back in for four months, after which they are dropped from the CPS.

To obtain jackknife standard errors, we let Z_i equal the CPS sample estimate of the number of eligible infants and children in state i (i = 1, 2, ..., 51) and $Z_{i,r}$ equal the contribution of rotation group r (r = 1, 2, ..., 8) to that estimate. In other words:

(1) $$Z_i = \sum_{r=1}^{8} Z_{i,r} \,.$$

If we were to exclude the observations in rotation group r, we could estimate the number of poor persons in state i by:

(2) $$Z_{i(r)} = \frac{8}{7}\,(Z_i - Z_{i,r}) \,.$$

The "(r)" subscript indicates that rotation group r has been excluded. The factor 8/7 enters the expression because when (approximately) 1/8 of the sample is removed, an estimate from the remaining 7/8 of the sample needs to be inflated to get an estimate for the whole. By excluding each of the eight rotation groups in turn, we can get eight alternative estimates for the number of poor persons in state i. Then, we can assess the degree of sampling variability (estimate the variance of Z_i) by measuring the variability among the eight estimates according to:

$$(3) \qquad \mathrm{var}(Z_i) = \frac{7}{8} \sum_{r=1}^{8} (Z_{i(r)} - Z_i)^2 .$$

The factor 7/8 enters this expression because the $Z_{i(r)}$ are obtained from samples that are only 7/8 the size of the full CPS sample for state i and, hence, are expected to be more variable than Z_i (by a factor of 8/7). If Y_i equals the CPS sample estimate of the percentage of infants and children eligible in state i:

$$(4) \qquad Y_i = 100 \frac{Z_i}{N_i} ,$$

where N_i is the CPS sample estimate of the population of infants and children in state i. We estimate the variance of Y_i by:

$$(5) \qquad \mathrm{var}(Y_i) = 100^2 \frac{\mathrm{var}(Z_i)}{N_i^2} ,$$

where $\mathrm{var}(Z_i)$ is calculated according to Equation (3). Our jackknife estimate of the standard error of Y_i is obtained by taking the square root of $\mathrm{var}(Y_i)$. Estimated jackknife standard errors for the CPS sample estimates for 1992 are presented in Table A.1.

3. Construct sample estimates of the change in the percentage eligible between 1989 and 1992.

A state's sample estimate of the change between 1989 and 1992 in the percentage of infants and children who were income eligible was obtained by subtracting the census estimate for 1989 from the CPS estimate for 1992. Sample estimates of change and their standard errors are presented in Table

A.1. We assumed that the sampling error associated with a census estimate is negligible. Therefore, the standard errors for the estimates of change in the percentage eligible equal the standard errors for the 1992 estimates of the percentage eligible.

4. Using a regression model, predict the change in the percentage eligible for each state based on observed changes in (i) Food Stamp Program (FSP) participation, (ii) Unemployment Insurance (UI) Program participation, and (iii) per capita income.

Our "best" regression model has three predictors that measure the changes between 1989 and 1992 in:

- FSP participation
- UI Program participation
- Per capita income

These three predictors were selected from a list that included variables measuring the changes in:

- National School Lunch Program (NSLP) participation (number of students approved for free or reduced-price meals relative to the size of the school-age population--ages 5 through 17)
- Supplemental Security Income (SSI) Program participation (number of recipients relative to the size of the population)
- Aid to Families with Dependent Children (AFDC) Program participation (number of recipients relative to the size of the population)
- Head Start Program participation (enrollment relative to the size of the preschool-age population--ages 0 through 4)
- Chapter 1 (Compensatory Education) Program funding (basic grant, in dollars, relative to the size of the school-age population)
- Per capita residential construction (in dollars)
- Per capita nonresidential construction (in dollars)
- Crime rate
- Population density

We considered these variables because (1) we believed that they might indicate differences among states in the incidence of poverty (especially child poverty), socioeconomic conditions related to poverty, or the health of the state economy and (2) they could be measured uniformly across states for 1992 from nonsample or highly precise sample data. Variables measuring vital events (e.g., infant deaths), WIC participation, and Medicaid participation were rejected as potential predictors because they are often used as outcome measures in analyses of the effectiveness of the WIC Program.[2]

We selected our best regression model on the basis of its consistently strong relative performance in predicting changes in WIC eligibles for three time periods: 1989 to 1990, 1989 to 1991, and 1989 to 1992. We judged performance by examining numerous functions of the regression residuals, including R^2 as well as measures that adjust for the loss in degrees of freedom from adding predictor variables.[3]

Definitions and data sources for the three predictor variables in our best regression model are given in Table A.3. Tables A.4 and A.5 provide the raw data for 1989 and 1992, respectively, used to calculate the predictor variables, and Table A.6 displays the calculated predictor variables for each state.

Following the estimation procedure described in Step 5, we obtained the estimated regression equation shown below:

$$
\begin{aligned}
\text{Change in percentage eligible} = &- 1.899 \\
&+ 1.617 \times \text{Change in FSP participation} \\
&+ 4.644 \times \text{Change in UI Program participation} \\
&- 6.498 \times \text{Change in per capita income}
\end{aligned}
$$

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[2]Estimating the numbers of WIC eligibles and, implicitly, WIC participation rates using the infant mortality rate (IMR), for example, as a predictor would have "built in" a relationship between WIC participation and the IMR, therefore biasing analyses of the effectiveness of WIC in reducing infant deaths.

[3]The residual for a state is the difference between the sample estimate and the regression prediction. Our best model tended to produce smaller residuals than did alternative models.

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TABLE A.3

DEFINITIONS AND DATA SOURCES FOR PREDICTOR VARIABLES

Predictor Variable	Definition: Change between 1989 and 1992 in	Principal Data Sources[a]
FSP participation[b]	$100 \times \dfrac{\text{Number of participants during August}}{\text{Resident population}}$	FSP participation data are population counts of participants from state program operations data and were obtained electronically from the Food and Consumer Service, U.S. Department of Agriculture.
UI Program participation[c]	$100 \times \dfrac{\text{Number of first payment beneficiaries during year}}{\text{Resident population}}$	UI data for 1992 were obtained electronically from the Unemployment Insurance Service, U.S. Department of Labor. Data for 1989 are from Table 603, "State Unemployment Insurance, by State and Other Areas: 1989," in U.S. Department of Commerce (1991a, p. 367).
Per capita income[d]	$\dfrac{(\text{Total personal income} \div \text{Resident population})}{\text{WIC poverty guideline for one-person family}}$	Total personal income data are from Table 1, "Total and Per Capita Personal Income by State and Region, 1985-90," in U.S. Department of Commerce (1991b, p. 30) and Table 1, "Total and Per Capita Personal Income by State and Region, 1987-92," in U.S. Department of Commerce (1993b, p. 74).

[a]Data on the resident population as of July 1 are from Table 26, "Resident Population--States and Puerto Rico: 1960 to 1990," in U.S. Department of Commerce (1991a, pp. 20-21) and Table 31, "Resident Population--States: 1970 to 1992," in U.S. Department of Commerce (1993a, pp. 28-29).

[b]Data for August are often used to measure FSP participation. See, for example, Schirm, Swearingen, and Hendricks (1992).

[c]A first payment beneficiary is a person receiving a UI payment for the first time in more than a year.

[d]We measure per capita income relative to the WIC poverty guideline for a one-person family to account for inflation. Poverty guidelines are adjusted annually based on the Consumer Price Index (CPI). The 1992 WIC poverty guidelines are displayed in Table A.2. The 1989 guidelines for a one-person family are $7345, $6760, and $5875 for Alaska, Hawaii, and the rest of the U.S., respectively.

TABLE A.4

1989 DATA FOR CALCULATING PREDICTOR VARIABLES

State	FSP Recipients in August	UI First Payment Beneficiaries	Total Personal Income ($1,000,000)	Resident Population on July 1 (1,000)
Alabama	428,280	152,000	56,698	4,118
Alaska	23,766	33,000	11,276	527
Arizona	276,862	74,000	55,652	3,556
Arkansas	226,262	83,000	31,290	2,406
California	1,827,414	1,024,000	576,489	29,063
Colorado	206,384	74,000	58,315	3,317
Connecticut	117,896	119,000	80,309	3,239
Delaware	30,286	22,000	12,693	673
District of Columbia	58,903	19,000	13,600	604
Florida	691,285	187,000	225,361	12,671
Georgia	486,762	210,000	104,107	6,436
Hawaii	79,135	19,000	20,417	1,112
Idaho	57,878	37,000	14,153	1,014
Illinois	973,376	303,000	220,389	11,658
Indiana	282,643	116,000	88,808	5,593
Iowa	163,210	73,000	44,856	2,840
Kansas	132,794	69,000	41,916	2,513
Kentucky	446,171	112,000	51,596	3,727
Louisiana	725,832	99,000	56,820	4,382
Maine	84,185	44,000	20,081	1,222
Maryland	248,688	89,000	98,231	4,694
Massachusetts	319,841	261,000	131,403	5,913
Michigan	875,425	393,000	163,269	9,273
Minnesota	248,854	123,000	77,334	4,353
Mississippi	483,489	72,000	31,089	2,621
Missouri	402,392	161,000	85,163	5,159
Montana	52,813	22,000	11,548	806
Nebraska	91,587	27,000	25,772	1,611
Nevada	44,504	36,000	20,919	1,111
New Hampshire	23,222	32,000	22,546	1,107
New Jersey	357,935	268,000	182,882	7,736
New Mexico	150,328	28,000	20,240	1,528
New York	1,409,738	544,000	374,692	17,950
North Carolina	381,299	211,000	101,440	6,571
North Dakota	37,536	15,000	9,047	660
Ohio	1,072,680	305,000	180,197	10,907
Oklahoma	253,921	50,000	45,691	3,224
Oregon	208,695	106,000	45,409	2,820
Pennsylvania	901,156	406,000	209,200	12,040
Rhode Island	57,680	46,000	18,092	998
South Carolina	249,251	97,000	48,344	3,512
South Dakota	48,600	8,000	10,022	715
Tennessee	500,159	164,000	72,912	4,940
Texas	1,681,021	340,000	263,558	16,991
Utah	93,793	31,000	22,287	1,707
Vermont	34,092	19,000	9,434	567
Virginia	325,167	131,000	115,546	6,098
Washington	319,547	169,000	84,408	4,761
West Virginia	257,470	53,000	23,041	1,857
Wisconsin	280,511	172,000	80,979	4,867
Wyoming	26,219	10,000	6,844	475

TABLE A.5

1992 DATA FOR CALCULATING PREDICTOR VARIABLES

State	FSP Recipients in August	UI First Payment Beneficiaries	Total Personal Income ($1,000,000)	Resident Population on July 1 (1,000)
Alabama	555,232	157,084	68,221	4,136
Alaska	40,477	44,094	13,157	587
Arizona	475,882	90,486	66,386	3,832
Arkansas	278,876	99,922	37,817	2,399
California	2,658,540	1,443,782	662,786	30,867
Colorado	264,118	79,360	71,654	3,470
Connecticut	207,380	157,319	89,036	3,281
Delaware	54,360	28,787	15,301	689
District of Columbia	86,135	26,831	15,590	589
Florida	1,398,057	339,288	262,929	13,488
Georgia	777,194	231,957	124,803	6,751
Hawaii	95,484	39,381	25,255	1,160
Idaho	71,221	46,156	17,634	1,067
Illinois	1,158,311	390,904	255,651	11,631
Indiana	464,594	149,845	104,204	5,662
Iowa	191,727	88,604	52,103	2,812
Kansas	179,183	70,823	48,807	2,523
Kentucky	527,608	127,034	63,261	3,755
Louisiana	773,535	109,968	68,055	4,287
Maine	133,530	58,640	22,360	1,235
Maryland	355,947	144,626	114,115	4,908
Massachusetts	430,034	249,341	142,828	5,998
Michigan	1,002,451	487,246	185,713	9,437
Minnesota	317,232	133,506	91,512	4,480
Mississippi	540,061	79,145	36,936	2,614
Missouri	558,861	184,467	98,963	5,193
Montana	66,965	25,147	13,397	824
Nebraska	109,253	33,436	30,438	1,606
Nevada	83,417	60,268	28,254	1,327
New Hampshire	57,302	39,915	25,100	1,111
New Jersey	510,070	339,837	210,059	7,789
New Mexico	233,234	31,702	24,609	1,581
New York	1,921,686	673,398	432,001	18,119
North Carolina	608,734	243,700	123,074	6,843
North Dakota	47,224	14,936	10,934	636
Ohio	1,247,751	357,397	207,769	11,016
Oklahoma	352,129	65,969	52,847	3,212
Oregon	258,457	141,756	54,840	2,977
Pennsylvania	1,157,341	517,810	244,814	12,009
Rhode Island	88,795	60,746	19,996	1,005
South Carolina	380,609	125,030	58,362	3,603
South Dakota	55,000	8,868	12,147	711
Tennessee	725,074	189,667	88,584	5,024
Texas	2,505,165	429,726	323,687	17,656
Utah	122,958	37,685	28,328	1,813
Vermont	53,626	26,477	10,732	570
Virginia	518,297	137,598	135,003	6,377
Washington	439,451	219,217	108,301	5,136
West Virginia	310,970	60,922	27,784	1,812
Wisconsin	339,986	215,669	95,936	5,007
Wyoming	33,517	12,222	8,545	466

TABLE A.6

VALUES FOR PREDICTOR VARIABLES IN REGRESSION MODEL

State	Change Between 1989 and 1992 in: FSP Participation	UI Participation	Per Capita Income
Alabama	3.024	0.107	0.112
Alaska	2.386	1.250	-0.243
Arizona	4.633	0.280	-0.084
Arkansas	2.221	0.715	0.134
California	2.325	1.154	-0.178
Colorado	1.389	0.056	0.083
Connecticut	2.681	1.121	-0.179
Delaware	3.390	0.909	0.097
District of Columbia	4.872	1.409	0.109
Florida	4.909	1.039	-0.124
Georgia	3.949	0.173	0.000
Hawaii	1.115	1.686	0.104
Idaho	0.967	0.677	0.085
Illinois	1.610	0.762	0.055
Indiana	3.151	0.573	0.038
Iowa	1.071	0.581	0.071
Kansas	1.818	0.061	0.042
Kentucky	2.080	0.378	0.153
Louisiana	1.480	0.306	0.157
Maine	3.923	1.147	-0.101
Maryland	1.954	1.051	-0.099
Massachusetts	1.761	-0.257	-0.237
Michigan	1.182	0.925	-0.066
Minnesota	1.364	0.154	0.018
Mississippi	2.213	0.281	0.085
Missouri	2.962	0.431	0.028
Montana	1.575	0.322	-0.018
Nebraska	1.118	0.406	0.099
Nevada	2.280	1.302	-0.034
New Hampshire	3.060	0.702	-0.103
New Jersey	1.922	0.899	-0.008
New Mexico	4.914	0.173	0.063
New York	2.752	0.686	-0.002
North Carolina	3.093	0.350	0.050
North Dakota	1.738	0.075	0.227
Ohio	1.492	0.448	-0.003
Oklahoma	3.087	0.503	0.038
Oregon	1.281	1.003	0.002
Pennsylvania	2.152	0.940	0.078
Rhode Island	3.055	1.435	-0.123
South Carolina	3.467	0.708	0.069
South Dakota	0.939	0.128	0.158
Tennessee	4.307	0.455	0.114
Texas	4.295	0.433	0.090
Utah	1.287	0.263	0.105
Vermont	3.395	1.294	-0.028
Virginia	2.796	0.010	-0.072
Washington	1.844	0.718	0.122
West Virginia	3.297	0.508	0.171
Wisconsin	1.026	0.773	0.021
Wyoming	1.672	0.518	0.279

As expected, the signs of the regression coefficients imply that, all else equal, states with (1) larger increases in FSP participation, (2) larger increases in UI Program participation, or (3) larger decreases in per capita income tend to have larger increases in the percentage of infants and children eligible for WIC.[4] Table A.7 presents regression estimates and their standard errors for each state.[5]

5. Using "shrinkage" methods, average the sample estimates of change and the predictions of change.

We have used a shrinkage estimator based on the Empirical Bayes estimator proposed by DuMouchel and Harris (1983). Their estimator was used by Ericksen and Kadane (1985) to estimate population undercounts in the 1980 census for 66 areas covering the entire U.S. and by Schirm, Swearingen, and Hendricks (1992) to estimate state poverty rates and FSP participation rates.

The Empirical Bayes shrinkage estimator proposed by DuMouchel and Harris (1983) is:

$$(6) \qquad Y_{c,EB} = \left[D + \frac{1}{u^2}M\right]^{-1} DY_s \, ,$$

where $Y_{c,EB}$ is a (51×1) vector of Empirical Bayes shrinkage estimates, and Y_s is a (51×1) vector of direct sample estimates. D is a (51×51) diagonal matrix with diagonal element (i,i) equal to one divided by the variance (standard error squared) of the direct sample estimate for state i.[6] $M = I - X(X'X)^{-1}X'$, where I is a (51×51) identity matrix and X is a $(51 \times K)$ matrix containing data for

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[4]This equation does not express a causal relationship. It does not imply that more FSP participants cause more WIC eligibles. Rather the equation implies only a statistical association: states with more FSP participants typically have more WIC eligibles than states with fewer FSP participants. For this reason, predictors are often called "symptomatic indicators." They are symptomatic of differences among states in conditions associated with having more or fewer WIC eligibles.

[5]As shown in the next step, we do not have to calculate regression estimates as a separate step, although we do have to select a best regression model before we can calculate shrinkage estimates.

[6]The fourth column of numbers in Table A.1 is Y_s, while D can be obtained from the last column in that table.

TABLE A.7

CHANGES BETWEEN 1989 AND 1992 IN PERCENTAGES OF INFANTS AND CHILDREN INCOME ELIGIBLE: REGRESSION ESTIMATES

State	Estimate	Standard Error
Alabama	2.760	2.627
Alaska	9.343	2.868
Arizona	7.439	2.888
Arkansas	4.142	2.478
California	8.377	2.618
Colorado	0.068	2.649
Connecticut	8.805	2.589
Delaware	7.174	2.573
District of Columbia	11.814	3.450
Florida	11.670	2.898
Georgia	5.290	2.685
Hawaii	7.058	3.350
Idaho	2.256	2.525
Illinois	3.886	2.362
Indiana	5.611	2.337
Iowa	2.070	2.476
Kansas	1.051	2.575
Kentucky	2.226	2.531
Louisiana	0.895	2.607
Maine	10.428	2.607
Maryland	6.785	2.437
Massachusetts	1.295	3.693
Michigan	4.737	2.505
Minnesota	0.905	2.577
Mississippi	2.432	2.421
Missouri	4.710	2.336
Montana	2.260	2.450
Nebraska	1.151	2.527
Nevada	8.055	2.540
New Hampshire	6.979	2.362
New Jersey	5.436	2.314
New Mexico	6.441	3.072
New York	5.750	2.254
North Carolina	4.403	2.406
North Dakota	-0.215	2.891
Ohio	2.614	2.390
Oklahoma	5.182	2.339
Oregon	4.817	2.477
Pennsylvania	5.439	2.422
Rhode Island	10.505	2.702
South Carolina	6.547	2.454
South Dakota	-0.813	2.785
Tennessee	6.438	2.822
Texas	6.472	2.765
Utah	0.721	2.554
Vermont	9.782	2.607
Virginia	3.137	2.728
Washington	3.625	2.459
West Virginia	4.681	2.699
Wisconsin	3.213	2.468
Wyoming	1.397	3.028
United States	5.503	0.899

each state on a set of $k = K - 1$ symptomatic indicators. (The other column of X consists of all ones and allows for an intercept in the regression model.)[7] u^2, a scalar reflecting the lack of fit of the regression model, is estimated by maximizing the likelihood function:

$$(7) \qquad L = |W|^{1/2} \; |X'WX|^{-1/2} \exp\left[-\frac{1}{2}Y_s'SY_s\right],$$

where $W = (D^{-1} + u^2I)^{-1}$ and $S = W - WX(X'WX)^{-1}X'W$. The variance-covariance matrix of the Empirical Bayes shrinkage estimator is:

$$(8) \qquad V_{c,EB} = \left[D + \frac{1}{u^2}M\right]^{-1}$$

This estimator treats the maximum likelihood estimate of u^2, once it is calculated, as known. We have taken a more fully Bayesian approach, treating u^2 as estimated.

If we specify flat prior distributions for both B--the $(K \times 1)$ vector of regression coefficients--and u, that is, distributions proportional to one, the posterior density of u, evaluated at u_j, is proportional to:

$$(9) \qquad p_j^* = |W_j|^{1/2} \; |X'W_jX|^{-1/2} \exp\left[-\frac{1}{2}(Y_s - X\hat{B}_j)'W_j(Y_s - X\hat{B}_j)\right],$$

where $W_j = (D^{-1} + u_j^2I)^{-1}$ and $\hat{B}_j = (X'W_jX)^{-1}X'W_jY_s$. Under this formulation treating u as unknown but following a particular distribution, there is no closed-form expression for our shrinkage estimator. Instead, we must numerically integrate over u.

[7]Except for a column of ones to allow for an intercept in the regression model, Table A.6 is the X matrix.

To perform the numerical integration, we selected a grid of 701 equally spaced values of u, starting with 0.00 and incrementing by 0.01. For each value u_j = 0.00, 0.01, ..., 7.00 of u, we calculated a vector of shrinkage estimates:

$$(10) \qquad Y_{c,j} = \left[D + \frac{1}{u_j^2} M \right]^{-1} D Y_s \,,$$

and a variance-covariance matrix:

$$(11) \qquad V_{c,j} = \left[D + \frac{1}{u_j^2} M \right]^{-1}$$

These expressions for the shrinkage estimates and the variance-covariance matrix are the same as when u is treated as known.[8] For each u_j, we also calculated p_j^* according to Equation (9). After calculating $Y_{c,j}$, $V_{c,j}$, and p_j^* 701 times (once for each value of u_j), we calculated the probability of u_j:

$$(12) \qquad p_j = \frac{p_j^*}{\sum_{j=1}^{701} p_j^*} \,,$$

which is also an estimate of the probability that the shrinkage estimates $Y_{c,j}$ are the true values. As Equation (12) suggests, the p_j are obtained by normalizing the p_j^* to sum to one.[9]

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[8]For $u_j = 0$, we set $Y_{c,j} = X(X'DX)^{-1}X'DY_s$ and $V_{c,j} = X(X'DX)^{-1}X'$, the limiting values derived by DuMouchel and Harris (1983).

[9]The p_j should approach 0 as u_j approaches the upper limit of the grid over which we integrate. If that does not occur, the grid should be extended, and the calculations repeated.

To complete the numerical integration over u and obtain a single set of shrinkage estimates, we calculated a weighted sum of the 701 sets of shrinkage estimates, weighting each set $Y_{c,j}$ by its associated probability p_j. Thus, our shrinkage estimates are:

$$(13) \qquad Y_c = \sum_{j=1}^{701} p_j Y_{c,j} \, .$$

The variance-covariance matrix is:

$$(14) \qquad V_c = \sum_{j=1}^{701} p_j V_{c,j} + \sum_{j=1}^{701} p_j (Y_{c,j} - Y_c)(Y_{c,j} - Y_c)' \, .$$

The first term on the right side of this expression reflects the error from sampling variability and the lack of fit of the regression model. The second term captures how the shrinkage estimates vary as our estimate of u varies. Thus, the second term accounts for the variability from not being able to estimate u very well. Our shrinkage estimates and their standard errors are displayed in Table A.8.[10]

Our regression estimates, which were presented in the previous step, were similarly obtained. They are:

$$(15) \qquad Y_r = \sum_{j=1}^{701} p_j Y_{r,j} \, ,$$

where $Y_{r,j} = X\hat{B}_j$ is the vector of regression estimates obtained when $u = u_j$. The variance-covariance matrix is:

[10]The standard errors were calculated by taking the square roots of the diagonal elements of V_c.

TABLE A.8

CHANGES BETWEEN 1989 AND 1992 IN PERCENTAGES OF INFANTS AND CHILDREN INCOME ELIGIBLE: SHRINKAGE ESTIMATES

State	Estimate	Standard Error
Alabama	2.506	2.484
Alaska	8.238	2.724
Arizona	6.336	2.724
Arkansas	3.977	2.302
California	8.619	1.403
Colorado	0.133	2.407
Connecticut	9.044	2.445
Delaware	6.788	2.308
District of Columbia	12.032	3.372
Florida	10.907	1.965
Georgia	4.785	2.474
Hawaii	7.325	3.006
Idaho	2.020	2.249
Illinois	4.638	1.936
Indiana	6.221	2.157
Iowa	2.634	1.877
Kansas	0.620	2.310
Kentucky	2.409	2.381
Louisiana	0.977	2.510
Maine	10.510	2.512
Maryland	8.268	2.161
Massachusetts	1.596	2.891
Michigan	4.331	2.165
Minnesota	1.454	2.460
Mississippi	2.436	2.284
Missouri	5.911	2.417
Montana	2.366	2.388
Nebraska	0.191	2.361
Nevada	7.788	2.384
New Hampshire	7.436	1.959
New Jersey	6.509	1.670
New Mexico	6.123	2.907
New York	6.917	1.684
North Carolina	4.608	1.859
North Dakota	-0.184	2.750
Ohio	2.522	1.783
Oklahoma	5.145	2.161
Oregon	4.830	2.278
Pennsylvania	3.904	2.114
Rhode Island	10.390	2.469
South Carolina	6.717	2.203
South Dakota	-1.148	2.643
Tennessee	7.873	2.725
Texas	6.306	2.375
Utah	0.227	2.451
Vermont	9.442	2.545
Virginia	3.033	2.347
Washington	3.041	2.169
West Virginia	4.868	2.579
Wisconsin	2.413	2.347
Wyoming	1.212	2.925
United States	5.590	0.683

$$(16) \qquad V_r = \sum_{j=1}^{701} p_j V_{r,j} + \sum_{j=1}^{701} p_j (Y_{r,j} - Y_r)(Y_{r,j} - Y_r)' ,$$

where $V_{r,j} = X(X'W_jX)^{-1}X' + u_j^2 I.$ We can estimate the regression coefficient vector by:

$$(17) \qquad \hat{B} = \sum_{j=1}^{701} p_j \hat{B}_j .$$

Estimated values for the regression coefficients were displayed in the previous step.

6. Add the shrinkage estimate of the change between 1989 and 1992 to the census estimate of the percentage eligible in 1989 to get a shrinkage estimate of the percentage eligible in 1992.

To facilitate a comparison of the alternative estimates, we have displayed in Table A.9 not only shrinkage estimates but also sample and regression estimates of the percentage eligible in 1992. These estimates were obtained by adding the census estimates for 1989 from Step 1 to the estimates of change derived in Steps 3, 4, and 5. The estimates of change were displayed together in Chapter II, Table II.2 The sample estimates in Table A.9 are, of course, equal to the sample estimates obtained in Step 2 because we have just added and then subtracted the census estimates.

7. Multiply the shrinkage estimate of the percentage eligible by the state population of infants and the state population of children to get preliminary shrinkage estimates of the numbers of eligible infants and children.

As we stated in Chapter II, we assumed in this step that the percentage of infants who were income eligible equals the percentage of children who were income eligible. Census estimates show that this assumption is reasonable. Nationwide, 37.982 percent of infants and 37.739 percent of children were income eligible in 1989.

TABLE A.9

PERCENTAGES OF INFANTS AND CHILDREN INCOME ELIGIBLE IN 1992

State	Sample Estimate	Regression Estimate	Shrinkage Estimate
Alabama	44.476	49.062	48.808
Alaska	41.355	50.710	49.605
Arizona	42.802	52.913	51.810
Arkansas	53.929	56.348	56.183
California	46.573	46.137	46.379
Colorado	36.754	36.125	36.190
Connecticut	34.766	30.005	30.244
Delaware	32.065	35.717	35.331
District of Columbia	67.187	58.055	58.273
Florida	49.457	51.691	50.928
Georgia	40.193	45.905	45.400
Hawaii	46.620	43.879	44.146
Idaho	46.822	49.064	48.828
Illinois	40.696	37.069	37.821
Indiana	47.088	41.081	41.691
Iowa	41.081	38.916	39.480
Kansas	34.028	37.811	37.380
Kentucky	53.568	50.349	50.532
Louisiana	55.899	53.546	53.628
Maine	47.455	44.956	45.038
Maryland	37.928	31.031	32.514
Massachusetts	27.620	26.382	26.683
Michigan	39.026	41.909	41.503
Minnesota	41.236	30.267	30.816
Mississippi	59.956	59.976	59.980
Missouri	59.946	43.639	44.840
Montana	53.704	48.899	49.005
Nebraska	32.261	39.251	38.291
Nevada	38.135	42.408	42.141
New Hampshire	30.094	27.510	27.967
New Jersey	31.036	27.882	28.955
New Mexico	54.170	60.436	60.118
New York	44.364	40.886	42.053
North Carolina	45.196	44.314	44.519
North Dakota	42.977	42.339	42.370
Ohio	39.171	39.662	39.570
Oklahoma	52.280	52.820	52.783
Oregon	44.718	44.696	44.709
Pennsylvania	33.162	38.867	37.332
Rhode Island	38.819	40.328	40.213
South Carolina	52.130	50.394	50.564
South Dakota	40.561	46.401	46.066
Tennessee	60.352	50.442	51.877
Texas	51.141	52.307	52.141
Utah	32.884	40.720	40.226
Vermont	29.180	40.946	40.606
Virginia	33.635	34.506	34.402
Washington	34.242	38.389	37.805
West Virginia	60.589	56.284	56.471
Wisconsin	29.870	37.307	36.507
Wyoming	36.873	42.608	42.423
United States	43.580	43.292	43.379

The independent population estimates used in this step and displayed in Chapter II, Table II.4 were obtained electronically from the U.S. Bureau of the Census. The release date for the estimates was March 15, 1994.

8. Control the preliminary state shrinkage estimates of the numbers of eligible infants and children to sum to the national totals for eligible infants and children obtained from the CPS.

In Chapter III, we presented approximate 90-percent confidence intervals for our final shrinkage estimates. The upper and lower bounds of the confidence intervals were calculated according to:

$$(18) \qquad \textit{Upper Bound}_i = E_{ci} + 1.645\ e_{ci}$$

and

$$(19) \qquad \textit{Lower Bound}_i = E_{ci} - 1.645\ e_{ci}\ ,$$

where E_{ci} is the final shrinkage estimate (for infants or children) for state i and e_{ci} is the standard error of that estimate. That standard error is:

$$(20) \qquad e_{ci} = r_c\ N_{Ii}\ \frac{\sqrt{V_c(ii)}}{100}\ ,$$

where r_c equals 1,717,743 ÷ 1,737,837 (for infants) or 6,925,815 ÷ 6,721,734 (for children), N_{Ii} is the independent population estimate of either infants or children in state i, and $V_c(ii)$ is the (i,i) diagonal element of V_c, which was calculated according to Equation (14). In other words, the square root of $V_c(ii)$ is the standard error of the shrinkage estimate of the percentage of infants and children eligible in state i in 1992.[11] We can find values for E_{ci}, N_{Ii}, and the square root of $V_c(ii)$ in Tables III.1, II.4, and A.8, respectively.

In addition to presenting the confidence intervals for our shrinkage estimates in Chapter III, we discussed the relative precision of sample and shrinkage estimates. To inform that discussion, we derived "final" sample estimates in the same way as we derived our final shrinkage estimates.[12] Both sets of final estimates appear in Table A.10. In Tables A.11 and A.12, we present confidence intervals for sample and shrinkage estimates of eligible infants and children, respectively. We calculated bounds for confidence intervals of sample estimates according to Equations (18) and (19), replacing shrinkage estimates by sample estimates. The standard error for a sample estimate is given by:

$$(21) \qquad e_{si} = r_s \, N_{Ii} \, \frac{\sqrt{1/D(ii)}}{100} \, ,$$

where r_s equals 1,717,743 ÷ 1,746,319 (for infants) or 6,925,815 ÷ 6,754,737 (for children), and the square root of $1/D(ii)$ is in the third column of numbers in Table A.1.

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[11]As in Step 3, we assumed that the sampling error associated with a census estimate is negligible. Therefore, the standard error for the shrinkage estimate of the proportion eligible is the same as the standard error for the shrinkage estimate of the change in the proportion eligible. Our estimate of e_{ci} does not take account of the correlation between r_c and our estimate of the proportion eligible. Instead, r_c is treated as a constant.

[12]Beginning with the sample estimates of the percentage eligible in 1992, we used the independent population estimates of infants and children to obtain preliminary sample estimates of the numbers eligible and, then, controlled those preliminary estimates to the national totals. The preliminary estimates summed to 1,746,319 infants and 6,754,737 children.

TABLE A.10

SAMPLE AND SHRINKAGE ESTIMATES OF THE NUMBERS OF INFANTS AND CHILDREN INCOME ELIGIBLE IN 1992

	"Final" Sample Estimates		Final Shrinkage Estimates	
State	Infants	Children	Infants	Children
Alabama	26,984	107,747	29,757	118,822
Alaska	4,683	19,504	5,645	23,510
Arizona	27,750	111,571	33,754	135,715
Arkansas	18,278	75,149	19,135	78,674
California	271,312	1,035,854	271,501	1,036,604
Colorado	19,374	79,004	19,170	78,174
Connecticut	15,929	67,388	13,925	58,911
Delaware	3,397	13,630	3,761	15,092
District of Columbia	5,499	21,829	4,793	19,026
Florida	92,634	381,175	95,855	394,439
Georgia	43,183	174,232	49,016	197,770
Hawaii	8,992	34,369	8,556	32,705
Idaho	7,861	32,188	8,238	33,732
Illinois	75,371	297,525	70,389	277,864
Indiana	38,129	156,313	33,924	139,077
Iowa	15,251	65,464	14,729	63,222
Kansas	12,316	52,495	13,596	57,949
Kentucky	27,874	113,262	26,423	107,367
Louisiana	38,685	154,766	37,294	149,207
Maine	7,280	32,458	6,942	30,956
Maryland	28,291	117,770	24,371	101,455
Massachusetts	23,429	96,568	22,745	93,750
Michigan	53,243	230,319	56,899	246,140
Minnesota	26,266	114,025	19,725	85,630
Mississippi	25,055	98,836	25,188	99,361
Missouri	44,002	185,288	33,074	139,277
Montana	6,005	25,730	5,506	23,594
Nebraska	7,246	31,700	8,642	37,810
Nevada	8,223	33,072	9,131	36,725
New Hampshire	4,584	20,444	4,281	19,092
New Jersey	36,016	145,098	33,765	136,034
New Mexico	14,821	58,849	16,529	65,632
New York	122,851	491,253	117,020	467,950
North Carolina	44,985	182,485	44,528	180,635
North Dakota	3,687	15,909	3,653	15,761
Ohio	63,347	254,736	64,304	258,595
Oklahoma	24,324	99,567	24,678	101,019
Oregon	18,157	77,819	18,242	78,185
Pennsylvania	52,950	220,867	59,899	249,861
Rhode Island	5,567	22,428	5,795	23,347
South Carolina	28,567	116,175	27,844	113,239
South Dakota	4,400	18,239	5,022	20,817
Tennessee	43,294	173,919	37,396	150,230
Texas	159,840	620,788	163,761	636,034
Utah	11,810	47,704	14,518	58,641
Vermont	2,162	9,684	3,023	13,542
Virginia	31,618	128,169	32,497	131,735
Washington	26,389	109,746	29,277	121,761
West Virginia	13,026	53,670	12,200	50,268
Wisconsin	20,366	88,591	25,013	108,807
Wyoming	2,437	10,445	2,817	12,076
United States	1,717,740	6,925,816	1,717,746	6,925,819

TABLE A.11

APPROXIMATE 90-PERCENT CONFIDENCE INTERVALS FOR ESTIMATES OF NUMBERS OF ELIGIBLE INFANTS

	Sample Estimates		Shrinkage Estimates	
State	Lower Bound	Upper Bound	Lower Bound	Upper Bound
Alabama	18,579	35,389	27,266	32,248
Alaska	3,690	5,676	5,135	6,155
Arizona	21,700	33,800	30,835	36,673
Arkansas	14,149	22,407	17,845	20,425
California	255,145	287,479	257,990	285,012
Colorado	13,624	25,124	17,073	21,267
Connecticut	9,116	22,742	12,073	15,777
Delaware	2,384	4,410	3,357	4,165
District of Columbia	3,728	7,270	4,337	5,249
Florida	85,098	100,170	89,771	101,939
Georgia	31,796	54,570	44,622	53,410
Hawaii	7,029	10,955	7,598	9,514
Idaho	6,329	9,393	7,614	8,862
Illinois	63,989	86,753	64,462	76,316
Indiana	30,238	46,020	31,037	36,811
Iowa	13,292	17,210	13,577	15,881
Kansas	9,107	15,525	12,214	14,978
Kentucky	20,683	35,065	24,375	28,471
Louisiana	26,006	51,364	34,423	40,165
Maine	4,450	10,110	6,305	7,579
Maryland	23,861	32,721	21,706	27,036
Massachusetts	18,266	28,592	18,691	26,799
Michigan	42,890	63,596	52,016	61,782
Minnesota	16,826	35,706	17,135	22,315
Mississippi	19,095	31,015	23,610	26,766
Missouri	35,332	52,672	30,141	36,007
Montana	3,402	8,608	5,065	5,947
Nebraska	5,464	9,028	7,765	9,519
Nevada	5,461	10,985	8,281	9,981
New Hampshire	3,536	5,632	3,788	4,774
New Jersey	31,318	40,714	30,561	36,969
New Mexico	10,796	18,846	15,214	17,844
New York	111,641	134,061	109,312	124,728
North Carolina	39,398	50,572	41,469	47,587
North Dakota	2,330	5,044	3,263	4,043
Ohio	55,063	71,631	59,538	69,070
Oklahoma	18,780	29,868	23,016	26,340
Oregon	13,399	22,915	16,713	19,771
Pennsylvania	45,196	60,704	54,319	65,479
Rhode Island	3,939	7,195	5,210	6,380
South Carolina	23,159	33,975	25,848	29,840
South Dakota	2,946	5,854	4,548	5,496
Tennessee	37,757	48,831	34,165	40,627
Texas	134,231	185,449	151,491	176,031
Utah	7,228	16,392	13,063	15,973
Vermont	698	3,626	2,711	3,335
Virginia	23,976	39,260	28,850	36,144
Washington	20,358	32,420	26,514	32,040
West Virginia	9,641	16,411	11,283	13,117
Wisconsin	14,051	26,681	22,368	27,658
Wyoming	1,210	3,664	2,497	3,137

TABLE A.12

APPROXIMATE 90-PERCENT CONFIDENCE INTERVALS FOR ESTIMATES OF NUMBERS OF ELIGIBLE CHILDREN

	Sample Estimates		Shrinkage Estimates	
State	Lower Bound	Upper Bound	Lower Bound	Upper Bound
Alabama	74,184	141,310	108,874	128,770
Alaska	15,369	23,639	21,386	25,634
Arizona	87,245	135,897	123,977	147,453
Arkansas	58,175	92,123	73,371	83,977
California	974,131	1,097,577	985,020	1,088,188
Colorado	55,557	102,451	69,621	86,727
Connecticut	38,563	96,213	51,077	66,745
Delaware	9,565	17,695	13,470	16,714
District of Columbia	14,799	28,859	17,215	20,837
Florida	350,164	412,186	369,404	419,474
Georgia	128,288	220,176	180,042	215,498
Hawaii	26,866	41,872	29,042	36,368
Idaho	25,914	38,462	31,176	36,288
Illinois	252,594	342,456	254,466	301,262
Indiana	123,964	188,662	127,240	150,914
Iowa	57,057	73,871	58,278	68,166
Kansas	38,819	66,171	52,058	63,840
Kentucky	84,042	142,482	99,045	115,689
Louisiana	104,043	205,489	137,719	160,695
Maine	19,840	45,076	28,116	33,796
Maryland	99,331	136,209	90,363	112,547
Massachusetts	75,288	117,848	77,041	110,459
Michigan	185,535	275,103	225,018	267,262
Minnesota	73,046	155,004	74,385	96,875
Mississippi	75,325	122,347	93,137	105,585
Missouri	14[illegible],781	221,795	126,927	151,627
Montana	14,575	36,885	21,703	25,485
Nebraska	23,903	39,497	33,975	41,645
Nevada	21,963	44,181	33,307	40,143
New Hampshire	15,768	25,120	16,892	21,292
New Jersey	126,171	164,025	123,128	148,940
New Mexico	42,869	74,829	60,411	70,853
New York	446,425	536,081	437,125	498,775
North Carolina	159,823	205,147	168,227	193,043
North Dakota	10,053	21,765	14,078	17,444
Ohio	221,423	288,049	239,427	277,763
Oklahoma	76,872	122,262	94,216	107,822
Oregon	57,428	98,210	71,632	84,738
Pennsylvania	188,525	253,209	226,586	273,136
Rhode Island	15,867	28,989	20,989	25,705
South Carolina	94,183	138,167	105,123	121,355
South Dakota	12,212	24,266	18,852	22,782
Tennessee	151,677	196,161	137,249	163,211
Texas	521,326	720,250	588,377	683,691
Utah	29,195	66,213	52,763	64,519
Vermont	3,128	16,240	12,146	14,938
Virginia	97,190	159,148	116,951	146,519
Washington	84,666	134,826	110,269	133,253
West Virginia	39,721	67,619	46,492	54,044
Wisconsin	61,123	116,059	97,300	120,314
Wyoming	5,184	15,706	10,706	13,446