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School Nutrition Dietary Assessment Study-IV

Volume I: School Foodservice Operations, School Environments, and Meals Offered and Served

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School Foodservice Operations, School Environments, and Meals Offered and Served

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GLOSSARY OF ACRONYMS AND ABBREVIATIONS

AI	Adequate Intake
AMDR	Acceptable Macronutrient Distribution Range
ANSMP	Assisted nutrient standard menu planning
AT	Alpha-tocopherol
CCD	National Center for Educational Statistics' Common Core of Data
CDC	Centers for Disease Control and Prevention
CN	Child Nutrition
DoD	Department of Defense
DoD Fresh	Department of Defense's Fresh Fruit and Vegetable Program
DRI(s)	Dietary Reference Intakes
DFE	Dietary folate equivalent
EAR	Estimated Average Requirement
FNDDS	USDA Food and Nutrient Database for Dietary Studies
FNS	Food and Nutrition Service
FNS-742	FNS's School Food Authority Verification Report
FRAC	Food Research and Action Center
FSM	Foodservice manager
FSMC	Foodservice management company
FY	Fiscal year
g	Grams
HACCP	Hazard Analysis and Critical Control Point
HHFKA	Healthy, Hunger-Free Kids Act
HHS	United States Department of Health and Human Services
HUSSC	HealthierUS School Challenge
IOM	Institute of Medicine
mcg	micrograms (µg)
mg	milligrams
MPED	MyPyramid Equivalents Database
NASPE	National Association for Sport and Physical Education
NESNP	National Evaluation of School Nutrition Programs

NRC	National Research Council
NSLP	National School Lunch Program
NSMP	Nutrient standard menu planning
ORA	FNS's Office of Research and Analysis
OVS	Offer-versus-serve
oz	ounce or ounce equivalents
PE	Physical education
PINs	Personal identification numbers
PL	Public law
PPS	Probability proportional to size
RAE	Retinol activity equivalent
RDA(s)	Recommended Dietary Allowances(s)
RE	Retinol equivalent
REA	Recommended Energy Allowance
SBP	School Breakfast Program
SE	Standard error
SFA	School Food Authority
SHPPS	School Health Policies and Practices Study
SMI	School Meals Initiative for Healthy Children
SNA	School Nutrition Association
SNAP	Supplemental Nutrition Assistance Program
SNDA	School Nutrition Dietary Assessment Study
SoFAS	Solid fats and added sugars
SY	School year
TA	Technical assistance or technical assistant
TN	Team Nutrition
tsp	Teaspoon
USDA	United States Department of Agriculture

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EXECUTIVE SUMMARY

The National School Lunch Program (NSLP) and the School Breakfast Program (SBP) provide meals and snacks to children during the school year. The overarching goal of both programs, known collectively as the school meal programs, is to ensure that children do not go hungry and have access to nutritious meals and snacks that support normal growth and development. All public and private nonprofit schools are eligible to participate in the school meal programs and any child in a participating school is eligible to obtain school meals. Students from low-income households are eligible to receive meals free or at a reduced price.

The school meal programs are administered by the Food and Nutrition Service (FNS) of the U.S. Department of Agriculture (USDA). The NSLP is the second largest of 15 nutrition assistance programs administered by FNS. Established in 1946, the program operates in virtually all public schools and 94 percent of all schools (public and private combined) in the United States. (Ralston et al. 2008). In fiscal year (FY) 2010, the program served lunches to an average of 31.7 million children on an average school day.¹ Almost two-thirds (65 percent) of these lunches were served free or at a reduced price to children from low-income households. Since 1998, schools participating in the NSLP have had the option of providing snacks to children in eligible afterschool programs. In FY 2010, 1.3 million afterschool snacks were served through the NSLP on an average school day.²

The SBP began as a pilot program in 1966 and was made permanent in 1975. Over the years, the program has steadily expanded. In school year (SY) 2009–2010, the SBP was available in 89 percent of schools that operated the NSLP. In FY 2010, the program served 11.7 million children on an average school day. The SBP primarily serves children from low-income households—in FY 2010, 84 percent of SBP meals were served free or at a reduced price.

Since the 1980s, FNS has assessed the school meal programs on a periodic basis. This report summarizes findings from the most recent assessment—the fourth School Nutrition Dietary Assessment Study (SNDA-IV), which was completed in SY 2009–2010.³ Mathematica Policy Research conducted SNDA-IV under contract with FNS.⁴

A. Research Questions

SNDA-IV addressed a broad array of issues that are of interest to stakeholders at the Federal, State, and local levels. Study research questions can be grouped into three basic categories:

¹ All FY 2010 statistics reported for the NSLP and SBP were obtained from national-level annual summary tables generated by FNS's Program Reports, Analysis and Monitoring Branch. These tables are available at <http://www.fns.usda.gov/pd/cnpmain.htm>. Accessed July 2, 2012.

² Source: "May 2011 Program Information Report." Available at <http://www.fns.usda.gov/fns/data.htm>. Accessed July 2, 2012.

³ The previous SNDA studies, SNDA-I, SNDA-II, and SNDA-III, were conducted in SY 1991–1992, SY 1998–1999, and SY 2004–2005, respectively.

⁴ Volume II provides a detailed description of the sample design, data collection, and data processing procedures used in the study.

1. What are the characteristics of schools and school food authorities (SFAs) participating in the NSLP and SBP, particularly as they relate to meal service operations and school food and physical activity environments?
2. What are the characteristics of NSLP lunches and SBP breakfasts *offered* and *served* to students?
3. How have characteristics of meals *offered* and *served* to students, as well as characteristics of school foodservice programs and school food environments, changed over time?

SNDA-IV also included an assessment of the food and nutrient content of afterschool snacks provided through the NSLP and a small, separate substudy of elementary schools that participate in USDA's HealthierUS School Challenge (HUSC) initiative.

B. Sample Design and Data Sources

SNDA-IV was designed to provide national estimates at both the SFA and school levels. The design included two samples—the SFA-only sample and the SFA-plus-school sample. As the names imply, data collection for SFAs included in the SFA-only sample was limited to SFA-level data. SFAs included in the SFA-plus-school sample provided both SFA- and school-level data. A stratified two-stage sampling approach was used, with SFAs selected first and schools selected second, within a random subsample of sampled SFAs. As in previous SNDA studies, the respondent universe included all public SFAs and schools participating in the NSLP and located in the contiguous 48 States and the District of Columbia.⁵ All analyses presented in this report have been weighted to be representative of these public SFAs or schools (as appropriate).

Data were collected from January through June 2010. SFA directors completed a brief web-based survey that collected data on SFA-level policies and practices related to menu planning, a la carte foods, food purchasing, food safety and sanitation, nutrition promotion, and school wellness policies. School foodservice managers (FSMs) completed a detailed menu survey that collected information about all of the foods and beverages offered in school meals and afterschool snacks during a selected week, including detailed food descriptions, portion sizes, and, for breakfasts and lunches, the number of servings provided in reimbursable meals. FSMs also completed a brief survey that collected information about the characteristics of school kitchens, availability of vending machines in foodservice areas, meal pricing, scheduling of meal periods, nutrition promotion activities, and other operational issues. Principals completed a brief web-based survey that collected information on mealtime policies; activities scheduled during mealtimes; availability of vending machines, school stores and snack bars; requirements for nutrition education and physical education; opportunities for physical activity during the school day; and school wellness policies. Finally, an individual designated by the principal provided information about foods available in vending machines, school stores, and other venues. Data were collected from 578 public SFAs and up to 895 schools (completed sample sizes vary by data collection instrument).

C. School Meal Program Operations

The school meal programs operate under Federal regulations and policies that are generally designed and implemented by FNS. Within these parameters, local SFAs and schools have

⁵ SNDA-I, which included private schools, was an exception to this rule (Burghardt et al. 1993).

considerable discretion in how they operate their programs. FNS makes technical assistance and guidance materials available to all SFAs, who also receive training, technical assistance, and monitoring from State Child Nutrition agencies.

Programs Offered

- In SY 2009–2010, most public schools that participated in the NSLP (89 percent) also participated in the SBP.
- More than one quarter (27 percent) of public NSLP schools provided reimbursable afterschool snacks. Elementary schools were more likely to provide afterschool snacks than either middle or high schools (33 versus 23 and 13 percent, respectively).

Student Participation

- On an average day in SY 2009–2010, 63 percent of all students in public NSLP schools participated in the program. Participation varied by type of school and was highest in elementary schools and lowest in high schools (70 versus 45 percent). In addition, students certified to receive free or reduced-price lunches participated at higher rates than students not certified to receive meal benefits (79 and 73 percent, respectively, versus 48 percent).
- Overall rates of student participation were notably lower for the SBP than the NSLP. On an average day in SY 2009–2010, 28 percent of all students in schools that participated in the SBP participated in the program. General patterns of participation were similar to those observed for the NSLP; however, the magnitude of the differences between subgroups of students was larger.

Meal Prices

- The average price charged for reduced-price meals in SY 2009–2010, was \$0.39 for lunch and \$0.30 for breakfast. By law, SFAs may charge no more than \$0.40 for a reduced-price lunch and no more than \$0.30 for a reduced-price breakfast.
- The average price charged for a paid lunch in SY 2009–2010 was \$1.93. This represents a 21 percent increase from the average price for a paid lunch in SY 2004–2005 (\$1.60).
- The average price charged for a paid breakfast in SY 2009–2010 was \$1.13. This represents a 28 percent increase from the average price for a paid breakfast in SY 2004–2005 (\$0.88).

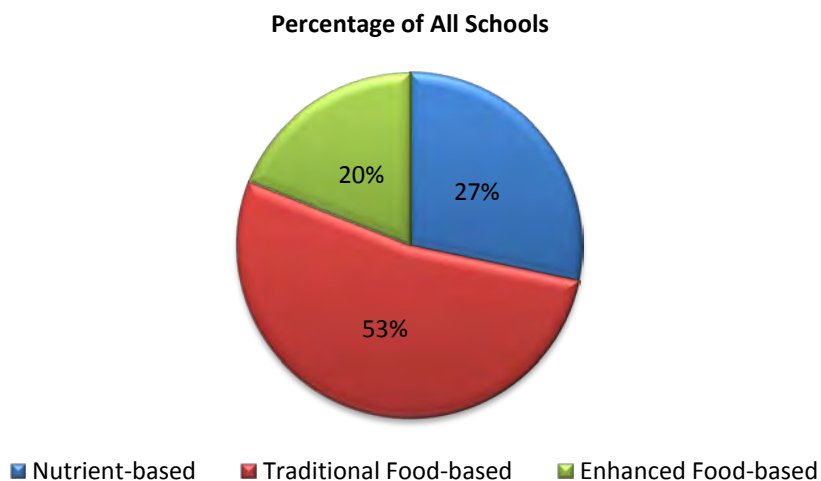
Menu-Planning Systems

In SY 2009–2010, SFAs could choose from five different systems for planning menus. Two systems were food-based (traditional and enhanced) and two were nutrient-based (nutrient standard menu planning [NSMP] and assisted NSMP [ANSMP]). A fifth option allowed SFAs to use other reasonable approaches, which typically varied only slightly from the four main systems and required State approval.

- More than three-quarters of all schools (73 percent) used food-based menu planning (Figure 1). More than half of all schools (53 percent) used traditional food-based menu

planning and another 20 percent used enhanced food-based menu planning. About one-quarter of all schools (27 percent) used nutrient-based menu planning.

Figure 1. Menu- Planning Systems Used in School Year 2009–2010



Note: The percentage for nutrient-based menu planning includes nutrient standard menu planning (NSMP) and assisted nutrient standard menu planning (ANSMP).

Meal Production and Service

- Most schools (80 percent) prepared food on site, and almost three-fourths (72 percent) prepared meals for their school only.
- About one in five SFAs (19 percent) used a foodservice management company (FSMC) to run all or part of their school meals program. Use of FSMCs was more common in medium-sized districts, districts with low levels of child poverty, and urban and suburban districts.
- The offer-versus-serve (OVS) option, which allows students to refuse a certain number of items offered in a reimbursable meal, is mandatory for high schools but optional for elementary schools and middle schools. Most elementary and middle schools used OVS for all students at both lunch (69 and 77 percent, respectively) and breakfast (73 and 82 percent, respectively).

Food Safety and Sanitation

- In SY 2009–2010, directors in 91 percent of SFAs reported that all of their schools had the food safety plan required by USDA. Most SFAs reported that all of the required components were present.
- About two-thirds (67 percent) of SFA directors reported that food safety certification is required for at least some foodservice personnel.

D. School Food and Physical Activity Environments

Historically, USDA has had limited control over school-level policies and practices that, although not directly associated with the school meal programs, may influence children's dietary

intakes and overall health. This includes, for example, policies and practices related to nutrition education and promotion, physical education, opportunities for physical activity, and the availability of competitive foods. In concert with characteristics of the meals offered to students through the NSLP and SBP, these policies and practices constitute a school's food and physical activity environment. Research has shown that school environments are associated with students' dietary behaviors, physical activity levels, and body weight (Fox et al. 2009b; Perry et al. 2004). For this reason, changing school environments has been suggested as a population-based approach to reducing childhood obesity (Centers for Disease Control and Prevention 2011; Institute of Medicine [IOM] 2004 and 2007). An important part of a school's food environment is the availability of competitive foods—foods that are made available to students outside of school meals. Competitive foods may be offered through a la carte sales in school cafeterias or through other venues, including vending machines, school stores, snack bars, and fundraisers.

In recent years, Congress has enhanced USDA's ability to have a broader influence on schools' food and physical activity environments. The Child Nutrition and WIC Reauthorization Act of 2004 (PL 108-265) required that all SFAs participating in the NSLP implement a comprehensive school wellness policy beginning in SY 2006–2007. The Healthy, Hunger-Free Kids Act of 2010 (HHFKA) (PL 111-296) expanded the scope of these wellness policies; required additional stakeholder involvement in the development, implementation, and review of the policies; and required public updates on the content and implementation of the policies. The intent of the new provisions was to strengthen school wellness policies so they become useful tools in evaluating, establishing, and maintaining healthy school environments.

Presence and Implementation of Local Wellness Policies

- In SY 2009–2010, SFA directors in 96 percent of SFAs reported that a district-level wellness policy was in place, and most SFAs (73 percent) had a designated wellness coordinator.
- Directors in more than three-fourths of SFAs reported that required wellness policy components related to nutrition education and physical activity were fully or partially implemented. These components were still being planned in another 6 to 9 percent of SFAs.
- In SY 2009–2010, the vast majority of SFAs had some type of ban or restriction on the availability of sweetened beverages or snack foods on school grounds. More than 80 percent of SFAs had a ban or restriction related to sweetened beverages and more than 75 percent had a ban or restriction related to other foods/snack items. These bans or restrictions most often applied to all schools in the SFA (rather than applying to only some schools).

School Requirements for Nutrition Education, Physical Education, and Opportunities for Physical Activity

- Most schools, ranging from 61 percent of elementary schools to 72 percent of middle schools, required some amount of classroom-based nutrition education in SY 2009–2010. Among schools requiring classroom-based nutrition education, 89 percent required nutrition education for all grades.

- Overall, 95 percent of schools had a requirement for physical education (PE). High schools were more likely than either elementary or middle schools not to have a PE requirement (10 versus 3 percent).
- Based on principals' reports about required PE classes and the amount of time students spend in PE, fewer than one in five schools (18 percent) met or exceeded guidelines from the National Association for Sport and Physical Education (NASPE), which recommends that schools provide 150 minutes per week of instructional PE for elementary school students and 225 minutes per week for middle and high school students each week of the school year.
- Among schools that require year-round PE (a core component of the NASPE recommendation), 22 percent of schools met the NASPE guideline. High and middle schools were more likely to do so than elementary schools (44 and 30 percent, respectively, versus 16 percent).
- About two-thirds (66 percent) of all schools reported offering students regular opportunities for physical activity during the school day in settings other than PE classes. This practice was much more common among elementary schools than either middle or high schools (86 versus 45 and 28 percent, respectively).

Competitive Foods

- In SY 2009–2010, more than 82 percent of elementary schools, 95 percent of middle schools, and 90 percent of high schools had a la carte offerings available at lunch. Smaller percentages of schools (58, 74, and 70 percent, respectively) had a la carte offerings available at breakfast.
- Vending machines were widely available in high schools (85 percent), but were somewhat less common in middle schools (67 percent) and rare in elementary schools (13 percent).
- On average, middle schools that had beverage vending machines in SY 2009–2010 allocated more space to 100% juice and water than to other types of beverages (carbonated sodas, energy/sports drinks, juice drinks, and chocolate drinks) (58 versus 41 percent).⁶ In contrast, high schools allocated more space to other beverages than to 100% juice and water (52 versus 44 percent).
- Schools that had snack machines in SY 2009–2010 allocated the majority (85 percent, on average) of the available space to snack foods (as opposed to baked goods and other types of food). Snack chips accounted for an average of 32 percent of the available space in snack machines. In middle schools, low-fat chips were more prevalent than regular chips (22 versus 15 percent); in high schools, the two types of chips were equally prevalent (16 to 17 percent).
- Based on principals' reports, school stores that sold foods and beverages and snack bars were available in 13 and 4 percent of all schools, respectively. Both of these competitive

⁶ Because of the small number of elementary schools with vending machines, these data were not tabulated for elementary schools.

food venues were available in more middle schools than elementary schools and in more high schools than middle schools.

E. Calorie and Nutrient Content of School Meals

To be eligible for Federal reimbursement, meals *offered* and *served* in the NSLP and SBP must meet defined nutrition standards. The nutrition standards in place during SY 2009–2010 were implemented in 1995 as part of the School Meals Initiative for Healthy Children (SMI). The SMI standards, which are based on the 1989 *Recommended Dietary Allowances* (RDAs) and the 1995 *Dietary Guidelines*, required that NSLP lunches provide one-third of the RDAs for calories, protein, vitamins A and C, calcium, and iron, and that SBP breakfasts provide 25 percent of the RDAs for calories and these target nutrients. The SMI standards also required that both lunches and breakfasts provide no more than 30 percent of calories from fat and less than 10 percent of calories from saturated fat. Finally, the SMI standards encouraged reduced levels of sodium and cholesterol in school meals and increased amounts of dietary fiber, but did not set quantitative targets for these dietary components.

Nutrition standards for school meals were recently revised to reflect the most current nutrition guidance provided by the *Dietary Guidelines* (U.S. Department of Agriculture and U.S. Department of Health and Human Services [HHS] 2010), as well as updated information about nutrient requirements included in the *Dietary Reference Intakes* (DRIs) (IOM 2006), which replaced the 1989 RDAs. The revised standards are based on recommendations included in the IOM (2010) report “School Meals: Building Blocks for Healthy Children.” The IOM recommendations, which were designed to increase alignment of school meals with the *Dietary Guidelines*, called for increasing fruits, vegetables, and whole grains in school meals; limiting milk to fat-free or low-fat varieties; substantially reducing the sodium content of school meals over time; controlling saturated fat and calorie levels; and minimizing trans fat while satisfying children’s nutrient requirements (IOM 2010). The final rule, issued in January 2012, requires that schools begin implementing the new requirements in SY 2012–2013.⁷

In assessing the calorie and nutrient content of school meals in SY 2009–2010, we used the SMI standards rather than the new requirements because the SMI standards were in place at the time data were collected. To provide additional insights about the nutritional quality, we also compared school meals to 2010 *Dietary Guidelines* recommendations for total fat, sodium, cholesterol, and dietary fiber. The standards used to assess the calorie and nutrient content of school meals are summarized in Table 1. For cholesterol and sodium, we used standards that represent one-third and one-fourth of the suggested daily limit to assess lunches and breakfasts, respectively. For dietary fiber, the standard was based on a density standard of 14 g dietary fiber per 1,000 calories, the benchmark used in establishing the DRIs for dietary fiber (IOM 2001). To simplify the discussion, we generally use the term *standard* to refer to all of the benchmarks used in assessing schools meals. It is important to note, however, that in SY 2009–2010, schools were not required to meet the standards based on 2010 *Dietary Guidelines* recommendations.

Analyses assessed the percentage of schools that *offered* and *served* meals that, on average, satisfied each of the individual standards as well as the percentage that *offered* and *served* meals that came within 10 percent of each standard. Information about the size of the disparity in nutrient content among schools that did not meet a particular standard can be useful to program

⁷ *Federal Register*, vol. 77, no. 17, Thursday, January 26, 2012, Rules and Regulations.

administrators in identifying targets for training and technical assistance to support school foodservice personnel in planning meals that do meet the standards.

Table 1. Standards Used in Evaluating the Nutrient Content of School Meals

Nutrient	Lunch Standard	Breakfast Standard
SMI Standards		
Based on 1989 Recommended Dietary Allowances ^a		
Calories	One-third of the REA	One-fourth of the REA
Protein, Vitamins A and C, Calcium, and Iron	One-third of the RDAs	One-fourth of the RDAs
Based on 1995 Dietary Guidelines for Americans ^b		
Total Fat	No more than 30 percent of calories	
Saturated Fat	Less than10 percent of calories	
Standards Based on the 2010 Dietary Guidelines for Americans ^c		
Total Fat	25 to 35 percent of calories	
Cholesterol	Less than100 mg ^d	Less than 75 mg ^d
Sodium	Less than 767 mg ^e	Less than 575 mg ^e
Dietary Fiber	14 g per 1,000 calories	

Note: Schools were not required to meet standards that are based on the 2010 *Dietary Guidelines*.

^aNational Research Council (1989).

^bU.S. Department of Agriculture and U.S. Department of Health and Human Services (1995).

^cU.S. Department of Agriculture and U.S. Department of Health and Human Services (2010).

^dStandards for cholesterol are based on one-third (lunch) and one-fourth (breakfast) of the suggested daily limit of less than 300 mg.

^eStandards for sodium are based on one-third (lunch) and one-fourth (breakfast) of the suggested daily limit of less than 2,300 mg.

REA = *Recommended Energy Allowance*; RDAs = *Recommended Dietary Allowances*; SMI = School Meals Initiative for Healthy Children.

We assessed the calorie and nutrient content of school meals in two ways—meals *as offered* and *as served*. Estimates of the average meal *offered* assume that students take one serving of each type of food (meal component) offered to them, for example, one milk, one entrée, one fruit, and one vegetable. Choices within a meal component group (for example, three different types of milk) are averaged and then the average calories and nutrients in each meal component group are summed. Estimates of the average meal *served* incorporate information about students' food selection patterns—that is, information about the number and types of foods included in the meals that are actually served to students. Instead of a simple average of all foods offered, estimates of average meal *served* give greater weight to the calorie and nutrient content of the foods and beverages that students select more frequently. The SMI introduced analysis of NSLP and SBP meals *as served* to provide a more accurate assessment of the potential contribution of school meals to children's dietary intakes.

Average NSLP Lunches *Offered* and *Served*

Most schools *offered* and *served* NSLP lunches that, on average over a typical school week, met the SMI standards for minimum levels of target nutrients (Figure 2).

- Eighty-five percent or more of all schools *offered* average NSLP lunches that met or exceeded the standards for SMI target nutrients—protein, vitamins A and C, calcium, and iron.
- With the exception of protein, fewer schools met the SMI standards for target nutrients the average NSLP lunch *served*. This is consistent with the fact that students do not necessarily take one serving of all foods offered to them. Still, the average lunch *served* in more than three-quarters of all schools met or came within 10 percent of the SMI standards for all target nutrients
- For both NSLP lunches *offered* and *served*, elementary schools were consistently more likely than either middle or high schools to meet the SMI standards for most target nutrients (data not shown in figure).

Schools were less likely to *offer and serve* average NSLP lunches that met the SMI standard for minimum calories. This was especially true for middle and high schools (Figure 2).

- Almost two-thirds (65 percent) of schools *offered* average NSLP lunches that met the SMI standard for minimum calories and another 20 percent came within 10 percent of this standard. In contrast, 39 percent of schools *served* lunches that met the SMI standard for calories and 26 percent came within 10 percent of this standard.

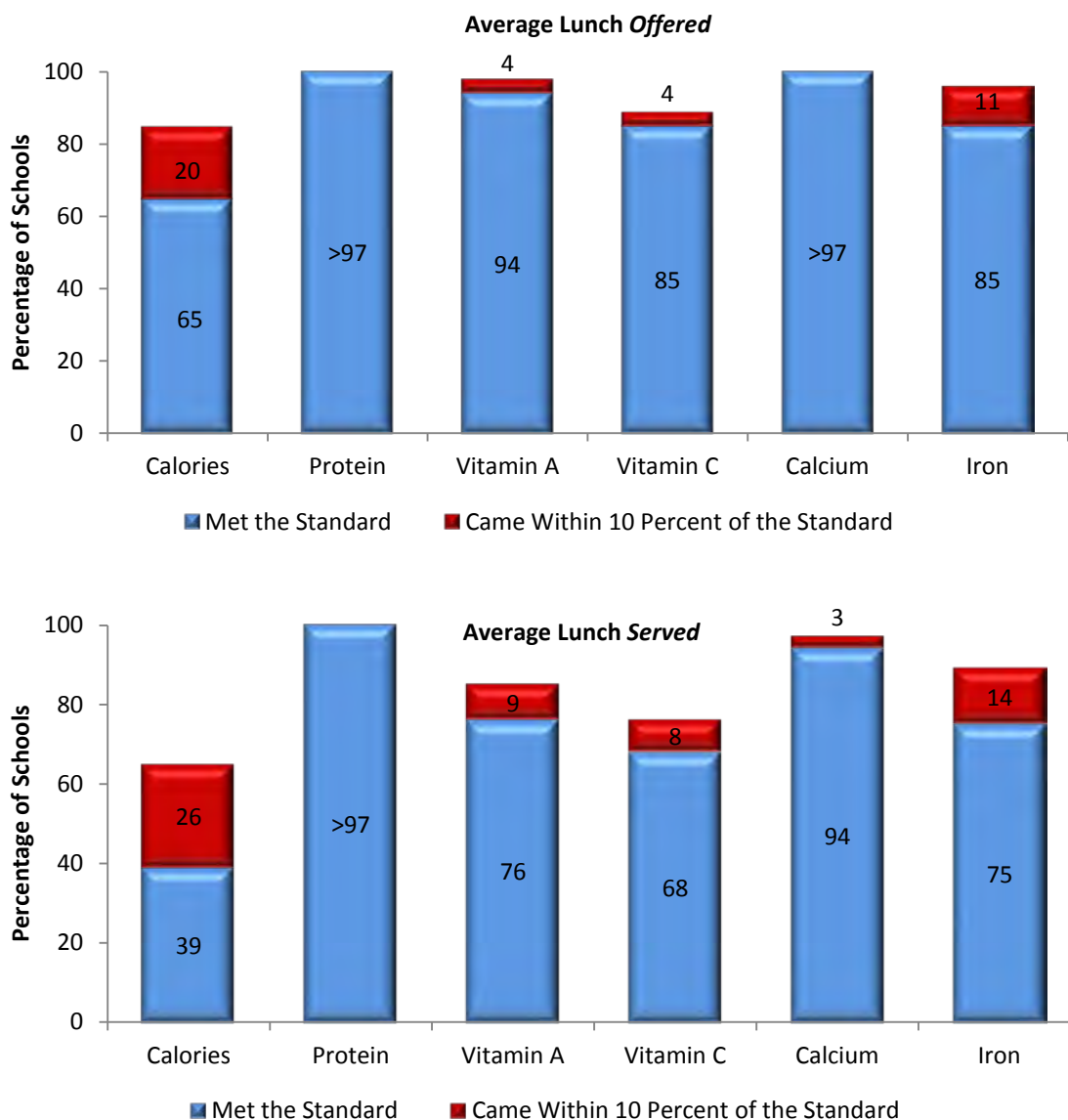
A majority of schools *offered* and *served* average NSLP lunches that either met the SMI standard for total fat (no more than 30 percent of calories) or came within 10 percent of this standard (Figure 3).

- On average, 35 percent of all schools *offered* average NSLP lunches that met the SMI standard for total fat and another 25 percent of schools *offered* lunches that came within 10 percent of this standard (which is equivalent to 30.1 to 33.0 percent of calories from total fat). Findings were similar for the average lunch *served*.

Schools were more likely to meet the 2010 *Dietary Guidelines* recommendation for total fat than the corresponding SMI standard (Figure 3).

- The 2010 *Dietary Guidelines* recommendation for total fat is less restrictive than the SMI standard (25 to 35 percent of calories from total fat versus no more than 30 percent [see Table 1]). Almost three-quarters of schools *offered* and *served* NSLP lunches that met the 2010 *Dietary Guidelines* recommendation for fat (70 and 72 percent, respectively) and roughly 20 percent of schools *offered* and *served* lunches that came within 10 percent of this standard.

Figure 2. Percentage of Schools *Offering* and *Serving* National School Lunch Program Lunches that, on Average, Met or Came Within 10 Percent of the SMI Standards for Calories and Target Nutrients



Notes: The SMI standards are one-third of the 1989 *Recommended Dietary Allowances*.

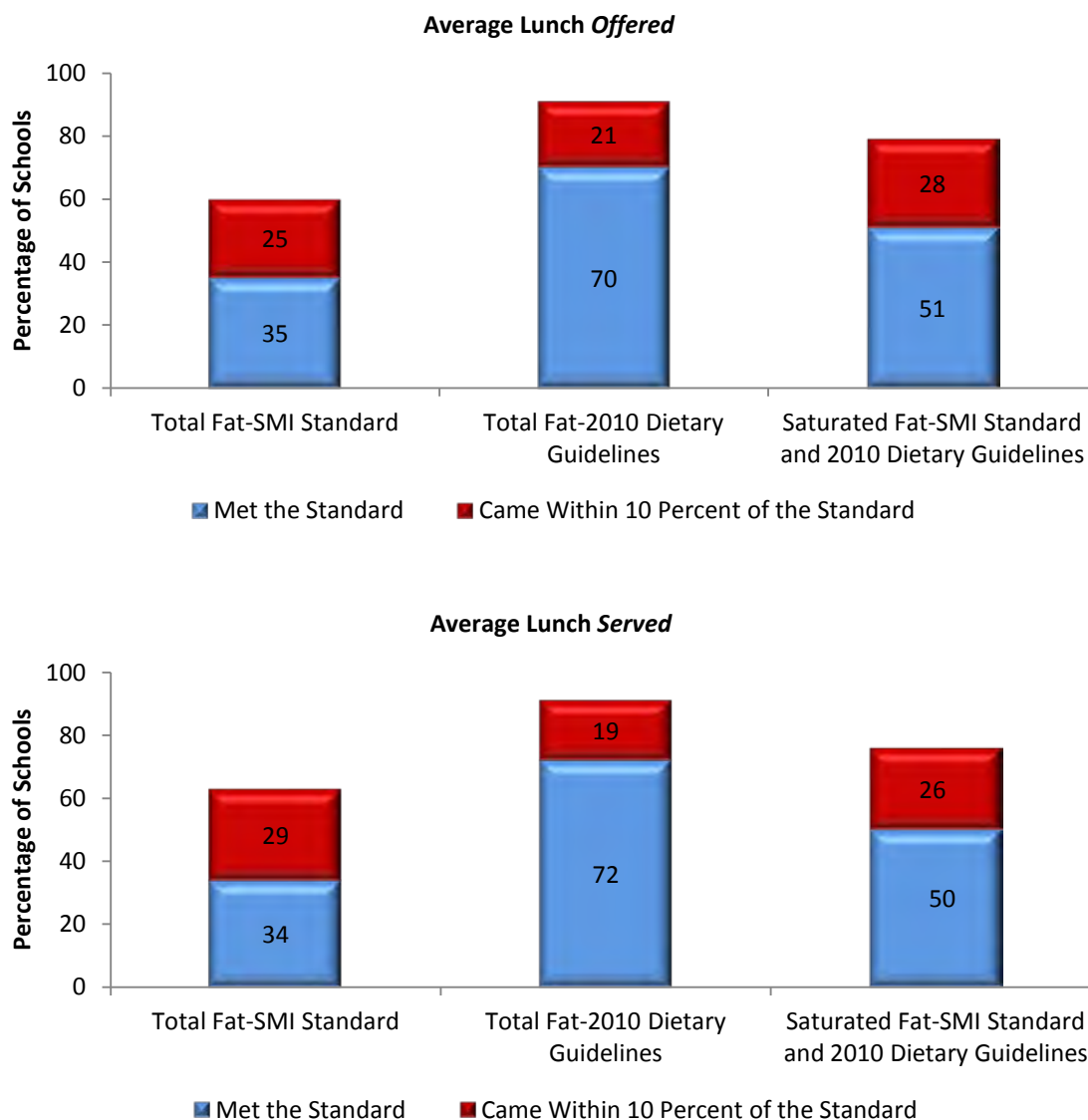
>97 is displayed for percentages between 97 and 100 when the point estimate is considered less precise because of a large coefficient of variation.

SMI = School Meals Initiative for Healthy Children.

More than three-quarters of all schools *offered* and *served* average NSLP lunches that met the SMI standard for saturated fat (less than 10 percent of calories) or came within 10 percent of this standard (Figure 3).

- About half (51 percent) of all schools *offered* average NSLP lunches that met the SMI standard for saturated fat (which is the same as the 2010 *Dietary Guidelines* recommendation for saturated fat). An additional 28 percent of schools *offered* lunches that came within 10 percent of this standard (which is equivalent to 10.0 to 10.9 percent of calories from saturated fat).

Figure 3. Percentage of Schools *Offering* and *Serving* National School Lunch Program Lunches that, on Average, Met or Came Within 10 Percent of SMI Standards and 2010 *Dietary Guidelines* Recommendations for Total Fat and Saturated Fat



Note: The SMI standard for total fat is no more than 30 percent of calories. The 2010 *Dietary Guidelines* recommendation for total fat for school-age children is 25–35 percent of calories. Both the SMI standard and the 2010 *Dietary Guidelines* recommendation for saturated fat are less than 10 percent of calories.

SMI = School Meals Initiative for Healthy Children.

- Results were comparable for the average NSLP lunch *served*. Half of all schools *served* NSLP lunches that were consistent with the SMI standard for saturated fat. An additional 26 percent of schools *served* average lunches that came within 10 percent of this standard.

Few schools *offered* or *served* average NSLP lunches that met *all* of the SMI standards.

- Overall, 14 percent of schools *offered* NSLP lunches that met *all* of the SMI standards. The percentage of schools that *served* average NSLP lunches that met *all* of the SMI standards was 50 percent lower, at 7 percent. As discussed previously and shown in Figures 2 and 3, the SMI standards for calories, total fat, and saturated fat were the most challenging for schools to meet in NSLP lunches.

Essentially all schools *offered* and *served* average NSLP lunches that met the 2010 *Dietary Guidelines* recommendation for cholesterol, but very few schools *offered* or *served* lunches that were consistent with 2010 *Dietary Guidelines* recommendations for sodium or dietary fiber.

- The mean sodium content of lunches *offered* and *served* in more than three-quarters of all schools exceeded the 2010 *Dietary Guidelines* recommendation for sodium by more than 50 percent. Excess sodium is not unique to school meals; virtually all Americans consume more sodium than they need. Most sodium comes from processed foods and achieving recommended levels of sodium will require a deliberate reduction in the sodium content of foods available in the marketplace (USDA and HHS 2010; IOM 2010).
- Only 4 percent of schools *offered* average NSLP lunches that met the 2010 *Dietary Guidelines* recommendation for dietary fiber and another 8 percent of schools came within 10 percent of meeting the recommendation. The average dietary fiber content of lunches *offered* in most schools (62 percent) was more than 25 percent below the 2010 *Dietary Guidelines* recommendation. Dietary fiber content was even lower in average NSLP lunches *served*.

Availability of Lunches that Met Standards

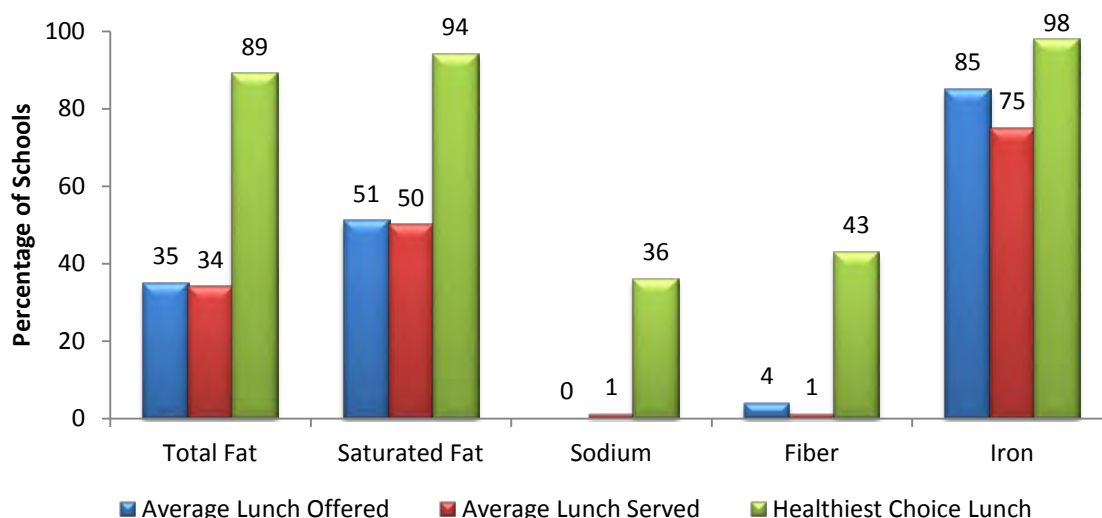
In schools in which the average NSLP lunch *offered* was not consistent with a particular standard, students might have had the opportunity to select a meal that did meet the standard. For example, provided that lower-fat menu choices were available, it is possible that individual students could have selected lunches that were consistent with the SMI standards for total fat and/or saturated fat. We assessed the availability of lunches that met standards that were the most challenging for schools to meet. This included the SMI standards for total fat, saturated fat, and iron, and the 2010 *Dietary Guidelines* recommendations for sodium and dietary fiber.

The analysis for each nutrient was based on the healthiest choices *offered* each day (for example, the lowest-fat choices or the highest-dietary-fiber choices) in each school. Although the availability of meals that meet the more challenging standards does not guarantee that students will select such meals, information about the availability of these meals can provide policymakers with helpful insights on the relative ease or difficulty of *offering* meals that meet specific nutrition standards.

Key findings from this analysis are presented in Figure 4 and summarized below:

- The vast majority of schools *offered* students the opportunity to select lunches that met the SMI standards for total fat, saturated fat, and iron.

Figure 4. Percentage of Schools Meeting Standards for the Average Lunch Offered, Average Lunch Served, and Healthiest-Choice Lunches



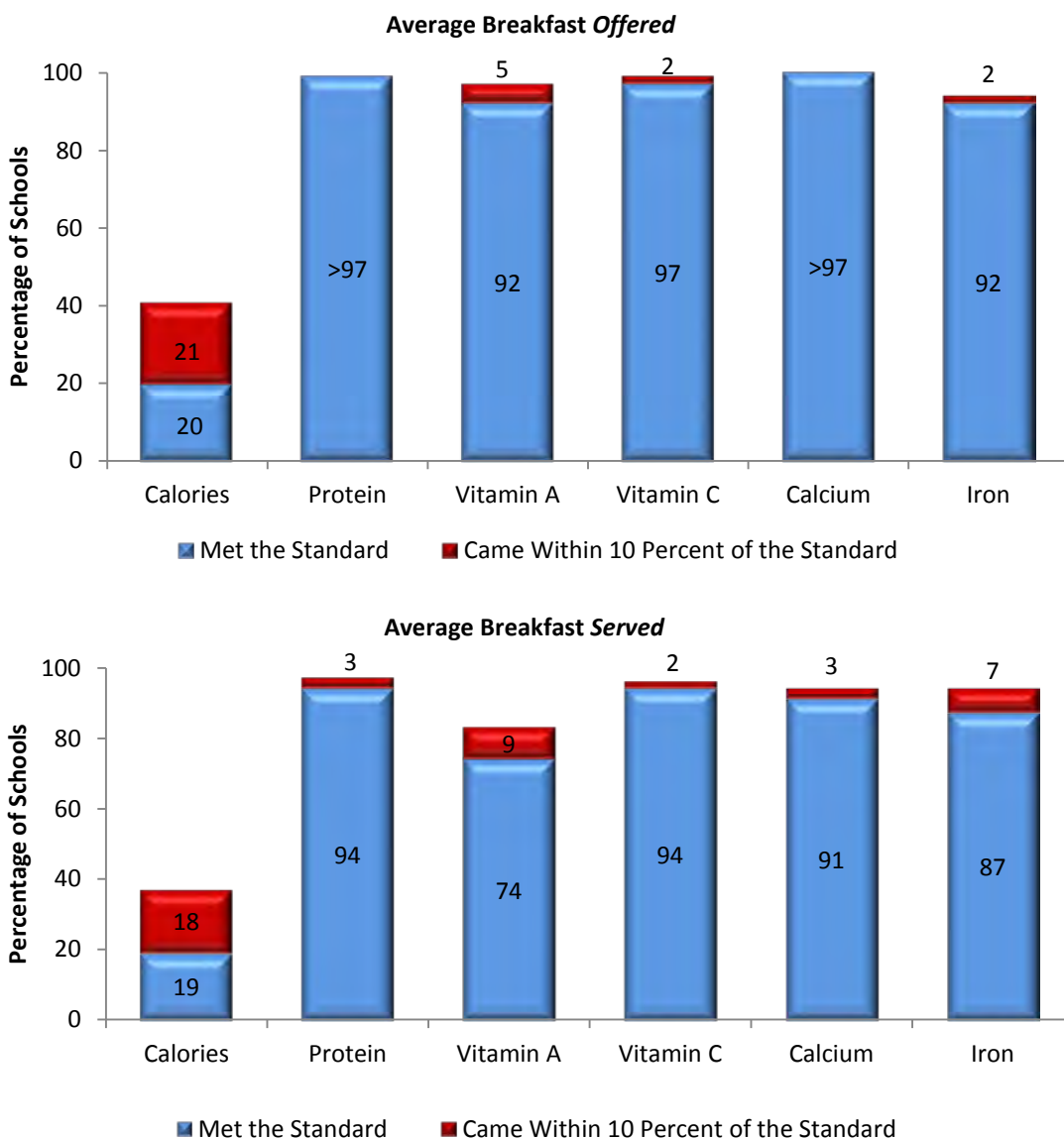
- Students had the opportunity to select lunches that met the 2010 *Dietary Guidelines* recommendations for sodium and fiber in about 40 percent of all schools (36 and 43 percent, respectively). Thus, students had the opportunity to select lunches that met these standards in substantially more schools than suggested by findings for the average lunch *offered* and *served*.
- Relative to the average lunch *offered*, all of the healthiest-choice lunches did a better job of meeting the more challenging nutrition standards, especially the SMI standards for fat and saturated fat and the 2010 *Dietary Guidelines* recommendation for dietary fiber. However, for all but the highest-dietary-fiber and the highest-iron lunches, the average healthiest-choice lunches were less likely to meet the SMI standard for calories than the average NSLP lunch *offered* (data not shown in figure.)

Average SBP Breakfasts Offered and Served

Most schools *offered* and *served* average SBP breakfasts that were consistent with the SMI standards for target nutrients, but fewer schools met the SMI standard for calories. (Figure 5).

- For each of the SMI target nutrients, 92 percent or more of all schools *offered* average SBP breakfasts that met the standards.
- Fewer schools met the SMI standards for the average breakfast *served*. This is consistent with the fact that students do not necessarily take one serving of all foods offered to them. Still, for each of the SMI target nutrients, more than 80 percent of all schools *served* average SBP breakfasts that met or came within 10 percent of the standard.
- For both SBP breakfasts *offered* and *served*, elementary schools were significantly more likely than middle or high schools to meet most of the SMI standards for target nutrients (data not shown in figure).

Figure 5. Percentage of Schools *Offering* and *Serving* School Breakfast Program Breakfasts that, on Average, Met or Came Within 10 Percent of the SMI Standards for Calories and Target Nutrients



Notes: The SMI standards are one-fourth of the 1989 *Recommended Dietary Allowances*.

>97 is displayed for percentages between 97 and 100 when the point estimate is considered less precise because of a large coefficient of variation.

SMI = School Meals Initiative for Healthy Children.

- Similar to the pattern observed for NSLP lunches, substantially fewer schools met the SMI standard for calories than the SMI standards for target nutrients. For both breakfasts *offered* and *served*, only about 20 percent of schools met the SMI standard for calories and about 20 percent more came within 10 percent of this standard.

Most schools *offered* and *served* average SBP breakfasts that met the SMI standard for total fat (no more than 30 percent of calories) or came within 10 percent of this standard (Figure 6).

- Overall, 98 percent of schools *offered* SBP breakfasts and 94 percent of schools *served* SBP breakfasts that, on average, met the SMI standard for total fat or came within 10 percent of meeting this standard (which is equivalent to 30.1 to 33.0 percent of calories from fat).

Schools were less likely to meet the 2010 *Dietary Guidelines* recommendation for total fat than the corresponding SMI standard (Figure 6).

- This is the opposite of the pattern observed for NSLP lunches. The reason for the difference is that breakfasts were lower in total fat than lunches. On average, fat provided about 22 to 24 percent of the calories in breakfasts. This level was consistent with the SMI standard for total fat (no more than 30 percent of calories), but fell below the lower end of the range of fat intake recommended for school-age children in the 2010 *Dietary Guidelines*.
- The fact that, on average, breakfasts *offered* in the SBP were somewhat low in fat, relative to the 2010 *Dietary Guidelines* is not necessarily a negative finding. Fat is a concern because most Americans consume too much fat (USDA and HHS 2010). Thus, meals that exceed the *Dietary Guidelines* recommendation for total fat, on average, are a concern because they contribute to the potential for overconsumption. However, meals that are somewhat low in average calories from fat are less of a concern because, in children's overall diets, these meals may balance out other meals and snacks that are higher in relative fat content.

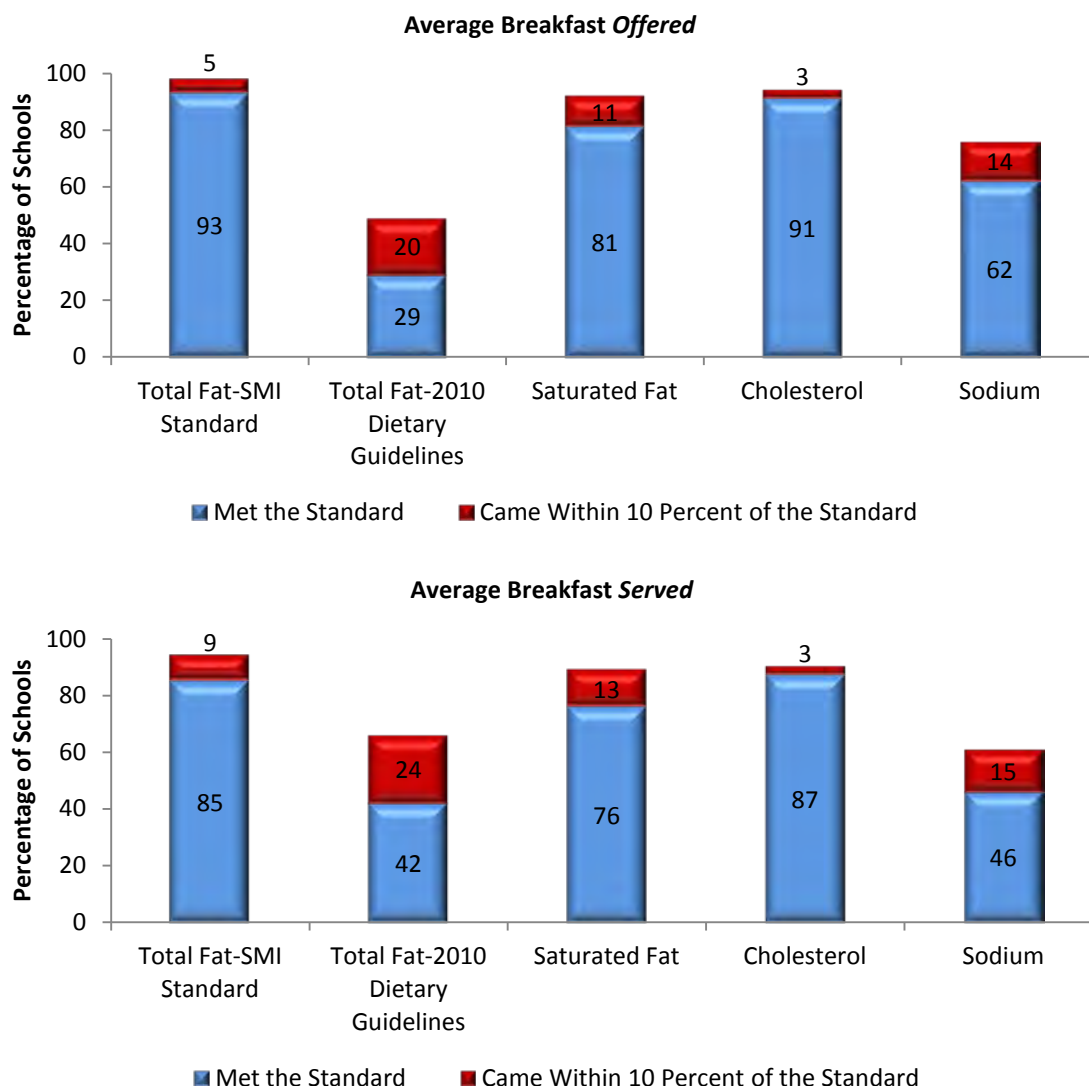
More than 85 percent of all schools *offered* and *served* average SBP breakfasts that met the SMI standard for saturated fat (less than 10 percent of calories) or came within 10 percent of this standard (Figure 6).

- More than three-quarters of all schools *offered* and *served* average SBP breakfasts that met the SMI standard for saturated fat.
- An additional 11 percent of schools *offered* average SBP breakfasts that came within 10 percent of this standard (which is equivalent to 10.0 to 10.9 percent of calories from saturated fat), and an additional 13 percent of schools *served* average breakfasts that came within 10 percent of this standard.

Few schools *offered* or *served* average SBP breakfasts that met *all* of the SMI standards (data not shown in figure).

- Overall, 15 percent of all schools *offered* average SBP breakfasts that met *all* of the SMI standards and 11 percent of schools *served* average SBP breakfasts that met *all* of the SMI standards. As discussed earlier and shown in Figures 5 and 6, the SMI standard that was the most challenging for schools to meet in SBP breakfasts was the standard for minimum calories.

Figure 6. Percentage of Schools *Offering* and *Serving* School Breakfast Program Breakfasts that, on Average, Met or Came Within 10 Percent of Standards and Recommendations for Total Fat, Saturated Fat, Cholesterol, and Sodium



Note: The SMI standard for total fat is no more than 30 percent of calories. The 2010 *Dietary Guidelines* recommendation for total fat for school-age children is 25–35 percent of calories. Both the SMI standard and the 2010 *Dietary Guidelines* recommendation for saturated fat are less than 10 percent of calories.

SMI = School Meals Initiative for Healthy Children.

About 90 percent of all schools *offered* and *served* average SBP breakfasts that met the 2010 *Dietary Guidelines* recommendations for cholesterol and sizeable proportions of schools *offered* and *served* breakfasts that were consistent with the 2010 *Dietary Guidelines* recommendation for sodium (Figure 6).

- About 90 percent of all schools *offered* and *served* breakfasts that met the 2010 *Dietary Guidelines* recommendation for cholesterol.
- Relative to NSLP lunches, schools did a better job meeting the 2010 *Dietary Guidelines* recommendation for sodium at breakfast, particularly for breakfasts as *offered*. The

average SBP breakfast *offered* in 62 percent of schools was consistent with the 2010 *Dietary Guidelines* recommendation for sodium, and the average breakfast *offered* in another 14 percent of schools came within 10 percent of this standard.

- Schools were less likely to meet the sodium standard for breakfasts as *served* (46 percent versus 62 percent for breakfasts as *offered*), which suggests that students tend to select higher-sodium breakfast foods more frequently than lower-sodium options.
- Essentially no schools *offered* or *served* SBP breakfasts that were consistent with the 2010 *Dietary Guidelines* recommendation for dietary fiber (data not shown in figure). The dietary fiber content of the average breakfast *offered* and *served* in most schools was more than 50 percent below the recommended level of 14 g per 1,000 calories.

F. Potential Contributions of School Meals to Recommended USDA Food Patterns

The USDA Food Patterns describe the types and amounts of foods included in a healthy dietary pattern—that is, a pattern that is consistent with the 2010 *Dietary Guidelines for Americans*. A healthy dietary pattern stays within recommended calorie levels; limits intakes of sodium, solid fats, added sugars, and refined grains; and emphasizes nutrient-dense foods and beverages—vegetables, fruits, whole grains, fat-free or low-fat dairy products, and lean protein foods (USDA and HHS 2010). To fully assess the nutritional quality of school meals, it is important to examine their potential contribution to healthy dietary patterns. Previous rounds of the SNDA study have not addressed this issue, so findings from this assessment make an important contribution to the knowledge base on the nutritional quality of school meals.

The USDA Food Patterns identify average daily amounts of foods, in nutrient-dense forms, to eat from five major food groups:

1. Vegetables
2. Fruits
3. Grains
4. Dairy
5. Protein Foods



The Food Patterns are designed to meet nutrient needs without exceeding calorie requirements. Food Pattern recommendations for individuals depend on calorie requirements, which are determined by age, gender and activity level. The system includes 12 different Food Patterns, ranging from 1,000 to 3,200 calories, which are designed to meet the needs of healthy individuals ages 2 and older as well as those at risk for developing chronic disease.

To assess the potential contribution of school meals to USDA Food Pattern recommendations, the food group content of average meals *offered* and *served* in elementary, middle, and high schools was compared with Food Patterns for 1,800, 2,000, and 2,400 calories, respectively. These are the calorie levels used by IOM in developing recommendations for revised nutrition standards for school meals (IOM 2010). To provide additional context, we applied the benchmarks used in the

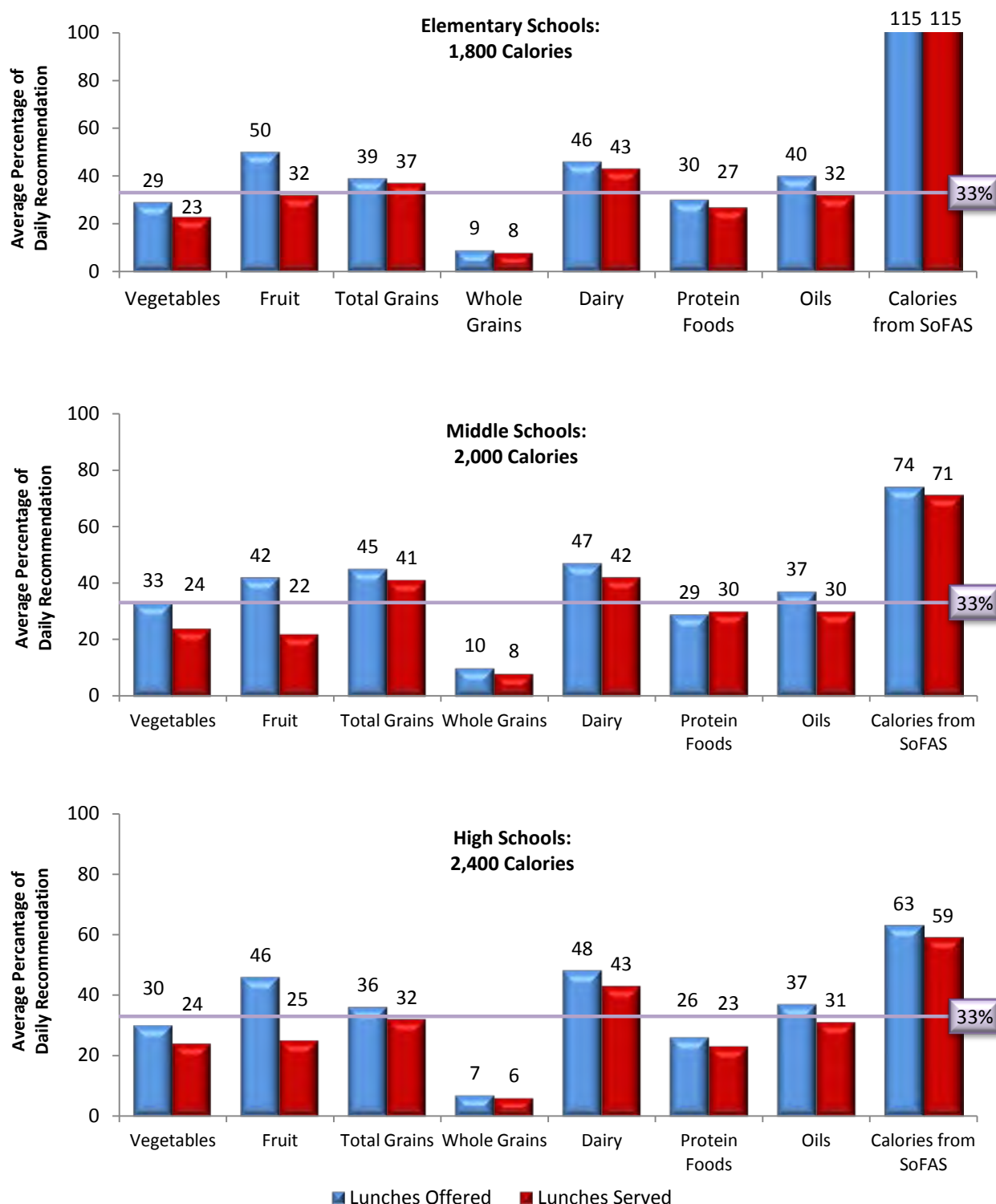
SMI nutrition standards—33 percent for NSLP lunches and 25 percent for SBP breakfasts—in assessing food group content. Thus, if the SMI benchmarks were applied to the USDA Food Patterns, the expectation would be that NSLP lunches and SBP breakfasts would provide one-third and one-fourth, respectively, of the recommended average daily amounts of food groups.

Figure 7 shows the average food group content of NSLP lunches *offered* and *served*, expressed as percentages of USDA Food Pattern recommendations. Key findings include the following:

- The average NSLP lunch *offered* and *served* in all three types of schools provided one-third or more of the daily amounts of grains, dairy foods, and oils recommended in the USDA Food Patterns, or came very close to meeting this target.
- The average NSLP lunch *offered* in all three types of schools provided more than one-third of recommended amounts of fruits (42 to 50 percent). The amount of fruit in the average lunch *served* was notably smaller (22 to 32 percent), suggesting that many students did not include a serving of fruit in their lunches.
- On average, NSLP lunches *offered* provided about 30 percent of recommended daily amounts of vegetables; as *served*, NSLP lunches provided about one-quarter of recommended daily amounts of vegetables.
- Average NSLP lunches *offered* and *served* were low in whole grains, providing 6 to 10 percent of recommended daily amounts.
- Average NSLP lunches *offered* and *served* were high in calories from solid fats and added sugars (SoFAS). The number of calories from SoFAS in the average NSLP lunch *offered* and *served* in elementary schools was 15 percent above the maximum recommended for the entire day. The average NSLP lunch *offered* and *served* in middle and high schools provided 59 to 74 percent of the maximum limit for calories from SoFAS. The disparity between elementary and secondary schools is driven by the fact that younger students, with lower overall calorie requirements, have less room in their diets for calories from SoFAS. Therefore the maximum limit for calories from SoFAS is substantially lower for elementary school students than for middle and high school students (160 calories versus 260 and 330 calories, respectively).
- In both NSLP lunches *offered* and *served*, about 62 percent of SoFAS calories came from solid fats and about 38 percent came from added sugars. The solid fats in the average NSLP lunch *offered* were contributed by a wide variety of foods; however, combination entree items and meat/meat alternates contributed 59 percent of solid fats and milk contributed 15 percent of solid fats.⁸ SoFAS calories contributed by added sugars also came from a wide variety of foods. Flavored milks accounted for 31 percent of added sugars in NSLP lunches *offered*, followed by combination entrees and meat/meat alternates (19 percent).

⁸ The analysis that assessed food sources of solid fats, added sugars, and calories from SoFAS was completed only for average lunches *offered*.

Figure 7. Average Amounts of Food Groups in National School Lunch Program Lunches *Offered* and *Served*, Relative to Recommended USDA Food Patterns



Notes: Daily recommendations are based on USDA Food Patterns. Calorie levels used for each type of school are based on the calorie levels used by the Institute of Medicine (2010) in developing recommendations for revised nutrition standards for school meals.

The 33-percent benchmark is used for illustrative purposes only and is based on the SMI standard that NSLP meals should provide one-third of students' average daily calorie and nutrient needs.

SMI = School Meals Initiative for Healthy Children; SoFAS = solid fats and added sugars.

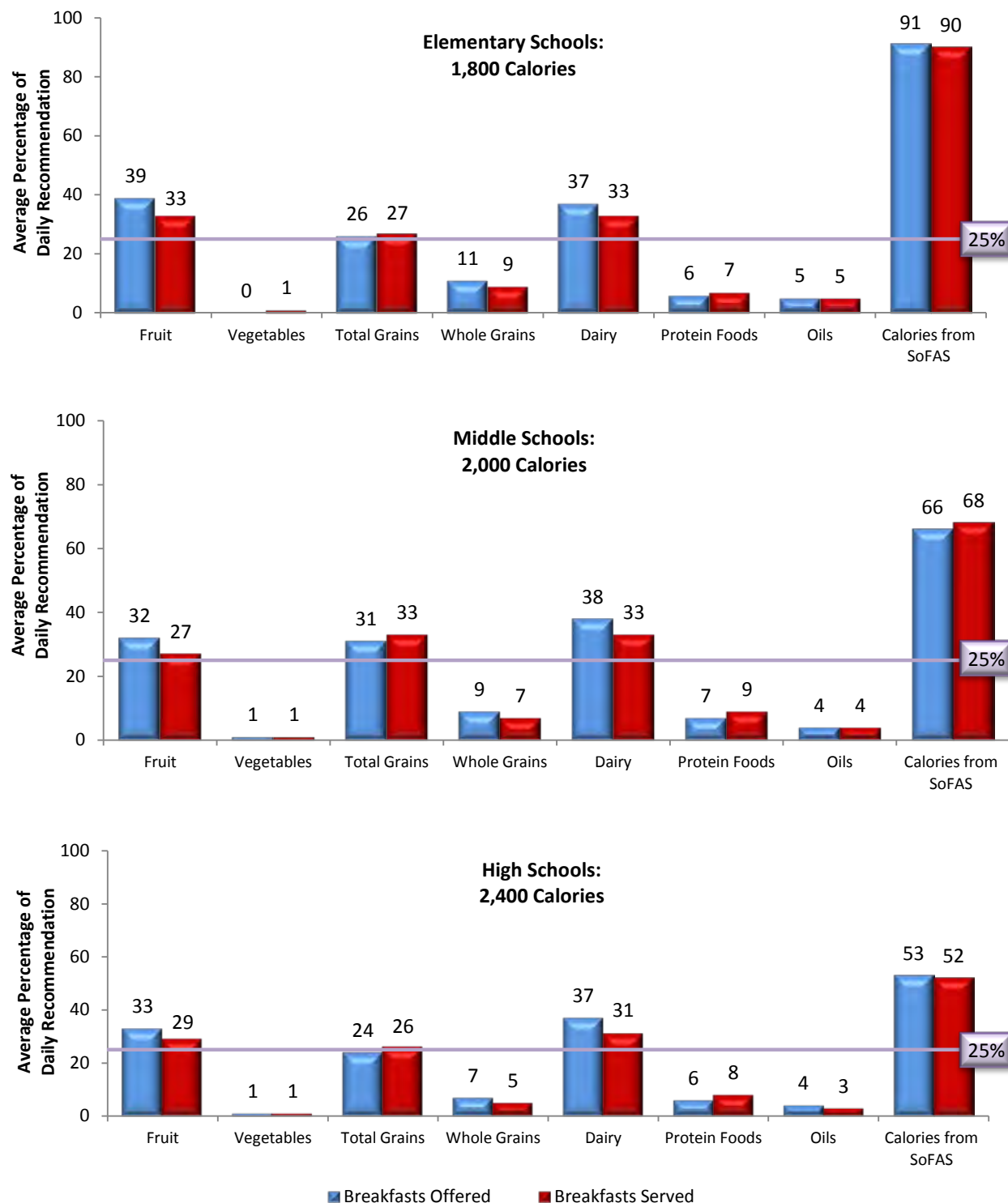
- The relative contribution of specific foods to SoFAS calories in NSLP lunches is influenced by both the amount of solid fat and added sugar in the food and the frequency with which it is offered. The top five contributors to SoFAS calories in average NSLP lunches *offered* were 1% flavored milk (10 percent), cookies, cakes and brownies (8 percent), pizza and pizza products (6 percent), condiments, toppings, and spreads (6 percent), and flavored skim/nonfat milk (5 percent). There was some variation in the relative contribution of these foods to SoFAS calories in lunches *offered* in elementary and secondary schools and, among secondary schools, hamburgers and cheeseburgers rather than flavored skim/nonfat milk was the fifth leading contributor of SoFAS calories.

Average Breakfasts *Offered* and *Served*

Figure 8 shows the average food group content of SBP breakfasts *offered* and *served*, expressed as percentages of the USDA Food Pattern recommendations. Key findings include the following:

- The average SBP breakfast *offered* and *served* in all three types of schools provided one-quarter or more of the recommended daily amounts of fruit, grains, and dairy foods, or came very close to meeting this target.
- The average SBP breakfast *offered* and *served* in all three types of schools provided limited amounts of whole grains (5 to 11 percent of recommended amounts), lean protein foods (6 to 9 percent), and oils (3 to 5 percent). Vegetables were infrequently offered in SBP breakfasts.
- Average SBP breakfasts *offered* and *served* were high in calories from SoFAS, particularly in elementary schools, where students have the lowest calorie requirements and, consequently, less room in their diets for SoFAS calories. The number of SoFAS calories in breakfasts *offered* and *served* in elementary schools was equivalent to about 90 percent of the maximum recommended for the entire day. The number of SoFAS calories in the average SBP breakfast *offered* and *served* in high and middle schools was equivalent to about 50 to 70 percent of the recommended daily maximum, respectively.
- Overall, solid fats and added sugars each contributed about half of the total calories from SoFAS in the average SBP breakfast *offered*. In the average SBP breakfast *served*, which reflects students' food selection patterns, solid fats contributed a larger share of SoFAS calories than added sugars (54 versus 46 percent). There was some variation in this pattern by school type. Solid fats accounted for a significantly larger share of SoFAS calories in the average breakfasts *served* in middle and high schools, relative to elementary schools (55 and 58 percent, respectively, versus 52 percent), and added sugars accounted for a significantly smaller share of SoFAS calories (45 and 42 percent, respectively, versus 48 percent).
- As a group, grains and grain products were the leading contributors to both solid fats and added sugars in the average SBP breakfasts *offered*. Foods in this group contributed 40 percent of the solid fats and 45 percent of the added sugars in SBP breakfasts *offered*. Milk was the next leading contributor of solid fats and added sugars, accounting for 24 percent of solid fats and 23 percent of added sugars in the average SBP breakfast *offered*.

Figure 8. Average Amounts of Food Groups in School Breakfast Program Breakfasts *Offered* and *Served*, Relative to Recommended USDA Food Patterns



Notes: Daily recommendations are based on USDA Food Patterns. Calorie levels used for each type of school are based on the calorie levels used by the Institute of Medicine (2010) in developing recommendations for revised nutrition standards for school meals.

The 25-percent benchmark is used for illustrative purposes only and is based on the SMI standard that SBP meals should provide one-fourth of students' average daily calorie and nutrient needs.

SMI = School Meals Initiative for Healthy Children; SoFAS = solid fats and added sugars.

- The relative contribution of specific foods to SoFAS calories in SBP breakfasts is influenced by both the amount of solid fat and added sugar in the food and the frequency with which it is offered. Overall, the top five contributors to SoFAS calories in the average SBP breakfast offered were sweet rolls, donuts, and toaster pastries (13 percent), condiments, toppings, and spreads (12 percent), cold cereal (10 percent), 1% flavored milk (10 percent), and muffins and sweet/quick breads (5 percent). Together, these five foods accounted for half of the SoFAS calories in SBP breakfasts. There was some variation in the relative contribution of these foods to SoFAS calories in elementary and secondary schools and, among secondary schools, breakfast sandwiches rather than muffins and sweet/quick breads was the fifth leading contributor of SoFAS calories.

G. Afterschool Snacks Offered in Public NSLP Schools

Since 1998, schools that participate in the NSLP have been eligible to receive cash reimbursement for snacks served in afterschool programs. To be eligible for reimbursement, snacks must be served in afterschool programs that provide children with regularly scheduled educational or enrichment activities in a supervised environment. In addition, snacks must be served free or at a reduced price to children from low-income families and must contain at least two of the following four components: (1) a serving of fluid milk; (2) a serving of vegetables, fruit, or 100% fruit or vegetable juice; (3) a serving of meat or meat alternate; or (4) a serving of whole grain or enriched bread or cereal.

SNDA-IV is the first study to collect data from a national sample of schools providing reimbursable afterschool snacks. Key findings include the following:

- Nationally, 27 percent of schools that participate in the NSLP provide reimbursable afterschool snacks. Elementary schools participate at higher rates than middle or high schools (33 versus 23 and 13 percent, respectively).
- A majority (69 percent) of schools that provide afterschool snacks do so on a daily basis, either by dropping the snacks off or making arrangements for afterschool program staff to pick up the snacks.
- More than half of all schools that provide afterschool snacks reported offering students a grain/bread item (75 percent), milk (60 percent) or fruit/100% juice (51 percent) as one of the two meal components required for an afterschool snack.
- Overall, there was very little choice among food groups in afterschool snacks. Among schools that offered milk as a component in the afterschool snack, most offered only one type. The same pattern was seen with fruits, vegetables and 100% juice, as well as grains and breads.
- On average, snacks provided almost half (47 percent) of the recommended maximum number of SoFAS calories for a 1,800-calorie diet. More than half (55 percent) of the SoFAS calories in the average snack came from solid fats and 45 percent came from added sugars.
- The top five contributors to SoFAS calories in afterschool snacks were crackers and pretzels (30 percent), 1% flavored milk (10 percent), cookies, cakes, and brownies (10 percent), flavored skim/nonfat milk (9 percent), and unflavored 1% milk (5 percent).

Together, these five foods accounted for 64 percent of the SoFAS calories in afterschool snacks.

H. Changes in School Meals, School Meal Programs, and School Environments Over Time

Three SNDA studies have been conducted since the SMI was enacted—SNDA-II in SY 1998–1999; SNDA-III in SY 2004–2005; and SNDA-IV, in SY 2009–2010. Nutrition standards for school meals were the same throughout this period—the SMI standards—and FNS policy was intended to maintain or increase the proportion of schools that met these standards. Thus, it is useful to understand how characteristics of school meals have changed over this period. In this section, we examine trends in the nutrient content of NSLP and SBP meals over time. Our comparisons focus mainly on estimates of average meals *served* and present data for elementary and secondary schools (middle and high schools combined) because these are the breakdowns used in previous published comparisons of data from the SNDA studies.

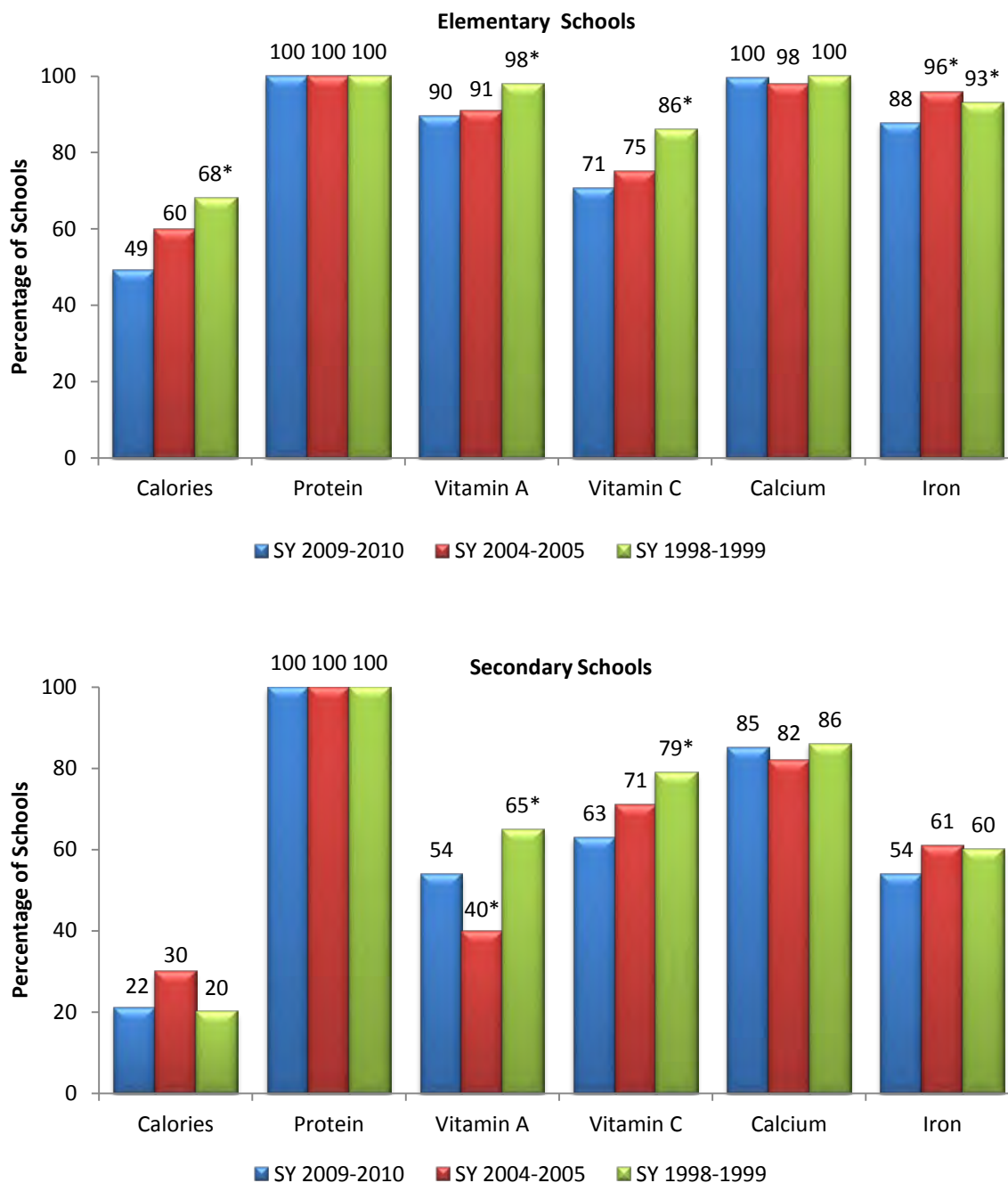
In addition, we present data on selected characteristics of school foodservice operations and school food environments. Most of these comparisons are limited to data from SNDA-III and SNDA-IV because the data elements were either not collected in SNDA-II or the survey questions were not comparable.

Trends in the Nutrient Content of Average NSLP Lunches *Served*

In SYs 2009–2010 and 2004–2005, similar proportions of schools *served* NSLP lunches that met SMI standards for calories and most target nutrients (Figure 9). There were more significant differences between SYs 2009–2010 and 1998–1999.

- There were no statistically significant differences in the proportions of elementary or secondary schools *serving* NSLP lunches that satisfied the SMI standard for calories between SYs 2004–2005 and 2009–2010.
- However, between SYs 1998–1999 and 2009–2010, there was a significant drop in the proportion of elementary schools *serving* NSLP lunches that met the SMI standard for calories (68 versus 49 percent). A parallel drop was not observed among secondary schools.
- At all three points in time, secondary schools were considerably less likely than elementary schools to *serve* lunches that met the SMI standard for calories.
- Compared with SY 2004–2005, NSLP lunches *served* in SY 2009–2010 in both elementary and secondary schools were generally as likely to satisfy the SMI standards for most target nutrients.
- Between SYs 1998–1999 and 2009–2010, there was a significant drop in the proportion of elementary schools *serving* lunches that met the SMI standards for vitamins A and C and iron. The proportion of secondary schools meeting the SMI standards for vitamins A and C also decreased significantly over this period. At both points in time, most schools met the relevant standards; however, the proportions were notably lower for secondary schools.

Figure 9. Percentage of Schools *Serving* National School Lunch Program Lunches that, on Average, Met SMI Standards for Calories and Target Nutrients: SYs 2009–2010, 2004–2005, and 1998–1999



Note: The SMI standards are one-third of the 1989 *Recommended Dietary Allowances*.

* Proportion is significantly different from SY 2009–2010 at the .05 level.

SMI = School Meals Initiative for Healthy Children; SY = school year.

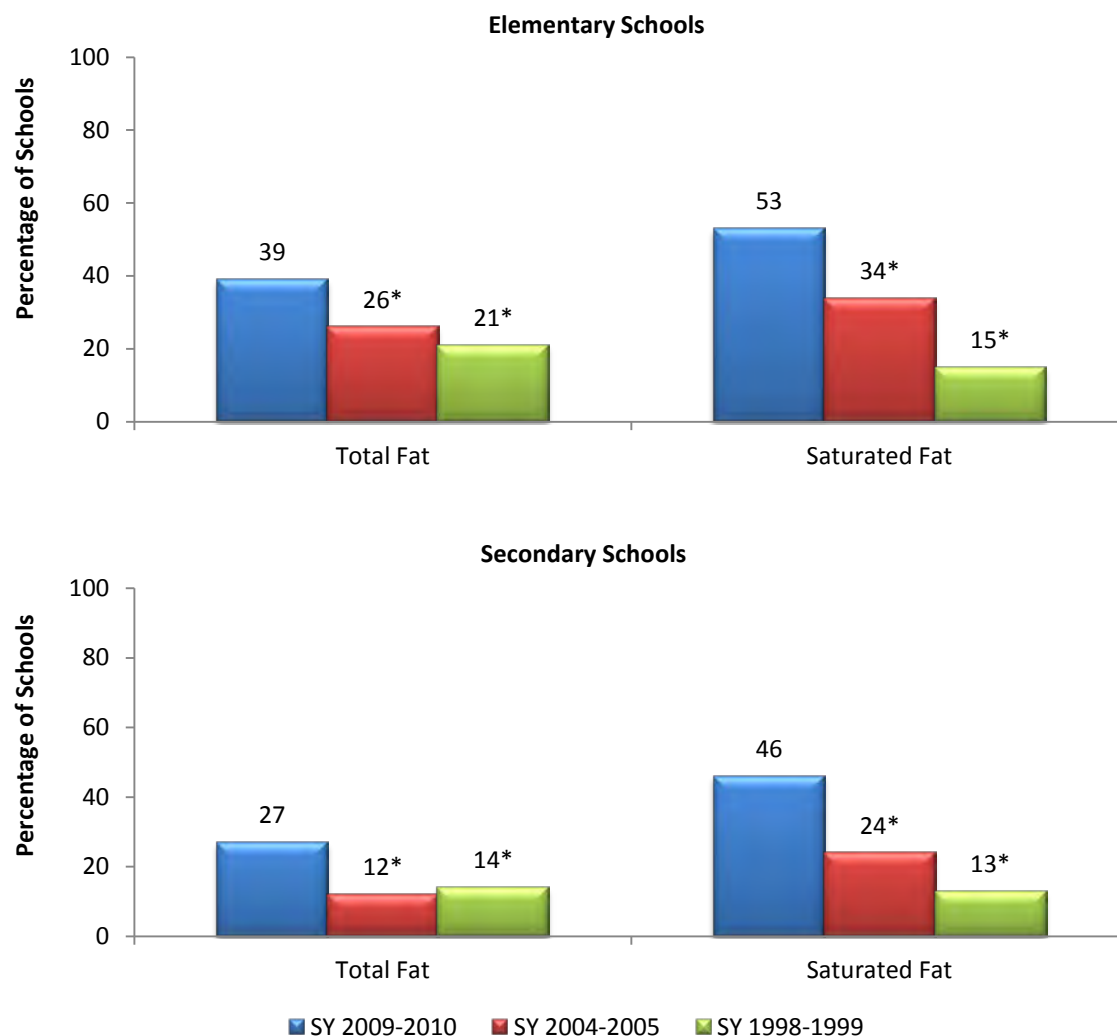
The proportion of schools *serving* NSLP lunches that met SMI standards for total fat and saturated fat has increased significantly since SYs 2004–2005 and 1998–1999 (Figure 10).

- Both elementary and secondary schools have made steady progress in meeting the SMI standards for total fat since SY 1998–1999. Both types of schools were significantly more likely to *serve* average NSLP lunches that met the SMI standard for the percentage of calories from fat in SY 2009–2010 than in SY 2004–2005 or SY 1998–1999.
- Between SYs 2004–2005 and 2009–2010, the proportion of schools meeting the SMI standard for total fat increased by 50 percent among elementary schools (from 26 to 39 percent) and more than doubled among secondary schools (from 12 to 27 percent).
- More than half (53 percent) of elementary schools and nearly half (46 percent) of secondary schools met the SMI standard for saturated fat in SY 2009–2010. This marks an increase of about 20 percentage points since SY 2004–2005 in the proportion of elementary and secondary schools that met the saturated fat standard.

There has been little change over time in the proportions of schools meeting other nutrition standards and recommendations.

- Between SY 2004–2005 and SY 2009–2010, there was no change in the percentage of schools that *served* average NSLP lunches that met *all* of the SMI standards. At both points in time, about 7 percent of all schools *served* such lunches.
- As noted previously, schools were not required to *serve* NSLP lunches that met specific quantitative standards for cholesterol or sodium, but were encouraged to keep levels of these dietary components low in planned menus. The average amount of cholesterol in lunches *served* at all three points in time was well below the benchmark of no more than 100 mg.
- Schools have not made notable progress toward meeting the sodium target over time. At all three points in time, less than 10 percent of elementary or secondary schools *served* lunches with an average sodium content that was within 200 mg of the recommended maximum. High sodium intakes are a problem for most of the U.S. population and meeting recommended levels will require a deliberate adjustment in the sodium content of foods in the marketplace (IOM 2010; USDA and HHS 2010).

Figure 10. Percentage of Schools *Serving* National School Lunch Program Lunches that Met SMI Standards for Total Fat and Saturated Fat: SYs 2009–2010, 2004–2005, and 1998–1999



Note: The SMI standard for total fat is no more than 30 percent of calories. The SMI standard for saturated fat is less than 10 percent of calories.

* Proportion is significantly different from SY 2009–2010 at the .05 level.

SMI = School Meals Initiative for Healthy Children; SY = school year.

Trends in the Nutrient Content of Average SBP Breakfasts *Served*

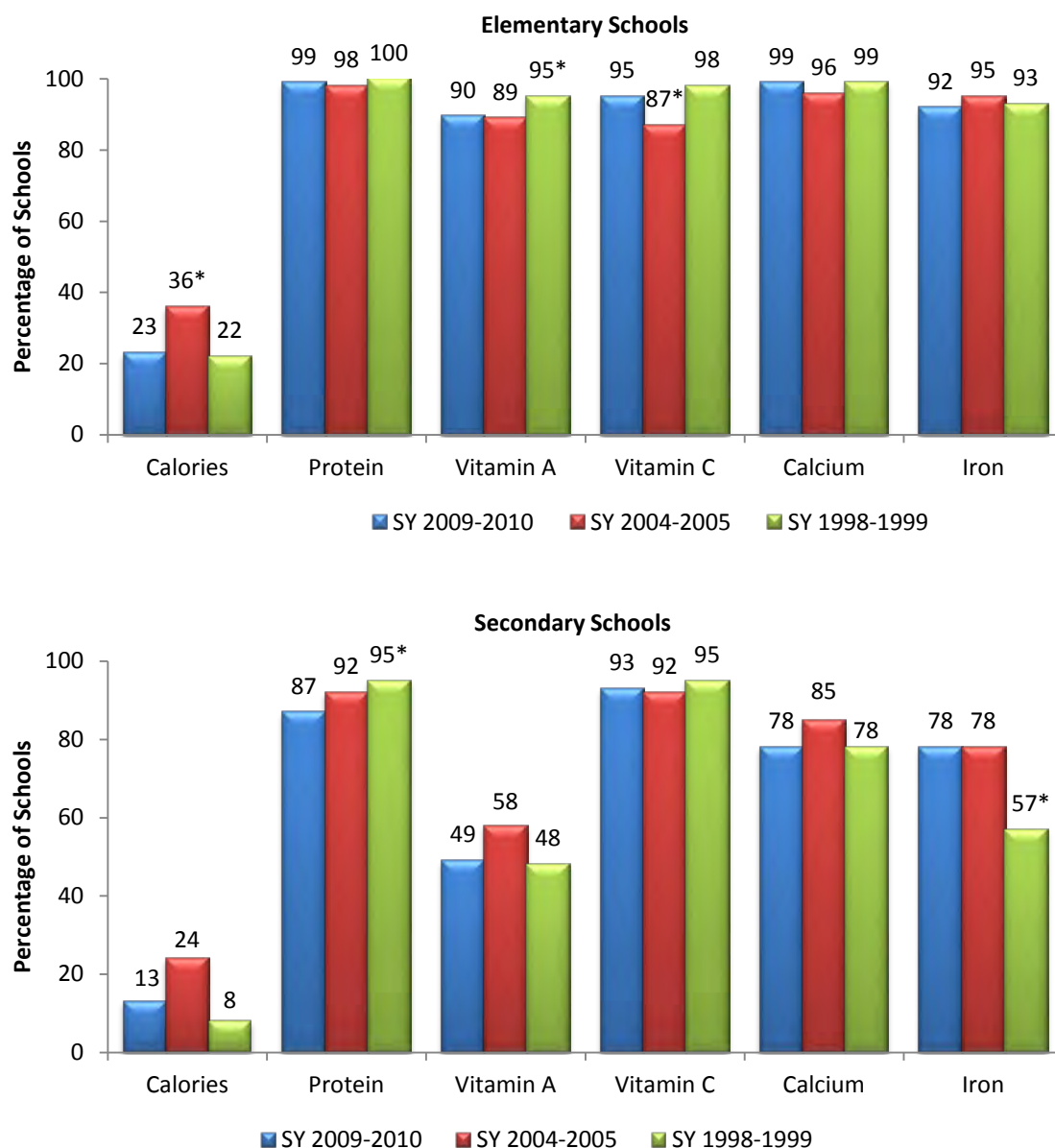
In SYs 2009–2010 and 2004–2005, similar proportions of schools *served* SBP breakfasts that met the SMI standards for target nutrients, but in SY 2009–2010, fewer schools met the SMI standard for calories (Figure 11).

- Significantly fewer elementary schools met the SMI standard for calories in SY 2009–2010 than in SY 2004–2005 (23 versus 36 percent). A parallel drop was noted for secondary schools, but the difference between SY 2009–2010 and SY 2004–2005 was not statistically significant. At all three points in time, secondary schools were considerably less likely than elementary schools to *serve* breakfasts that met the SMI standard for calories.
- Compared with SY 2004–2005, SBP breakfasts *served* in SY 2009–2010 in both elementary and secondary schools were generally as likely to satisfy the SMI standards for protein, vitamins A and C, calcium, and iron.
- Between SY 1998–1999 and SY 2009–2010, there was a significant drop in the proportion of elementary schools *serving* breakfasts that met the SMI standard for vitamin A (95 versus 90 percent).
- Among secondary schools, there was a significant drop in the proportion of schools that met the SMI standard for protein (95 versus 87 percent) and a significant increase in the proportion that met the SMI standard for iron (57 versus 78 percent) between SYs 1998–1999 and 2009–2010.

The percentage of schools *serving* SBP breakfasts that met SMI standards for total fat and saturated fat has increased significantly since SY 1998–1999, but there were few significant increases between SYs 2004–2005 and 2009–2010 (Figure 12).

- As noted for NSLP lunches, both elementary and secondary schools made steady progress over time in meeting the SMI standards for total fat and saturated fat in SBP breakfasts. Differences between school years were less dramatic than those observed for NSLP lunches, however, because breakfasts have always been lower in fat and saturated fat than lunches.
- Between SY 2004–2005 and SY 2009–2010, there was no significant change in the proportion of elementary schools that *served* breakfasts that satisfied the SMI standards for fat and saturated fat or in the proportion of secondary schools that satisfied the SMI standard for saturated fat.
- The proportion of secondary schools that *served* breakfasts that met the SMI standard for total fat increased significantly between SY 2004–2005 and SY 2009–2010 (from 67 to 80 percent).
- Compared with SY 1998–1999, schools in SY 2009–2010 were significantly more likely to *serve* average breakfasts that met the SMI standards for both total fat and saturated fat.

Figure 11. Percentage of Schools *Serving* School Breakfast Program Breakfasts that Satisfied SMI Standards for Calories and Target Nutrients

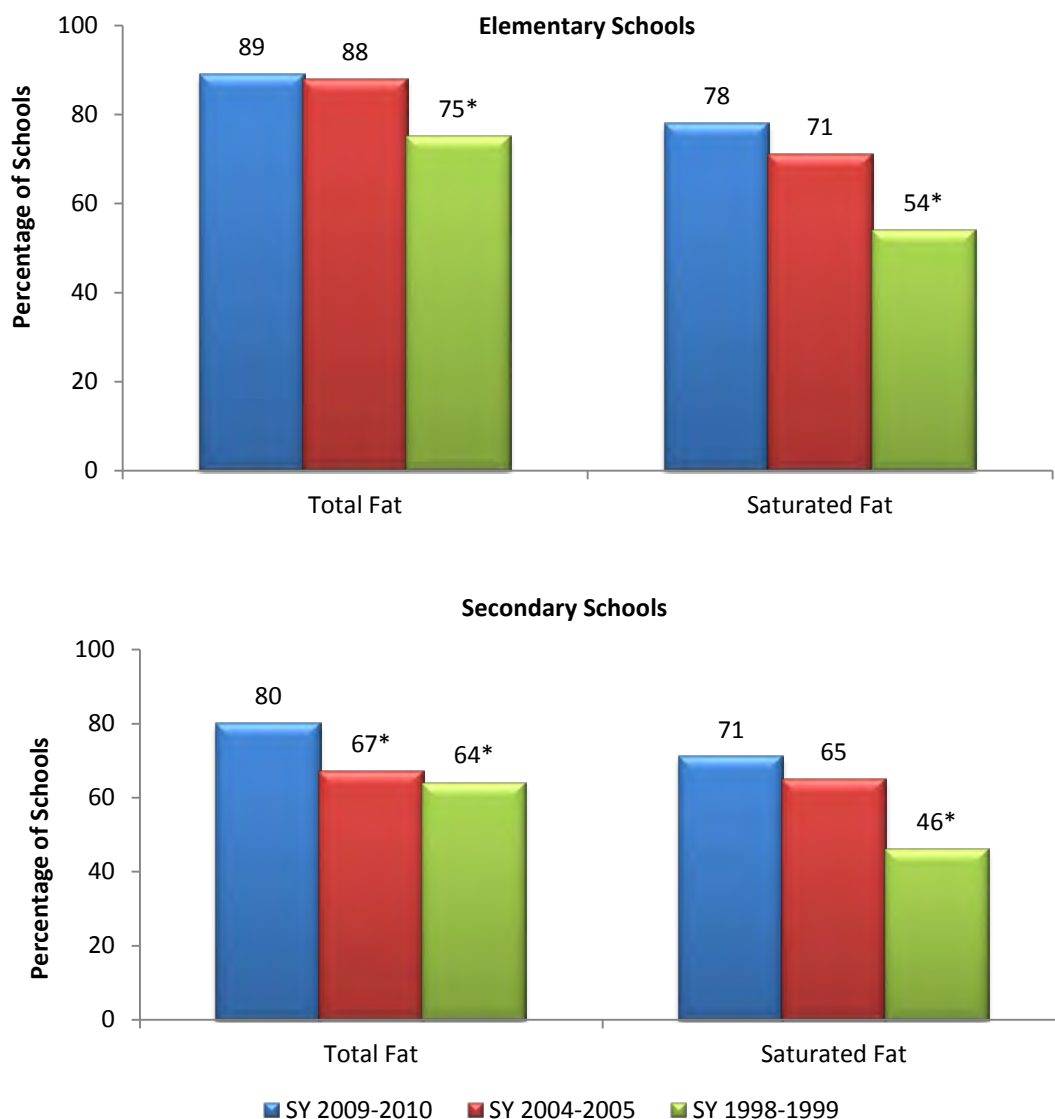


Note: The SMI standards are one-fourth of the 1989 *Recommended Dietary Allowances*.

* Proportion is significantly different from SY 2009–2010 at the .05 level.

SMI = School Meals Initiative for Healthy Children; SY = school year.

Figure 12. Percentage of Schools *Serving* School Breakfast Program Breakfasts that, on Average, Met SMI Standards for Total Fat and Saturated Fat: SYs 2009–2010, 2004–2005, and 1998–1999



Note: The SMI standard for total fat is no more than 30 percent of calories. The SMI standard for saturated fat is less than 10 percent of calories.

* Proportion is significantly different from SY 2009–2010 at the .05 level.

SMI = School Meals Initiative for Healthy Children; SY = school year.

Between SY 2004–2005 and SY 2009–2010, there was a statistically significant drop in the percentage of schools that *served* average SBP breakfasts that met *all* of the SMI standards.

- In SY 2004–2005, 20 percent of schools *served* SBP breakfasts that met all of the SMI standards. In SY 2009–2010, the proportion of schools that *served* SBP breakfasts that met all of the SMI standards was almost 50 percent lower (11 percent). This is consistent with a decrease over this time period in the percentage of schools that met the SMI standard for minimum calories (see Figure 11).

There have been no statistically significant changes over time in the proportion of schools meeting the standards used to assess cholesterol and sodium content of average SBP breakfasts.

- At all three points in time, the majority of schools (76 to more than 90 percent), *served* breakfasts that met the benchmark for cholesterol (one-quarter of the recommended daily maximum).
- At all three points in time, the proportion of schools meeting the standard for sodium has generally been substantially lower than for all other standards except calories. The proportion of schools *serving* SBP breakfast that met the standard for sodium increased by about 10 percentage points between SYs 2004–2005 and 2009–2010; however, this increase was not statistically significant.

Trends in Wellness Policies

- The prevalence of wellness policies has increased sharply since SY 2004–2005 at both the school and district levels. In SY 2004–2005, the proportion of schools reporting a district policy ranged from 14 percent for high schools to 29 percent for elementary schools. By SY 2009–2010, the proportion of schools reporting a district-level wellness policy had increased to 70 percent in high schools and 77 percent of elementary schools. This increase is consistent with the fact that the Child Nutrition and WIC Reauthorization Act of 2004 established a Federal requirement that all school districts participating in the NSLP have a comprehensive wellness policy in place by the start of SY 2006–2007.

Trends in the Availability of Competitive Foods

In both SNDA-III (SY 2004–2005) and SNDA-IV (SY 2009–2010), data on the availability of competitive foods were collected from multiple respondents. FSMs provided information about whether foods and beverages were available for a la carte purchase outside the school meal programs. Principals provided information about the availability of vending machines and school stores. In addition, competitive foods checklists provided information about the availability of vending machines, school stores, and other venues. In SNDA-III, which included on-site data collection for many sampled schools, field interviewers completed these checklists. In SNDA-IV, which did not include on-site data collection, most checklists were completed by a school staff member designated by the principal. In some schools, the school staff member completed the checklists over the telephone.

A la Carte Foods and Beverages

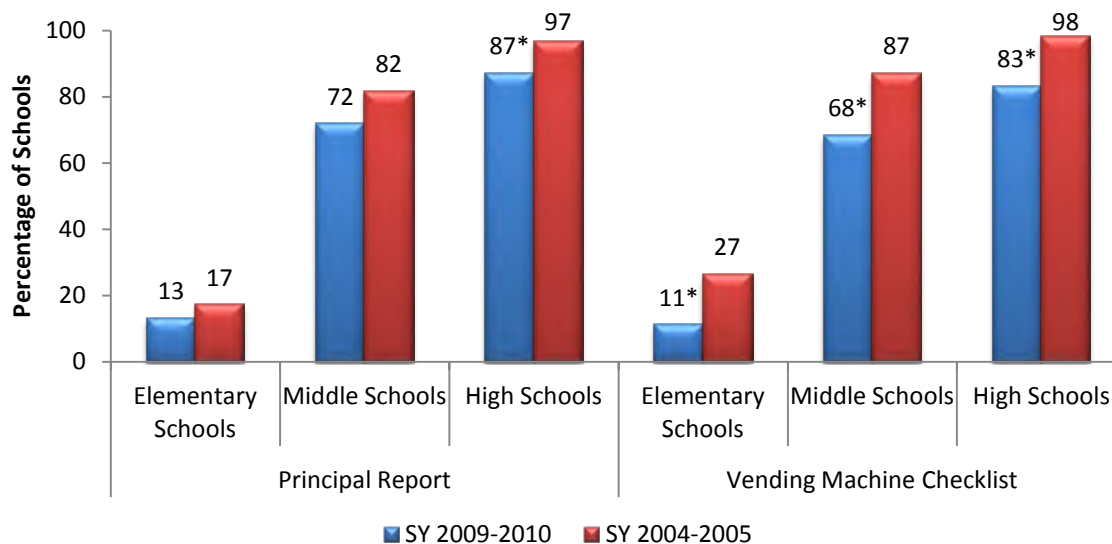
- There was no significant change between SYs 2004–2005 and 2009–2010 in the availability of a la carte foods and beverages. At both points in time, a la carte offerings were available at lunch in more than three-quarters of elementary schools and about 90 percent or more of middle and high schools. Fewer schools offered a la carte options at breakfast, and the percentage that did so remained relatively constant over time in elementary and middle schools.

Vending Machines (Figure 13)

- Findings about changes in the availability of vending machines between SYs 2004–2005 and 2009–2010 vary by data source. According to the vending machine checklists, significantly fewer schools had vending machines available in SY 2009–2010 than in SY 2004–2005. This was true for elementary, middle, and high schools alike and the decrease between the two periods ranged from 15 to 19 percentage points.
- In contrast, data from the principal surveys show a significant decrease in the availability of vending machines only among high schools—from 97 percent of high schools in SY 2005–2006 to 87 percent of high schools in SY 2009–2010.
- In both SNDA-III and SNDA-IV, there were discrepancies between estimates of the percentage of schools with vending machines based on principal surveys and the vending machine checklists. In SNDA-III, estimates based on the checklist were consistently higher than estimates based on the principal survey. The difference ranged from 1 to 10 percentage points across school types and was greatest for elementary schools (for example 27 versus 17 percent for the SNDA-III [SY 2004–2005] estimates of the availability of vending machines in elementary schools, based on the vending machine checklist and principal survey, respectively). In SNDA-IV, discrepancies between the two data sources were smaller (2 to 4 percentage points) and the pattern of differences was reversed, with estimates based on the checklist being slightly but consistently lower than estimates based on the principal survey.
- It is likely that the different data collection approaches used for the checklists in SNDA-III and SNDA-IV (field interviewers versus principal designees) contributed to the differences observed at the two points in time. At the time this report was prepared, we were unable to locate any corroborating evidence that the presence of vending machines decreased in the nation's schools between SY 2004–2005 and SY 2009–2010 as dramatically as the vending machine checklist data would suggest. Thus, findings based on the comparison of data from the vending machine checklists should be interpreted with great caution. On balance, we favor findings from the principal surveys.

School Stores and Snack Bars

- There was no significant change in the reported availability of school stores and snack bars between SYs 2004–2005 and 2009–2010.
- At both points in time, school stores and snack bars were less commonly available than either a la carte foods and beverages or vending machines. Based on principals' reports, school stores that sold food or beverages were available in less than 10 percent of elementary schools, less than 20 percent of middle schools, and about one-quarter of high schools.
- Snack bars were even less common—reportedly available in 1 to 2 percent of elementary schools, 2 to 5 percent of middle schools, and about 10 percent of high schools at both points in time.

Figure 13. Percentage of Schools with Vending Machines Available to Students: SYs 2009–2010 and 2004–2005

* Proportion is significantly different from SY 2009–2010 at the .05 level.

SY = school year.

Bans or Restrictions on Competitive Foods

- Data from the SFA director surveys in SNDA-III and SNDA-IV indicate a dramatic increase between SYs 2004–2005 and 2009–2010 in the percentage of districts that have district-wide bans or restrictions that govern the availability of sweetened beverages or other foods/snack items on school grounds.
- In SY 2004–2005, only 6 and 10 percent of SFA directors reported a district-wide ban or restriction on sweetened beverages or other foods/snack items, respectively. In SY 2009–2010, the percentage of SFA directors that reported a district-wide ban or restriction on sweetened beverages was about nine times higher (53 percent), and the percentage reporting a district-wide ban or restriction related to snack items was about 4.5 times higher (46 percent).⁹ Both of these differences were statistically significant.
- These findings are consistent with the fact that school districts participating in the NSLP were required to have comprehensive district-level wellness policies by the beginning of SY 2006–2007.

⁹ Restrictions or bans might have affected the contents of vending machines rather than the availability of vending machines.

I. Schools Participating in the HealthierUS School Challenge

HUSSC was established in 2004 to recognize schools that are creating healthier school environments through their promotion of good nutrition and physical activity. HUSSC is designed to build upon USDA's Team Nutrition initiative, which provides schools with nutrition education materials for children, families, and educators; technical assistance materials for foodservice directors, managers, and staff; and materials to build school and community support for healthy eating and physical activity. The chance to be recognized as a HUSSC school provides an incentive for schools to take increasingly bold steps to address the problems of childhood overweight and obesity.

Participation in HUSSC is voluntary. To be certified as part of HUSSC, a school must enroll in Team Nutrition and submit a formal application. Schools must verify that they meet HUSSC criteria for lunch menu-planning practices and nutrient content that are more stringent than the standards that other schools must meet.¹⁰ HUSSC schools must also have a local school wellness policy that supports the HUSSC initiative and affirms that schools play a critical role in promoting student health and preventing obesity. HUSSC schools are certified for a period of four years and make a commitment to meet or exceed the HUSSC criteria for that four-year period. Schools can reapply at the end of each certification period. A separately funded substudy in SNDA-IV collected information from a small sample of HUSSC schools. The goal of the substudy was to provide a snapshot of how HUSSC schools were doing, relative to other schools, in meeting the SMI standards and in implementing wellness policies.

Sample Design for the HUSSC Substudy

The HUSSC substudy used a non-random sample of HUSSC schools. The number of schools participating in the program at the time SNDA-IV data were collected (SY 2009–2010) was relatively small and was not nationally representative of all schools participating in the NSLP. Because the vast majority of schools that participated in HUSSC at that time were elementary schools, the sample for the HUSSC substudy was limited to public elementary schools.

The sampling frame was a file provided by FNS, which included information for all public elementary schools certified as HUSSC schools for SY 2009–2010. A non-random sample of 36 HUSSC schools was selected (from a list of 375 eligible schools) and was stratified by State, community type, enrollment, and grade span. Schools that were already part of the main SNDA-IV sample were excluded and only one HUSSC school per SFA was selected. The resulting sample of HUSSC schools provided broad representation across FNS regions and variation across schools in community type, size (enrollment), and grade span. Findings from this purposeful sample are not formally representative of all public elementary schools participating in HUSSC in SY 2009–2010. However, the fact that the sample of 36 schools represented 9.7 percent of the eligible population of HUSSC schools (a relatively large proportion of the population in sampling terms) lends face validity to the findings as a snapshot of HUSSC elementary schools in SY 2009–2010.

¹⁰ The HUSSC certification criteria in place during SY 2009–2010 are summarized in Appendix L. Certification criteria were updated and expanded on July 1, 2012. At that time, specific criteria related to breakfast menu-planning practices and nutrient content were added.

Sample Sizes and Data Sources

Of the 36 sampled HUSC schools, 31 were successfully recruited into the study. The data collected for HUSC schools was identical to data collected for the main SNDA-IV sample. The final sample of HUSC schools includes four elementary schools from the main SNDA-IV sample that were certified HUSC schools in SY 2009–2010 (according to the list of HUSC schools provided by FNS), for a total of 35 schools.

The methods used to analyze data for the HUSC schools were identical to the methods used in the main SNDA-IV analyses. The findings provide a snapshot of HUSC elementary schools in SY 2009–2010 and insights about how HUSC schools compared with all elementary schools nationwide.

Key Findings for HUSC Elementary Schools

NSLP Lunches

- For both NSLP lunches *offered* and *served*, a larger share of HUSC elementary schools met the SMI standards for calories, vitamin C, and iron, on average, than elementary schools nationwide. This was also true for vitamin A in lunches *served*.
- For both NSLP lunches *offered* and *served*, a larger share of HUSC elementary schools met SMI and 2010 *Dietary Guidelines* standards for total fat and saturated fat, on average, than elementary schools nationwide.
- HUSC elementary schools did a better job than elementary schools nationwide in *offering* average NSLP lunches that met *all* of the SMI standards. Forty percent of HUSC elementary schools *offered* average NSLP lunches that met *all* of the SMI standards, compared with 17 percent of all elementary schools nationwide. A comparable pattern was noted for the average NSLP lunch *served*. However, few elementary schools in either group *served* average NSLP lunches that met *all* of the SMI standards (14 percent of HUSC elementary schools and 9 percent of elementary schools overall).
- The proportion of daily lunch menus in HUSC schools that included unflavored 1% milk was notably larger than the proportion in elementary schools nationwide (90 versus 74 percent) and the proportion that included unflavored 2% milk was notably lower (9 versus 28 percent).
- Daily lunch menus in HUSC schools were also more likely to include skim milk, compared with lunch menus in elementary schools nationwide (54 versus 47 percent for unflavored skim milk, and 45 versus 39 percent for flavored skim milk). This pattern of findings likely reflects the fact that one of the criteria for HUSC certification in SY 2009–2010 was that schools offer only 1% and fat-free milks.
- Raw vegetables were more commonly offered in HUSC schools than elementary schools nationwide (63 percent of daily lunch menus versus 57 percent). Differences between HUSC schools and elementary schools nationwide in the types of vegetables offered were relatively modest but were consistent with HUSC criteria requiring that dark green or orange vegetables be offered three times per week and legumes be offered at least once per week.

- More than 8 of 10 lunch menus in HUSSC schools (82 percent) included fresh fruit, compared with more than half (56 percent) of lunch menus in elementary schools nationwide. Fewer than 1 in 5 lunch menus in HUSSC schools (18 percent) included 100% fruit juice, compared with more than one-quarter (26 percent) of lunch menus in elementary schools nationwide. Both of these findings are consistent with HUSSC criteria that required fresh fruit at least once per week (two days per week for the highest-level HUSSC awards) and limited 100% juice to once per week.

SBP Breakfasts

- There were relatively few differences between HUSSC elementary schools and elementary schools nationwide in the proportion of schools meeting SMI standards for target nutrients in SBP breakfasts. This is not surprising, given that the HUSSC certification criteria in place during SY 2009–2010 did not address breakfasts. Moreover, on average, more than 90 percent of HUSSC elementary schools and all elementary schools nationwide met the SMI standards for all target nutrients for breakfasts *offered* and breakfasts *served*.
- Among HUSSC elementary schools, only 9 percent met the SMI standard for calories for the average SBP breakfast *offered*. The proportion of schools that met this standard was more than double for elementary schools nationwide, but was still quite low (24 percent). The disparity between HUSSC elementary schools and elementary schools nationwide in the proportion of schools meeting the SMI standard for calories was smaller for the average SBP breakfast *served* (17 versus 23 percent).
- For SBP breakfasts *offered* and *served*, the majority of both HUSSC elementary schools and elementary schools nationwide met SMI standards for total fat and saturated fat.
- Relatively few elementary schools in either group *offered* or *served* average SBP breakfasts that met *all* of the SMI standards. For the average SBP breakfast *offered*, fewer HUSSC elementary schools met all of the SMI standards than elementary schools nationwide (6 versus 19 percent). However, this difference evened out (14 versus 15 percent) in the average SBP breakfast *served*, which reflects students' food selections. The SMI standard that posed the greatest challenge for both HUSSC elementary schools and all elementary schools nationwide was the standard for minimum calories.
- Only about one-quarter of HUSSC elementary schools and an equivalent share of elementary schools nationwide met the 2010 *Dietary Guidelines* recommendation for total fat for the average SBP breakfast *offered*. Schools that did not meet the 2010 *Dietary Guidelines* recommendation *offered* average SBP breakfasts that were low in fat, relative to this standard.
- More schools in both groups met this recommendation for the average SBP breakfast *served*, which indicates that students tended to select higher-fat breakfast items (which increased the average percentage of calories from fat). More HUSSC elementary schools met the 2010 *Dietary Guidelines* recommendation for total fat in breakfasts *served* than elementary schools nationwide (46 versus 33 percent).

CHAPTER 1

INTRODUCTION

The National School Lunch Program (NSLP) and the School Breakfast Program (SBP) provide meals to children during the school year. Schools participating in the NSLP may also provide snacks to children participating in eligible afterschool programs. The overarching goal of both programs, known collectively as the school meal programs, is to ensure that children do not go hungry and have access to nutritious meals and snacks that support normal growth and development. Any child in a participating school or afterschool program is eligible to obtain meals and snacks. The programs provide a safety net for children from low-income families, who are eligible to receive meals and snacks free or at a reduced price. Over the past two decades, program administrators at the Federal, State, and local levels have worked with school foodservice professionals to enhance the nutritional quality of school meals. The goal is to bring school meals into better alignment with the dietary practices recommended in the *Dietary Guidelines for Americans* (U.S. Department of Agriculture and U.S. Department of Health and Human Services [HHS] 2010).

The U.S. Department of Agriculture (USDA), which administers the school meal programs, has assessed the programs on a periodic basis since the 1980s. Findings from these assessments have provided policymakers with useful information that has fueled important program improvements. For example, the first School Nutrition Dietary Assessment Study (SNDA-I), completed in school year (SY) 1991–1992, found that levels of fat, saturated fat, and sodium in school lunches were not consistent with the *Dietary Guidelines* (Burghardt et al. 1993).¹ In response, USDA launched the School Meals Initiative for Healthy Children (SMI), a multifaceted initiative that established new nutrition standards for school meals, revised the approaches used to plan school menus, and provided training and technical assistance for school foodservice operators. Most recently, the Institute of Medicine (IOM), at USDA's request, used data from the third SNDA study (SNDA-III) (Gordon et al. 2007) to help develop recommendations for updating the nutrient- and food-based requirements that govern school meals (IOM 2010).

This report presents findings from the fourth SNDA study (SNDA-IV), which Mathematica Policy Research conducted under contract with USDA's Food and Nutrition Service (FNS). The study builds on the methods used in the three previous SNDA studies and, thus, allows some examination of trends over time. The report presents information about the foods offered and served in school meals during SY 2009–2010 and their nutrient content. It also presents information about important aspects of the food environment in the nation's schools, including the availability of competitive foods—foods sold in schools that are not part of a school meal, the content and implementation of school wellness policies, and practices related to food safety. Finally, the report presents data on three topics that previous SNDA studies have not addressed: (1) the potential contribution of school meals to recommended dietary patterns, (2) the food and nutrient content of afterschool snacks, and (3) characteristics of schools that participate in USDA's HealthierUS School

¹ SNDA-I was preceded by the National Evaluation of School Nutrition Programs (NESNP), which was conducted in SY 1980–1981 (Wellisch et al. 1983). NESNP data were subsequently analyzed by Devaney and Fraker (1989), who reexamined the nutrient content of SBP breakfasts, and Fraker (1987), who examined the sodium and macronutrient content of school meals.

Challenge (HUSSC) initiative and the food and nutrient content of meals offered and served in these schools.

A. Overview of the School Meal Programs

All public and private nonprofit schools are eligible to participate in the school meal programs.² Any child in a participating school or afterschool program is eligible to obtain school meals or afterschool snacks, and students from low-income households are eligible to receive meals and snacks free or at a reduced price.

The NSLP is the second largest of 15 nutrition assistance programs administered by FNS. Established in 1946, the NSLP operates in virtually all public schools and 94 percent of all schools (public and private combined) in the United States (Ralston et al. 2008). On an average school day in fiscal year (FY) 2010, the program served lunches to 31.7 million children.³ Sixty-five percent of these lunches were served free or at a reduced price to children from low-income households. Since 1998, schools participating in the NSLP have had the option to provide snacks to children in eligible afterschool programs. In FY 2010, 1.3 million afterschool snacks were served through the NSLP on an average school day.⁴

The SBP began as a pilot program in 1966 and was made permanent in 1975. Over the years, the program has steadily expanded. In SY 2009–2010, the SBP was available in 89 percent of all public schools that operate the NSLP (see Chapter 2, Table 2.1). On an average school day in FY 2010, the program served breakfasts to 11.7 million children.³ The SBP primarily serves children from low-income households—in FY 2010, 84 percent of SBP meals were served free or at a reduced price.

The school meal programs are administered at the local level by State Child Nutrition (CN) agencies and School Food Authorities (SFAs), which usually are individual school districts or small groups of districts. Key responsibilities of State CN agencies include conveying Federal requirements to SFAs, serving as conduits for funding, and monitoring SFAs for compliance with established regulations. Individual SFAs are responsible for offering meals that meet daily requirements for types and amounts of food and/or weekly requirements for average nutrient content. SFAs are also responsible for establishing children's eligibility for free and reduced-price meals and snacks. Children from families with household incomes at or below 130 percent of the Federal poverty threshold are eligible to receive free meals and snacks (\$28,665 for a family of four in SY 2009–2010); those from households with incomes between 130 and 185 percent of the

² Public or licensed residential child care institutions (RCCIs) are also eligible to participate in the NSLP and SBP. RCCIs are not included in the SNDA studies.

³ All FY 2010 statistics reported for the NSLP and SBP were obtained from national-level annual summary tables generated by FNS's Program Reports, Analysis and Monitoring Branch. These tables are available at <http://www.fns.usda.gov/pd/cnpmain.htm>. Accessed July 2, 2012. Data are subject to revision.

⁴ Source: "May 2011 Program Information Report." Available at <http://www.fns.usda.gov/fns/data.htm>. Accessed July 2, 2012. Data are subject to revision.

Federal poverty level (\$40,793 for a family of four in SY 2009–2010) are eligible to receive meals and snacks at a reduced price.⁵

Eligibility for free and reduced-price meal benefits can be established through an application process, usually at the beginning of the school year, or through direct certification processes, which establish adjunctive eligibility based on households' participation in other means-tested Federal programs, such as the Supplemental Nutrition Assistance Program (SNAP) or the Medicaid program. Federal regulations set a maximum price for reduced-price meals (\$0.40 for lunch and \$0.30 for breakfast in SY 2009–2010) that is well below the rate typically paid by students who are not eligible for reduced-price meal benefits.

SFAs that participate in the NSLP and SBP receive two types of Federal assistance: cash reimbursements and donated USDA Foods (formerly known as commodity foods). SFAs receive a cash reimbursement for each meal and snack served, with substantially higher rates paid for meals served free or at a reduced price to income-eligible students. SFAs that serve high proportions of low-income children are eligible to receive higher levels of reimbursement. Reimbursement rates in effect during SY 2009–2010 are shown in Table 1.1.

Table 1.1. SY 2009–2010 Reimbursement Rates for School Meals and Snacks

Meal/Poverty Level of School	Free Meals/Snacks	Reduced-Price Meals/Snacks	Paid Meals/Snacks
National School Lunch Program Lunches			
Schools with less than 60 percent meals served free or at a reduced price	\$2.68	\$2.28	\$0.25
Schools with 60 percent or more of meals served free or at a reduced price	\$2.70	\$2.30	\$0.27
School Breakfast Program Breakfasts			
Schools with less than 40 percent of meals served free or at a reduced price	\$1.46	\$1.16	\$0.26
Schools with 40 percent or more of meals served free or at a reduced price	\$1.74	\$1.44	\$0.26
Afterschool Snacks			
All schools	\$0.74	\$0.37	\$0.06

Source: "National School Lunch, Special Milk, and School Breakfast Programs, National Average Payments/Maximum Reimbursement Rates." *Federal Register*, vol. 74, no. 134, July 15, 2009, p. 34304. Available at <http://www.fns.usda.gov/cnd/Governance/notices/naps/NAPs09-10.pdf>. Accessed January 25, 2012.

Note: Reimbursement rates were higher for Alaska and Hawaii.

SY = school year.

⁵ Income eligibility differs for households of different sizes and for Alaska and Hawaii. See Appendix Table A.1 for a complete summary of income eligibility guidelines in effect during SY 2009–2010.

The value of each SFA's entitlement to donated USDA Foods is based on an established per-meal flat rate, which is applied to the number of reimbursable lunches served the preceding school year (USDA, FNS, May 2010). Subject to availability, SFAs may also be offered bonus USDA Foods in amounts that can be used without waste. The types and amounts of bonus USDA Foods available vary from year to year based on agricultural surpluses and purchasing decisions made by USDA.

1. Nutrition Standards for School Meals

To be eligible for Federal reimbursement, meals served in the NSLP and SBP must meet defined nutrition standards. The nutrition standards in place during SY 2009–2010 were implemented in 1995 as part of the SMI and are referred to as the SMI nutrition standards. The SMI standards (Table 1.2) were based on the 1995 *Dietary Guidelines* and required that meals provide no more than 30 percent of calories from fat and less than 10 percent of calories from saturated fat. The SMI standards also established the requirement that breakfasts provide 25 percent of the 1989 *Recommended Dietary Allowances* (RDAs) for energy (calories), protein, vitamins A and C, calcium, and iron (before the SMI, there were no quantitative nutrition standards for the SBP), and retained an existing requirement that lunches provide 33 percent of the RDAs.⁶ Finally, the SMI standards encouraged SFAs to reduce levels of sodium and cholesterol in school meals and to increase availability of fiber, without setting quantitative targets.

Table 1.2. School Meals Initiative Nutrition Standards

Nutrient	Standard/Recommendation	
	NSLP Lunches	SBP Breakfasts
Based on 1989 (RDAs)^a		
Food energy (calories)	One-third of the REA	One-fourth of the REA
Protein, vitamins A and C, calcium, iron	One-third of the RDA	One-fourth of the RDA
Based on 1995 <i>Dietary Guidelines</i> for Americans^b		
Total fat	No more than 30 percent of calories	
Saturated fat	Less than 10 percent of calories	

^a National Research Council (1989).

^b U.S. Department of Agriculture and U.S. Department of Health and Human Services (1995).

NSLP = National School Lunch Program; RDA = *Recommended Dietary Allowances*; REA = *Recommended Energy Allowance*; SBP = School Breakfast Program.

Nutrition standards for school meals were recently revised to reflect the most current nutrition guidance provided by the *Dietary Guidelines* (USDA and HHS 2010), as well as updated information about nutrient requirements included in the *Dietary Reference Intakes* (DRIs) (IOM 2006), which replaced the 1989 RDAs. The revised standards are based on recommendations included in the IOM (2010) report “School Meals: Building Blocks for Healthy Children.” The IOM recommendations, which were designed to increase alignment of school meals with the *Dietary Guidelines*, called for increasing fruits, vegetables, and whole grains in school meals; limiting milk to fat-free or low-fat

⁶ The RDAs that were in effect at the time the SMI standards were implemented were developed in 1989 (National Research Council 1989).

varieties; substantially reducing the sodium content of school meals over time; controlling saturated fat and calorie levels; and eliminating trans fat while satisfying children's nutrient requirements (IOM 2010). In January 2011, USDA issued a proposed rule for new nutrition standards for school meals, based on the IOM recommendations.⁷ After a period of public comment, the updated and final rule was issued in January 2012.⁸ The final rule requires that schools begin implementing the new requirements in SY 2012–2013.

All of the analyses presented in this report refer to the SMI standards because these are the standards that were in place during SY 2009–2010, when data were collected. To provide additional insights about the nutritional quality of school meals, the average nutrient content of schools meals was also compared with 2010 *Dietary Guidelines* recommendations for total fat, sodium, cholesterol, and dietary fiber.

2. Menu-Planning Options

In SY 2009–2010, SFAs participating in the NSLP and SBP had five options for planning menus to meet the SMI nutrition standards:

1. **Traditional food-based menu planning.** This menu-planning system identified food groups (or meal components) that must be included in the meal, as well as minimum acceptable serving sizes for children in different grades. For example, lunches were required to include milk (as a beverage), meat or meat alternate, bread or other grain product, and two servings of fruit and/or vegetables.
2. **Enhanced food-based menu planning.** This system was similar to the traditional food-based system but required more servings of bread or grain products over the course of a week and larger servings of fruit and vegetables.
3. **Nutrient standard menu planning (NSMP).** NSMP required that SFAs use one of several USDA-approved computerized nutrient analysis systems to plan menus. The only food-based menu planning requirements imposed under NSMP, for lunch, were 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 were free to use whatever portions and combinations of foods they wished to meet the nutrition standards. Thus, in theory, NSMP provided more flexibility in menu planning than the two food-based systems while providing a greater degree of assurance that meals met nutrition standards.
4. **Assisted nutrient standard menu planning (ANSMP).** ANSMP was similar to NSMP, but it allowed SFAs to arrange for external sources to assist with menu planning and/or nutrient analysis.
5. **Other reasonable approaches.** Schools could use any other reasonable approach to plan menus, as long as the menus met the nutrition standards. State agencies could

⁷ *Federal Register*, vol. 76, no. 9, Thursday, January 13, 2011, Proposed Rules.

⁸ *Federal Register*, vol. 77, no. 17, Thursday, January 26, 2012, Rules and Regulations.

establish guidelines for using a modified approach to menu planning and could require that SFAs receive prior approval before implementing such a system.

SFAs that elected to use either of the food-based menu-planning systems or an alternative approach to menu planning were not required to analyze the nutrient content of planned menus. They were, however, expected to offer and serve meals that met the SMI nutrition standards.⁹ All SFAs were required to undergo a mandatory SMI review every five years. As part of this process, State agency staff analyzed a representative weekly menu.

Under the new rules that took effect in SY 2012–2013, all SFAs must use a single food-based approach to menu planning.¹⁰ State agencies will monitor SFAs on a three-year cycle. States will conduct a thorough review of a representative weekly menu to assess compliance with the standard for trans fat and all food-based requirements. They will also conduct a nutrient analysis to assess compliance with standards for calories, saturated fat, and sodium.

3. Afterschool Snacks

Since 1998, schools that participate in the NSLP have been eligible to receive cash reimbursement for snacks served in afterschool programs. To be eligible for Federal reimbursement, snacks must be provided in afterschool programs that provide children with regularly scheduled educational or enrichment activities in a supervised environment. In addition, snacks must meet specific food-based requirements and must be served free or at a reduced price to children from low-income families.

Eligibility for free and reduced-price snacks can be based on determinations made for the NSLP (via application or direct certification) or on area eligibility. An afterschool program site is considered area-eligible if it is located at a school or in a catchment area in which at least 50 percent of the enrolled children are eligible for free or reduced-price meals. All snacks served in area-eligible afterschool programs are served free of charge and SFAs receive the free level of cash reimbursement (Table 1.1).

SNDA-IV is the first study to collect data from a national sample of schools providing reimbursable afterschool snacks. Findings about the foods and beverages offered in afterschool snacks and their nutrient and food group content are presented in Chapter 10.

4. The HealthierUS School Challenge

HUSSC, established in 2004, recognizes schools that are creating healthier school environments through promotion of good nutrition and physical activity. HUSSC is a voluntary initiative that is designed to build on USDA's Team Nutrition (TN) initiative, which provides schools with nutrition education materials for children, families and educators; technical assistance materials for foodservice directors, managers and staff; and materials to build school and community support for healthy eating and physical activity. To be certified as part of HUSSC, schools must submit a formal

⁹ Details about the specific requirements of each menu planning approach are provided in Appendix A.

¹⁰ *Federal Register*, vol. 77, no. 17, Thursday, January 26, 2012, Rules and Regulations.

application. Schools that receive HUSC awards must be enrolled in TN, have completed an SMI review within the past five years, and implemented all corrective actions (if any). Schools are also required to have a local (district-level) wellness policy and to meet or exceed established HUSC criteria in the following areas: (1) average daily student participation in the NSLP; (2) daily and weekly lunch offerings of fruits and vegetables, whole grains, and low-fat or fat-free milk; (3) student access to competitive foods; (4) calorie and nutrient content of competitive foods (including foods sold as part of fund-raising activities);¹¹ (5) nutrition education; and (6) physical education/activity.¹²

Schools that receive HUSC awards commit to meeting these criteria throughout a four-year certification period. Four award levels are available—Bronze, Silver, Gold, and Gold with Distinction. Higher-level awards are associated with more stringent qualifying criteria. Beginning in 2009, monetary incentives were provided to HUSC schools, ranging from \$500 for the Bronze award to \$2,000 for the Gold with Distinction award.¹³

A separately funded substudy in SNDA-IV collected information from a purposeful sample of HUSC schools to provide preliminary information about how HUSC schools are doing, relative to other schools, in meeting the SMI standards and in implementing wellness policies. Findings from the HUSC substudy are presented in Chapter 12.

B. Policy Context for the Study

Public interest in the nutritional quality of school meals is at an all-time high, at least partially fueled by concerns about the prevalence of childhood obesity. For example, First Lady Michelle Obama established the *Let's Move!* initiative, with the goal of eliminating childhood obesity in a generation.¹⁴ Healthy eating is a major focus of the initiative—it promotes HUSC as well as the “Chefs Move to Schools” program, which matches schools with local chefs to incorporate healthy recipes and food preparation techniques into school meals.

The availability of competitive foods in schools has also received a great deal of scrutiny in recent years. The widespread availability of competitive foods has been well documented (Gordon et al. 2007; Fox et al. 2009a; O'Toole et al. 2007). Many observers have reasoned that competitive foods—many of which are high in calories and fat and low in nutrients—could be contributing to childhood obesity.

In response to concerns about the collective school food environment, the Child Nutrition and WIC Reauthorization Act of 2004 (PL 108-265) required that all SFAs participating in the school meal programs implement school wellness policies by the beginning of SY 2006–2007. These policies were to set goals for nutrition education and physical activity and to establish nutrition

¹¹ Nutrition standards for competitive foods are based on recommendations made in an IOM report (2007).

¹² The HUSC criteria in effect during SY 2009–2010 are summarized in Appendix L. HUSC criteria were updated in July 2012 to reflect the revised meal requirements that took effect in SY 2012–2013.

¹³ “HealthierUS School Challenge—Monetary Incentives.” USDA Memo to State CN Directors. Available at http://www.fns.usda.gov/tn/healthierus/husc_incentives.pdf. Accessed February 17, 2012.

¹⁴ Appendix A includes a *Let's Move!* fact sheet. The fact sheet was downloaded from <http://www.letsmove.gov> on February 16, 2012.

guidelines for all foods available on school campuses, including competitive foods. The Healthy Hunger-Free Kids Act of 2010 (PL 111-296) included provisions to strengthen school wellness policies and provided USDA with the authority to establish nutrition standards for *all* foods sold on school campuses during the school day.

SNDA-IV provides information about the status of school meal programs in SY 2009–2010. As such, it provides the most comprehensive and up-to-date national data about the nutritional quality of school meals and other aspects of the school food environment.¹⁵ It also provides information about other important issues related to the school meal programs, including participation—particularly whether children from low-income households are participating in the programs and how prices charged for paid meals might affect participation among other students—and food safety. This information provides useful insights into how school meals and school food environments have changed since the SNDA-III study, which was conducted in SY 2004–2005—before the requirement that all SFAs implement a school wellness policy. It also provides information about how school meals and school food environments have changed in the almost two decades since the first SNDA study was conducted. In addition, the SNDA-IV data provide an important baseline against which future changes in the school meal programs can be measured. As noted previously, major revisions to the standards that govern the food and nutrient content of school meals will begin to be implemented in SY 2012–2013.

C. Design of the SNDA-IV Study

1. Research Questions

The overarching objective of the SNDA-IV study is to describe the school meal programs and the schools in which they operate. The study addresses a broad array of research questions that are of interest to stakeholders at the national, State, and local levels. These research questions fall into three basic categories:

1. What are the characteristics of schools and SFAs participating in the NSLP and SBP, particularly as they relate to meal service operations and food and physical activity environments?
2. What are the characteristics of meals and snacks *offered* and *served* to students?
3. How have characteristics of meals *offered* and *served* to students changed over time? How have characteristics of school meal programs and school food environments changed?

¹⁵ The Robert Wood Johnson Foundation-funded Bridging the Gap research program conducts annual surveys of elementary schools and secondary schools to track school district policies and school practices that may be related to childhood obesity (see http://www.bridgingthegapresearch.org/about_us). Bridging the Gap does not conduct a comprehensive assessment of the calorie, nutrient, and food group content of school meals.

2. Sample Design

SNDA-IV was designed to provide national estimates at both the SFA and school levels.¹⁶ The design included two samples—the SFA-only sample, which collected data only at the SFA level, and the SFA-plus-school sample, which collected data at both the SFA and school levels. The sample frame of SFAs was constructed primarily from the National Center for Education Statistics 2006–2007 Common Core of Data Local Education Agency (School District) Universe Survey Data (CCD) (see <http://nces.ed.gov/ccd/pubagency.asp>).¹⁷ Data from FNS’s School Food Authority Verification Summary Report (FNS-742) were used to determine, in some cases, which school districts were SFAs. Districts that were not identified as SFAs via matching with FNS-742 were screened for SFA status.

A stratified two-stage sampling approach was used, with SFAs selected first and schools selected second, within a random subsample of sampled SFAs. As in previous SNDA studies, the respondent universe included all public SFAs and schools participating in the NSLP and located in the contiguous 48 States and the District of Columbia.¹⁸ SFAs were selected using probability proportional to size (PPS) sampling methods. Stratifying variables included FNS region (of which there are seven), poverty level, total enrollment, degree of urbanicity, and number of schools. For SFAs in the SFA-plus-school sample, the design called for collecting data from three schools, if available: one elementary school, one middle school, and one high school. SFAs and schools that declined to participate in the data collection were replaced by randomly chosen substitutes. Additional details about the SNDA-IV design are provided in Volume II of this report.

3. Data Collection

Data were collected from January through June 2010 from SFA directors, school foodservice managers (FSMs), and principals. In addition, an individual designated by the principal provided information about foods available in vending machines, school stores, and other venues outside of the school meal programs. Table 1.3 shows the data collection instruments used in SNDA-IV, along with information about respondents and mode of data collection. Copies of all data collection instruments are provided in Appendix N.

a. SFA-Level Data

The recruitment interview was completed only for SFAs in the school sample. The interview collected data on key characteristics of the schools sampled in each SFA, including whether the school participated in the NSLP (only schools that participated in the NSLP were eligible for inclusion in the study), the SBP, and whether they served reimbursable afterschool snacks; the type of menu-planning system used; and enrollment. The SFA director survey collected data on SFA policies and practices regarding menu planning, a la carte foods, food purchasing, food safety and sanitation, nutrition promotion, and school wellness policies.

¹⁶ As in previous SNDA studies, estimates are representative of the 48 contiguous States and the District of Columbia.

¹⁷ The SY 2006–2007 database was the most recent available at the time the sample frame was constructed.

¹⁸ SNDA-I, which included private schools, was an exception to this rule (Burghardt et al. 1993).

Table 1.3. Data Collection Instruments Used in the SNDA-IV Study

Instrument	Respondent	Mode
Recruitment Interview	SFA director (only SFAs in the SFA-plus-school sample)	Telephone
SFA Director Survey	SFA director	Web, with telephone follow-up
Menu Survey	School foodservice manager	Mail, with intensive telephone-based training, technical assistance, and follow-up
Foodservice Manager Survey	School foodservice manager	Mail
A la Carte Checklist	School foodservice manager	Mail
Principal Survey	Principal	Web, with telephone follow-up
Competitive Foods Checklists Vending machine checklist Other sources of foods and beverages checklist	Principal's designee	Fax-back, with training module ^a and telephone follow-up

^a A PowerPoint (converted to pdf format when necessary) training module discussed the data collection forms in detail, described the protocol for completing and returning the forms, raised ambiguous situations and provided instructions on how to address them, and answered frequently asked questions.

SFA = School Food Authority.

b. School-Level Data

At the school level, data were collected from the FSM, the principal, and a school staff member designated by the principal using the following instruments:

- **Menu survey.** FSMs completed the menu survey with intensive training and support from trained technical assistants. The goal of the survey was to collect data on all foods offered and served in school lunches as well as school breakfasts and afterschool snacks (if available). Data were collected for one school week, referred to as the target week. The data were processed using USDA's Survey Net system, a computer-assisted food coding and nutrient analysis system, which was used to link individual items reported in menu surveys to nutrient values included in the USDA's Food and Nutrient Database for Dietary Studies (FNDDS).

The resulting menu survey database includes, for each school, separate daily records for lunch and, where offered, breakfast and afterschool snacks. Each day-and-meal-specific record (for example, the record for Monday lunch) includes the following information for every item offered in reimbursable meals: food name/description; portion size; number of portions served in reimbursable meals; and nutrient content per portion.¹⁹

¹⁹ More than 60 nutrients are available in this database. A list of the nutrients included is available at www.ars.usda.gov/SP2UserFiles/Place/12355000/pdf/fndds_doc.pdf#nutrientlist.

- **A la carte checklist.** The a la carte checklist documented whether a la carte foods were available to students at breakfast or lunch and, if so, the specific foods and beverages that were available. The FSM completed the checklist on one randomly assigned day during the target week.
- **School foodservice manager survey.** This brief survey collected information about the characteristics of school kitchens, availability of school foodservice-operated vending machines, meal pricing, scheduling of meal periods, nutrition promotion activities, practices used to count reimbursable meals, and practices used to distribute and count afterschool snacks.
- **Principal survey.** The principal survey collected information about mealtime policies (including whether students were allowed off campus and the rules about buying a la carte foods); scheduling of other activities during mealtimes; availability of vending machines, school stores and snack bars; requirements for nutrition education and physical education; opportunities for physical activity during the school day; and school wellness policies.
- **Competitive foods checklists.** A member of the school staff designated by the principal completed the competitive foods checklists. The checklists documented the presence of vending machines (vending machines checklist), school stores, snack bars, fundraisers and other sources of foods and beverages (other sources of foods and beverages checklist), and the specific foods available in each venue. Respondents received a training module, which could be accessed using a web link or received by email. The training module discussed the data collection forms in detail, described the protocol for completing and returning the forms, raised ambiguous situations and provided instructions on how to address them, and answered frequently asked questions. Some schools completed competitive foods checklists by telephone. In these cases, data collection was limited to documenting the types of competitive food venues available. Detailed information about the specific foods and beverages available in the various venues was not collected.

4. Response Rates and Sample Sizes

Table 1.4 shows final completed sample sizes and response rates for recruitment and data collection. All response rates are weighted using unadjusted sampling weights, which correct for unequal probability of selection (see Volume II for additional information). SFAs in the SFA-only sample were not formally recruited; rather, they were invited by email to complete the web-based SFA director survey. SFAs in the SFA-plus-school sample were formally recruited to participate in the study.

The recruitment effort included gaining approval for the SFA and all sampled schools (one to six schools per SFA) to participate.²⁰ Across both samples of SFAs, a total of 747 SFAs were invited to participate in the study and a total of 595 agreed (85.7 percent weighted response rate). This rate

²⁰ In a small number of SFAs, study staff submitted Institutional Review Board (IRB) clearance packages to district administrators in order to obtain approval for the district and sampled schools to participate in the study.

includes replacements for SFAs in the SFA-plus-school sample that refused to participate. Among SFAs that agreed to participate in the study, 902 of the 1,059 sampled schools were successfully recruited (95.7 percent weighted response rate).

Table 1.4. Completed Sample Sizes and Response Rates

	Initial Sample	Completed Sample	Weighted Response Rate (%)
Recruitment			
SFAs	747	595	85.7
Schools	1,059	902	95.7
Data Collection			
SFA director survey	595	578	94.0
Menu survey	902	884	97.7
Foodservice manager survey	902	876	96.7
A la carte checklist	902	895	99.5
Principal survey	902	721	87.2
Vending machine checklist	902	680	79.0
Other sources of foods and beverages checklist	902	732	88.1

Notes: All response rates are weighted using raw sampling weights—that is, weights that correct for unequal probability of selection, before any nonresponse adjustments. For more information, see Volume II.

Sample sizes and response rates for SFA recruitment and the SFA director survey include SFAs in both the SFA-only and SFA-plus-school samples.

Data collection response rates reflect the percentage of eligible SFAs/schools that completed each instrument, given that the SFA/school had been recruited and agreed to participate in the study.

SFA = School Food Authority.

SFA directors and FSMs who agreed to participate in the study were very cooperative with the data collection. Weighted response rates for instruments completed by these respondents (SFA director survey, menu survey, foodservice manager survey, and a la carte checklist) were very high, ranging from 94.0 to 99.5 percent. Gaining cooperation from school principals was more challenging. The SFA directors who agreed to participate in the study did not have the authority to compel principals to participate, as they generally did with FSMs. In addition, the finite end date for the data collection period (the end of the school year) limited the amount of follow-up that could be done with nonresponding principals. The responsiveness of principals also affected response rates for the competitive foods checklists (vending machine checklist and other sources of foods and beverages checklist) because the data collection protocol called for the principal to designate a respondent for those instruments. For these reasons, instrument-level response rates for the principal survey and the competitive foods checklists were lower than for the other components of the study.

5. Background Characteristics of SFAs and Schools

Table 1.5 shows the distributions of key subgroup characteristics among SFAs, weighted to be nationally representative (of the 48 contiguous United States and the District of Columbia), as well as, for each subgroup, the number of sample SFAs (unweighted) and the estimate of the number of SFAs nationally (weighted). Subgroups examined include district size (measured by enrollment), urbanicity, child poverty level, and region (using the seven FNS administrative regions).²¹ These national estimates closely match the estimates from the sample frame of more than 2,000 SFAs from which the SNDA-IV sample was selected (see Volume II).²²

Table 1.6 shows key background characteristics of the school sample. The definitions used to classify elementary, middle, and high schools match those used in previous SNDA studies:

- **Elementary schools** are those with one of the following grade configurations: (1) the lowest grade is between pre-kindergarten and grade 3 or (2) the lowest grade is 4 or 5 and the highest grade is less than 8. Schools with grade ranges such as K–8 and K–12 are classified as elementary schools.²³
- **Middle schools** follow one of these grade configurations: (1) the lowest grade is 4 or 5 and the highest grade is 8 or higher; or (2) the lowest grade is 6, 7, 8, or 9 and the highest grade is less than 10.
- **High schools** are those in which (1) the lowest grade is 6, 7, 8, or 9 and the highest grade is 10 or higher; or (2) the lowest grade is 10 or higher.

Appendix Table B.1 presents data on the characteristics shown in Table 1.6 for each type of school. In addition, Appendix Table B.2 presents data on the specific grade-level configurations within each type of school, with unweighted and weighted counts. Most middle schools include grades 6 to 8, most high schools include grades 9 to 12, and most elementary schools include pre-kindergarten or kindergarten through grades 5 or 6.

²¹ Data on urbanicity were obtained from the Department of Education Common Core of Data, 2006–2007 (the most recent data available at the time the sample frame was constructed). Data on child poverty rates were from the U.S. Census Bureau’s Small Area Income and Poverty Estimates school district file (see <http://www.census.gov/hhes/www/saipe/district.html>).

²² Table 1.5 also shows that weights have a substantial effect on results at the SFA level, particularly for variables related to SFA enrollment, which is expected, because the sample of SFAs was selected with probability proportional to size (enrollment) and the weights were based on the inverse of the probability of selection.

²³ This classification was created in SNDA-I and has been used in all subsequent rounds of the SNDA study.

Table 1.5. Characteristics of Public School Food Authorities

Characteristic	Number of Sample SFAs (Unweighted)	Number of SFAs (Weighted)	Percentage of SFAs (Weighted)
District Size			
Fewer than 1,000 students	144	7,700	49.4
1,000 to 5,000 students	193	5,600	35.7
More than 5,000 students	241	2,300	14.9
Urbanicity			
Urban	126	1,700	11.2
Suburban	269	7,200	46.2
Rural	183	6,700	42.6
District Child Poverty Rate			
Low (less than 30 percent)	402	11,100	70.8
Higher (30 percent or more)	176	4,500	29.2
FNS Region			
Northeast	54	2,000	12.9
Mid-Atlantic	52	1,500	9.5
Southeast	76	1,200	8.0
Midwest	124	3,900	24.9
Southwest	89	2,500	16.2
Mountain Plains	86	2,600	16.5
West	97	1,900	12.1
Number of SFAs	578	15,600	

Source: School Nutrition Dietary Assessment-IV, School Food Authority Director Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public SFAs offering the NSLP.

Notes: Data on enrollment and urbanicity are from the U.S. Department of Education's Common Core of Data, 2006–2007. Data on child poverty rates are from the U.S. Census Bureau's Small Area Income and Poverty Estimates school district file. Weighted estimates of the numbers of SFAs have been rounded to the nearest hundred.

FNS = Food and Nutrition Service; SFA = School Food Authority.

Table 1.6. Characteristics of Public National School Lunch Program Schools

Characteristic	Number of Sample Schools (Unweighted)	Number of Schools (Weighted)	Percentage of Schools (Weighted)
School Size			
Small (fewer than 500 students)	357	43,800	52.5
Medium (500 to 999 students)	320	30,400	36.5
Large (1,000 or more students)	207	9,200	11.0
Urbanicity			
Urban	277	23,000	27.6
Suburban	407	38,600	46.3
Rural	200	21,800	26.1
District Child Poverty Rate			
Low (less than 30 percent)	598	55,700	66.8
Higher (30 percent or more)	286	27,700	33.2
FNS Region			
Northeast	80	9,500	11.4
Mid-Atlantic	77	7,700	9.2
Southeast	153	12,700	15.2
Midwest	156	16,500	19.7
Southwest	147	12,700	15.2
Mountain Plains	112	10,300	12.3
Western	159	14,200	17.0
Number of Schools	884	83,400	

Source: School Nutrition Dietary Assessment-IV, Menu Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are based on schools that completed the menu survey and are weighted to be representative of all public schools offering the NSLP.

Notes: Data on school size (student enrollment) were reported by SFA directors or taken from the U.S. Department of Education's Common Core of Data, 2008–2009. Data on urbanicity are from the U.S. Department of Education's Common Core of Data, 2006–2007. Data on child poverty rates are from the U.S. Census Bureau's Small Area Income and Poverty Estimates school district file. Weighted estimates of numbers of schools have been rounded to the nearest hundred.

FNS = Food and Nutrition Service.

D. Analysis Samples

1. Weighting and Estimation

All analyses of SNDA-IV data were weighted to produce estimates that are representative of public SFAs and schools in the 48 contiguous United States and the District of Columbia that participate in the NSLP. The final weights adjust both for unequal probabilities of selection at each stage of sampling and for nonresponse at each stage of data collection. Because of different sample sizes and response rates across instruments, several different weights were developed:

- Two weights were developed for the SFA director survey because the survey collected data at both the SFA and school levels. One weight is used with SFA-level data and the other is used with data collected for the sampled schools in each SFA.
- One weight was developed for use with the menu survey and the foodservice manager survey.

- Separate weights were developed for use with the remaining instruments: afterschool snack form (a component of the menu survey that was completed by schools that offered reimbursable afterschool snacks), a la carte checklist, principal survey, vending machine checklist, and other sources of foods and beverages checklist.

Student-level weights were also developed. These weights were used to replicate selected analyses related to the nutrient content of school meals to produce student-level estimates. These estimates describe students in schools that offer the NSLP or SBP—for example, the proportion of students who attend schools where the average lunch offered was consistent with the SMI standard for saturated fat. Tables presenting student-level estimates are included in Appendices E and G, but are not discussed in the report.

Because SNDA-IV included a complex sample design, estimated standard errors and tests of statistical significance were adjusted using the SUDAAN statistical package (Research Triangle Institute 2006). Standard errors are explicitly presented only for the estimates of the nutrients in school meals (see Appendices E and G). Because of the descriptive nature of this report, statistical tests of differences between subgroups of schools were limited to analyses that assess the food and nutrient content of school meals.

2. Subgroup Analysis

All of the tables that present school-level data include separate estimates for three subgroups of schools: elementary, middle, and high schools. Findings from selected analyses related to the food and nutrient content of school meals are also presented for subgroups of schools that used different menu-planning systems (traditional food-based, enhanced food-based, and nutrient-based). Tables that present data for additional subgroups of schools based on school size, urbanicity, and district child poverty rate are presented in Appendices E and G. These tables are not discussed in the report.

3. Statistical Reporting Standards

To help readers assess the reliability of estimates, reporting standards based on those of the joint USDA/National Center for Health Statistics Working Group (Federation of American Societies for Experimental Biology 1995) have been applied.²⁴ Specifically, based on a broadly estimated average design effect of 1.6, data are not reported for any subgroup with fewer than 48 schools or SFAs. In addition, in tables presenting data on the food and nutrient content of meals and snacks, estimated means are flagged (with ~) when the coefficient of variation is greater than 30 percent. Estimated percentages in the tails of the distribution (less than 25 percent or greater than 75 percent) are similarly flagged when the number of observations represented by the percentage is less than 13 ($8 \times$ average design effect of 1.6). When these rules are applied, percentages close to 0 or 100 are often flagged. In this report, flagged percentages between 0 and 3 percent and between 97 and 100 percent are displayed as <3 and >97, respectively.

²⁴ Statistical reporting standards were not applied in the HUSSC substudy. These statistical controls are not necessary because the HUSSC substudy is purely descriptive; no attempt is made to draw statistical inferences about other schools or SFAs from the HUSSC data.

4. Comparisons with Previous Rounds of the SNDA Study

As the fourth in a series of studies that employed similar methods to explore the same basic set of issues at different points in time, SNDA-IV provides a unique opportunity to examine changes in school meal programs and school food environments over time. Many of the analyses conducted for SNDA-IV replicate those done in SNDA-III. This allows for explicit comparisons between findings from SNDA-IV and SNDA-III as well as, in some cases, findings from SNDA-II and SNDA-I.

These comparisons are presented in Chapter 11. In interpreting the trends apparent in these data, it is important to recognize that changes in many important factors that influence the outcomes of interest have occurred over time. For example, the food and nutrient database used to code the menu data for SNDA-IV is an updated version of the one used in SNDA-III. In addition, changes in data collection and analysis procedures over time might have improved the quality and completeness of the data in SNDA-III and SNDA-IV, compared with earlier rounds of the study. Comparisons to SNDA-I are also problematic because that study used a different (non-USDA) nutrient database. Although some caution is appropriate in interpreting any of the comparisons presented in Chapter 11, comparisons between SNDA-IV and SNDA-II or SNDA-I merit the most caution.

E. Design of the HealthierUS School Challenge Substudy

The HUSC subsudy addresses the following research questions:

1. How do characteristics of HUSC schools and SFAs compare with schools and SFAs nationwide?
2. What are the characteristics of meals *offered* and *served* in HUSC schools? How do these compare with meals *offered* and *served* in schools nationwide?
3. What are the characteristics of meal service operations and food and physical activity environments in HUSC schools? How do these compare with meal service operations and food and physical activity environments in schools nationwide?

1. Sample Design

The HUSC subsudy used a purposeful sample because the number of schools participating in the program in SY 2009–2010 was relatively small. In addition, because the vast majority of schools that participated in HUSC at that time were elementary schools, the HUSC sample was limited to elementary schools. The design specified by FNS called for recruitment of 30 HUSC schools and an analysis that would combine data for these schools with data for any HUSC schools identified in the SNDA-IV sample.

The sampling frame for the HUSC subsudy was a file (provided by FNS) that included information for 397 elementary schools certified as HUSC schools for SY 2009–2010.²⁵ Using

²⁵ The number of schools participating in HUSC has increased since SY 2009–2010. As of April 3, 2012, there were 3,098 HUSC-certified schools (see <http://teamnutrition.usda.gov/healthierUS/index.html>). Accessed July 2, 2012.

school identification numbers obtained from the CCD, this list of schools was compared with the list of SFAs and schools included in the SNDA-IV sample. In addition, 22 schools that could not be matched to the CCD were dropped from the frame. In order to maximize the number of schools included in the analysis, HUSC schools located in SFAs that were part of the SNDA-IV sample were dropped from the HUSC sample frame. After these schools were eliminated, a purposeful sample of 36 HUSC schools was selected, based on State and degree of urbanicity.²⁶ Among SFAs that had more than one HUSC school, only one school was selected, based on degree of urbanicity, enrollment, and grade span. The resulting sample of HUSC schools provides broad representation across FNS regions and variation across schools in degree of urbanicity, size, and grade span.

2. Data Collection, Response Rates, and Sample Sizes

Of the 36 sampled HUSC schools, 31 were successfully recruited into the study (86.1 percent response rate). Recruitment was done at the SFA level, following the protocol used in recruiting SFAs and schools for SNDA-IV, and all of the SNDA-IV data collection instruments were used to collect data. Recruited HUSC schools and their associated SFAs were very cooperative. Final sample sizes for all instruments range from 28 to 31, for instrument-level response rates of 90 to 100 percent.

3. Analysis Sample

The sample of HUSC schools used in the analyses reported in Chapter 12 includes the HUSC schools that were identified and recruited as part of the HUSC substudy, as well as four elementary schools in the SNDA-IV sample that were certified HUSC schools in SY 2009–2010 (based on the list of HUSC schools provided by FNS). Given that the protocols for recruitment and data collection were identical for SNDA-IV and the HUSC substudy, it is appropriate to combine the two sets of schools for analysis. Because a purposeful sample was used, statistical weights were not applied to analyses of data for HUSC schools and the statistical reporting standards described in Section D.3 of this chapter were not applied.

F. Organization of the Report

The remainder of this report presents findings in four broad topic areas: (1) characteristics of SFAs and schools; (2) characteristics of school meals and afterschool snacks; (3) changes in the characteristics of school meals, school foodservice operations, and school food environments over time; and (4) characteristics of HUSC schools and the meals offered and served in these schools. Chapters 2 and 3 describe characteristics of public SFAs and schools, including characteristics of meal service programs (Chapter 2) and school food and physical activity environments (Chapter 3). Chapters 4 through 7 describe the food and nutrient content of lunches and breakfasts offered and served in schools participating in the NSLP and SBP, and the extent to which these meals complied with the SMI standards and the 2010 *Dietary Guidelines*. Chapter 8 presents data on the potential contribution of school meals to dietary patterns recommended in USDA's Food Patterns (www.Choosemyplate.gov). Chapter 9 presents data on the food sources of calories, nutrients, solid fats and added sugars in school breakfasts and lunches. The foods and beverages offered in

²⁶ A sample of 38 HUSC schools was initially selected. However, two of these schools were later determined to be ineligible; one was a private school and the other was located in an SFA that was included in the SNDA-IV sample.

reimbursable afterschool snacks and their nutrient and food group content are described in Chapter 10. Chapter 11 describes changes in the nutrient content of school meals over time, as well as changes in selected characteristics of school meal program operations and school food environments. Finally, Chapter 12 describes characteristics of HUSC schools and the meals offered and served in these schools.

CHAPTER 2

CHARACTERISTICS OF SCHOOL MEAL PROGRAMS

The school meal programs—the NSLP and the SBP—operate under Federal regulations and policies that are generally designed and implemented by FNS. Within these parameters, local SFAs and schools have considerable discretion in how they operate their programs. FNS makes technical assistance (TA) and guidance materials available to all SFAs, who also receive training, TA, and monitoring from their State CN agencies. The SNDA studies provide policymakers with an opportunity to assess local program operations on a periodic basis. These assessments provide updated information about a broad range of topics, including student participation rates, meal prices, menu-planning practices, food safety and sanitation, use of TA and guidance materials, and credentials of program directors and managers.

The data presented in this chapter were obtained from surveys of SFA directors and FSMs. All surveys were implemented between January and June 2010. The SFA director survey was web-based and included SFA directors from both the SFA-only sample and the SFA-plus-school sample (see Chapter 1). Maximum sample sizes for data collected in the SFA director survey vary depending on whether the data element was collected at the SFA level or the school level. For data elements collected at the SFA level, all SFA directors responded to the question. For data elements collected at the school level, only SFA directors in the SFA-plus-school sample responded to the question, providing information for the schools that were sampled in their SFA. FSMs completed a detailed menu survey (see Chapter 1), as well as a brief FSM survey. Both instruments were self-administered. The FSM survey was included in the packet of materials FSMs received (via mail) for the menu survey. Technical assistants who trained FSMs to complete the menu survey were also available to provide assistance in completing the FSM survey.

Maximum sample sizes for the tabulations presented in this chapter vary depending on the instrument and type of data collected:

- 578 SFAs for SFA-level data collected via the SFA director survey
- 842 schools for school-level data collected via the SFA director survey
- 884 schools for data collected via the menu survey
- 876 schools for data collected via the FSM survey

Sample sizes for individual tables or subsections within a table may vary because of conditional analysis samples and item nonresponse. All statistics are weighted to be nationally representative of public SFAs or public schools in the contiguous United States participating in the NSLP. School-level data are generally presented separately by school type—defined by grade level (elementary, middle, and high schools)—and for all schools combined.

A. Summary of Findings

- In SY 2009–2010, most public schools that participated in the NSLP (89 percent) also participated in the SBP.

- More than a quarter (27 percent) of public NSLP schools provided reimbursable afterschool snacks. Elementary schools were more likely to provide afterschool snacks than either middle or high schools (33 percent versus 23 and 13 percent, respectively).

Student Participation

- On an average day in SY 2009–2010, 63 percent of all students in public NSLP schools participated in the program. Participation varied by school type and was highest in elementary schools and lowest in high schools (70 versus 45 percent). Participation also varied by student eligibility status. Students certified to receive free or reduced-price lunches participated at a higher rate than students who were not certified to receive meal benefits (79 and 73 percent, respectively, versus 48 percent).
- Overall rates of student participation were notably lower for the SBP. On an average day in SY 2009–2010, 28 percent of all students in schools that participated in the SBP participated in the program. General patterns of participation were similar to those observed for the NSLP; however, the magnitude of the differences between subgroups of students was larger. For example, for the SBP, the rate of participation among students certified to receive free meals was four times higher than the rate of participation among students not certified to receive meal benefits (40 versus 10 percent), compared to a 65 percent difference for NSLP participation (79 versus 48 percent).

Meal Prices

- In SY 2009–2010, the average price charged for reduced-price meals was \$0.39 for lunch and \$0.30 for breakfast. The average price charged for reduced-price meals has remained essentially constant since the SNDA-I study (SY 1991–1992).
- The average price charged for paid meals was \$1.93 for lunch and \$1.13 for breakfast. Compared with average prices charged for paid meals in SY 2004–2005 (when SNDA-III was conducted), average prices in SY 2009–2010 were 21 percent higher for lunch (\$1.93 versus \$1.60) and 28 percent higher for breakfast (\$1.13 versus \$0.88).

Menu Planning and Meal Production

- In SY 2009–2010, 73 percent of schools used food-based menu planning. More than half of all schools (53 percent) used traditional food-based menu planning and another 20 percent used enhanced food-based menu planning. About one-fourth of all schools (27 percent) used nutrient-based menu planning.
- Most schools (80 percent) prepared food on site, and almost three-fourths (72 percent) prepared meals for their school only. One in five schools received partially prepared or fully plated meals from a separate base or central kitchen.
- Most SFA directors (89 percent) reported that school meal recipes had been modified since SY 2004–2005. Prepared entree items were most commonly targeted for modification, followed by sandwiches, vegetable side dishes, and desserts. Three-fourths or more of SFAs that modified recipes focused on calorie, fat, saturated fat, and/or

whole grain content; more than half focused on sodium, trans fat, sugar, and/or dietary fiber content; and almost two-thirds reported adjusting portion sizes.

- In SY 2009–2010, about one in five SFAs (19 percent) used a foodservice management company (FSMC) to run all or part of their school meal programs. Use of FSMCs was more common in medium-sized districts, districts with low levels of child poverty, and urban and suburban districts, and was notably more prevalent in the mid-Atlantic and Northeast than in other areas of the country.

Meal Service Practices

- In SY 2009–2010, relatively few schools used alternative methods of breakfast service. Only 9 percent of schools that participated in the SBP reported serving breakfast in classrooms, 7 percent reported offering grab-and-go options, and no schools reported serving breakfast on school buses.
- The offer-versus-serve (OVS) option, which allows students to refuse a certain number of items offered in a reimbursable meal, is mandatory for high schools but optional for elementary and middle schools. Most elementary and middle schools used OVS for all students for both lunch (69 and 77 percent, respectively) and breakfast (73 and 82 percent, respectively).
- To identify students who are eligible for free or reduced-price meals at the point of sale (and thereby count reimbursable meals), most schools (65 percent) used personal identification numbers (PINs). Almost a third (31 percent) of schools used nonelectronic systems to determine student eligibility, such as cashier lists (15 percent), identification cards (6 percent), verbal identification (5 percent), and tickets or tokens (5 percent). Elementary schools used nonelectronic methods more often than middle or high schools.

Food Safety and Sanitation

- In SY 2009–2010, directors in 91 percent of SFAs reported that all of their schools had the food safety plan required by USDA. Most SFAs reported that all of the required components were present in the plan. The survey question that asked about the content of food safety plans included a nonsense item (procedures for assessing mercury levels in cooked foods), which was meant to provide a barometer of the relative reliability of respondents' self-reports. The fact that few SFA directors (9 percent) responded affirmatively to the nonsense item suggests that their responses about food safety plan content are reliable.
- Two-thirds of SFA directors reported that food safety certification was required for at least some foodservice personnel. Among SFAs that require food safety certification, most (87 percent) require that managers have food safety certification and two-thirds require that cooks have certification.

B. Proportions of Schools Offering SBP Breakfasts and Afterschool Snacks

1. The School Breakfast Program

SNDA-IV is representative of all public schools in the contiguous 48 States that offer the NSLP. Thus, all of the schools in the SNDA-IV sample offered the NSLP. Most schools (89 percent) that participated in the NSLP in SY 2009–2010 also participated in the SBP (Table 2.1).¹ Findings were consistent (roughly 9 of 10 schools) for elementary, middle, and high schools. School-level participation in the SBP has expanded substantially since the early 1990s, when the first SNDA study (SNDA-I) was conducted. A number of issues fueled program expansion, including concerns about the proportions of low-income children eligible to receive free or reduced-price breakfasts that were not receiving them (Food Research and Action Center (FRAC) 2003; Rossi 1998), and concerns that children who came to school hungry were at risk for poor academic performance as well as increased tardiness and absenteeism (FRAC 2009 and 2003; Kennedy and Davis 1998).

Table 2.1. Proportions of National School Lunch Program Schools that Participated in the School Breakfast Program and Provided Afterschool Snacks

	Percentage of Schools			
	Elementary Schools	Middle Schools	High Schools	All Schools
Participated in the School Breakfast Program	88.8	91.0	89.5	89.3
Provided Afterschool Snacks	33.2	22.9	13.3	27.3
Number of Schools	315	284	277	876

Source: School Nutrition Dietary Assessment Study–IV, Foodservice Manager Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

When SNDA-I was conducted in SY 1991–1992, 44 percent of all NSLP schools participated in the SBP (Burghardt et al. 1993).² Participation in the SBP increased to 76 percent of all public NSLP schools by SY 1998–1999 (SNDA-II; Fox et al. 2001) and to 85 percent of all public NSLP schools by SY 2004–2005 (SNDA-III; Gordon et al. 2007). The SNDA-IV data suggest that growth in SBP participation between SY 2004–2005 and SY 2009–2010 was modest and that the largest increase

¹ This percentage is very similar to but slightly higher than the 87 percent reported by the Food Research and Action Center (FRAC) for the same period (SY 2009–2010). The FRAC estimate is not limited to public schools. It includes private schools, residential child care institutions (RCCIs), and other institutions that operate school meal programs (FRAC 2011).

² The SNDA-I estimate is not directly comparable to later SNDA studies because it includes private schools. In addition, the estimate was about 10 percentage points lower than USDA administrative data, a difference that is larger than can be expected from sampling error and was not explained (Burghardt et al. 1993).

occurred among high schools (89.5 percent in SNDA-IV [Table 2.1] versus 82.3 percent in SNDA-III [Gordon et al. 2007]).³

2. Afterschool Snacks

Since 1998, schools participating in the NSLP have had the option of providing snacks to children in eligible afterschool programs. SFAs receive cash subsidies for each snack they serve. To be eligible for these subsidies, snacks must meet specific food-based requirements and afterschool programs must provide children with regularly scheduled educational or enrichment activities in a supervised environment. SNDA-IV is the first study to collect data from a national sample of schools providing afterschool snacks through the NSLP.

Nationally, about 27 percent of schools provided afterschool snacks through the NSLP in SY 2009–2010 (Table 2.1). Elementary schools were more likely to provide afterschool snacks than middle or high schools (33 percent versus 23 and 13 percent, respectively). Schools that provide afterschool snacks do not necessarily serve an afterschool program that is located in their building or that serves their students. Schools may provide afterschool snacks to programs run by other schools or entities within their school district.⁴ Additional information about schools that provide afterschool snacks and a description of the food and nutrient content of snacks is provided in Chapter 10.

C. Student Participation in the NSLP and SBP

1. Student Participation Rates

Participation in the NSLP and SBP is open to all students in participating schools. Students from low-income households are eligible to receive meals free of charge or at a reduced price. On an average day in SY 2009–2010, 63 percent of all students in public NSLP schools participated in the program (Table 2.2). Participation varied by type of school and was highest in elementary schools and lowest in high schools (70 versus 45 percent).

Participation also varied by student eligibility status. Students certified to receive free or reduced-price lunches participated at a higher rate than students who were not certified to receive meal benefits (79 and 73 percent, respectively, versus 48 percent). Within each meal benefit category, elementary school students participated at higher rates than either middle or high school students.

Overall rates of student participation were notably lower for the SBP, even among students certified to receive free or reduced-price breakfasts. It is well recognized that many students who are eligible to receive these breakfasts do not participate in the SBP (FRAC 2011). On an average day in SY 2009–2010, 28 percent of all students in schools that offered the SBP participated in the

³ The increase reported in FRAC annual reports on SBP participation for the period SY 2004–2005 to SY 2009–2010 is larger (FRAC 2011, 2009, 2008, and 2007). However, FRAC’s estimate of school-level participation in SY 2004–2005—which included private schools, residential child care institutions, and other institutions—was lower than the SNDA-III estimate (81.1 versus 85.4 percent).

⁴ For snacks to be eligible for Federal reimbursement through the NSLP, the afterschool program must be sponsored or operated by a school district that participates in the NSLP.

program (that is, they received a free breakfast or purchased a reduced- or full-price breakfast). General patterns of participation were similar to those observed for the NSLP; however, the magnitude of the differences between subgroups of students was larger. For example, the rate of SBP participation among elementary school students was almost double that of high school students (33 versus 17 percent), compared with a 56 percent difference for NSLP participation (70 versus 45 percent). Similarly, the rate of SBP participation among students approved for free meals was four times higher than the rate of participation among students not approved for meal benefits (40 versus 10 percent), compared with a 65 percent difference for NSLP participation (79 versus 48 percent). Finally, within each meal benefit category, differences in participation rates of elementary school students and middle and high school students were larger than those observed for NSLP participation. The difference was greatest among students not approved for meal benefits.⁵

Table 2.2. Student Participation Rates

Program/M meal Benefit Category	Percentage of Students Participating on an Average Day			
	Elementary Schools	Middle Schools	High Schools	All Schools
National School Lunch Program				
All Students	69.5	61.8	45.0	63.2
Students Certified for Free Meals	84.2	78.6	63.9	79.1
Students Certified for Reduced-Price Meals	77.7	73.6	59.1	73.2
Students Not Certified for Meal Benefits	53.7	47.4	32.7	48.3
Number of Schools	284	265	256	805
School Breakfast Program				
All Students	32.9	20.1	17.3	27.5
Students Certified for Free Meals	45.4	32.4	31.8	40.2
Students Certified for Reduced-Price Meals	30.5	17.0	20.5	25.8
Students Not Certified for Meal Benefits	13.2	5.8	5.4	10.1
Number of Schools	262	252	241	755

Source: School Nutrition Dietary Assessment Study-IV, Menu Survey, Recruitment Interview, and Principal Survey, school year 2009-2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Notes: Fifty-four schools were excluded from the analysis of one or more NSLP participation rates and 40 schools were excluded from the analysis of one or more SBP participation rates because they were missing data on the number of meals served and/or the number of students certified for free or reduced-price meal benefits.

⁵ We do not compare student participation rates for SNDA-IV and SNDA-III because the studies used different methods to estimate student participation. SNDA-III estimates are based on survey responses from parents and students, combined with information about the sources and types of foods students reported eating for breakfast and lunch (as reported in 24-hour dietary recalls) (Gordon et al. 2007). General patterns of participation were consistent in the two studies, but point estimates varied by school type and meal benefit categories. Differences were most pronounced for the SBP.

2. Distribution of Free, Reduced-Price, and Paid Meals

Another approach used to describe student participation in the school meal programs is to examine the distribution of meals by meal reimbursement category. During a typical week in SY 2009–2010, 55 percent of reimbursable lunches served in public NSLP schools were served free of charge, 9 percent were served to students approved for reduced-price lunches, and the remaining 36 percent were served to students who paid full-price for their meals (referred to as paid meals) (Table 2.3). These statistics are consistent with USDA administrative data, which show that 65 percent of all NSLP lunches served in FY 2009–2010 were served free (56 percent) or at a reduced price (9 percent).⁶

Table 2.3. Average Distribution of Free, Reduced-Price, and Paid Meals

Program/Reimbursement Category	Average Percentage of Daily Reimbursable Meals			
	Elementary Schools	Middle Schools	High Schools	All Schools
National School Lunch Program				
Free Lunches	55.0	53.7	56.2	55.0
Reduced-Price Lunches	8.5	9.5	9.7	8.9
Paid Lunches	36.5	36.8	34.1	36.1
Number of Schools	314	284	276	874
School Breakfast Program				
Free Breakfasts	74.9	78.0	75.6	75.6
Reduced-Price Breakfasts	8.2	7.9	9.6	8.5
Paid Breakfasts	16.9	14.1	14.8	16.0
Number of Schools	279	265	256	800

Source: School Nutrition Dietary Assessment Study–IV, Menu Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Note: Ten schools were excluded from the analysis of NSLP meals and 12 schools were excluded from the analysis of SBP meals because they did not provide data on the number of reimbursable meals served.

The distribution of free, reduced-price, and paid meals in the SBP was notably different from the NSLP. In the SBP, about three-fourths (76 percent) of breakfasts were served free of charge, about 9 percent were served at a reduced price, and fewer than one in five (16 percent) were paid breakfasts. These statistics are also consistent with FNS administrative data, which show that 84 percent of all SBP breakfasts served in FY 2010 were served free (75 percent) or at a reduced price (9 percent).⁶

⁶ Statistics were obtained from national-level annual summary tables generated by FNS's Program Reports, Analysis and Monitoring Branch. These tables are available at <http://www.fns.usda.gov/pd/cnpmain.htm>. Accessed July 2, 2012. Data are subject to revision.

D. Meal Prices

1. Prices Charged for Reduced-Price and Paid Lunches

By law, SFAs may charge no more than \$0.40 for a reduced-price lunch. At the time SNDA-IV data were collected, Federal regulations included no restrictions on what SFAs may charge for a paid lunch.⁷ Prices charged for paid lunches are largely influenced by food and labor costs, but SFAs are sensitive to not setting prices so high that they would discourage participation (Gordon et al. 2007).

In SY 2009–2010, the average price charged for a reduced-price lunch was \$0.39, overall and for all subgroups of schools (Table 2.4). Most schools reported charging the maximum allowable price of \$0.40, but a few schools in all subgroups charged as little as \$0.20 to \$0.25. The average price charged for a reduced-price lunch has remained essentially constant since the SNDA-I study (SY 1991–1992). This is largely due to the fact that the Federally set maximum has not changed over the years. In addition, less than 10 percent of all SFAs reported increasing the price charged for a reduced-price lunch between SY 2004–2005 and SY 2009–2010 (Table 2.5).

Overall, the average price charged for a paid lunch in SY 2009–2010 was \$1.93 (Table 2.4). The most common (modal) price was \$2.00, and there was a wide range—from \$0.25 (very few schools) to \$4.00. The average price of a paid lunch was about \$0.20 higher in middle and high schools than in elementary schools (\$2.07 and \$2.04, respectively, versus \$1.86). The average price of a paid lunch also varied by school size, urbanicity, and district poverty level. Average prices were lowest in small schools (fewer than 500 students), rural schools, and schools in higher-poverty districts.

The average reported price of a paid lunch in the SNDA-III study was \$1.60 (Gordon et al. 2007). Thus, the average price of a paid lunch increased 21 percent between SY 2004–2005 and SY 2009–2010.⁸ This is consistent with the fact that more than half (55 percent) of all SFA directors reported increasing prices for paid lunches over this period (Table 2.5). When price increases were instituted, SFAs tended to implement them in all types of schools, rather, for example, than raising the price in high schools but not elementary schools.

⁷ The Healthy, Hunger-Free Kids Act of 2010 (PL 111-296) required schools to gradually increase the price charged for paid meals (with annual increases of no more than \$0.10) until the revenue per meal matches the per-meal Federal reimbursement for free meals. FNS implemented new regulations to address this requirement, effective July 1, 2011 (see www.fns.usda.gov/cnd/Governance/Legislation/Pricing_Equity_Facts.pdf).

⁸ The inflation-adjusted increase, based on the Consumer Price Index, is 8 percent.

Table 2.4. Prices Charged for Reduced-Price and Paid Lunches

	Prices for Reduced-Price Lunches				Prices for Paid Lunches			
	Mode	Mean	Minimum	Maximum	Mode	Mean	Minimum	Maximum
All Schools	\$0.40	\$0.39	\$0.20	\$0.40	\$2.00	\$1.93	\$0.25	\$4.00
School Type								
Elementary	0.40	0.39	0.20	0.40	2.00	1.86	0.25	3.50
Middle	0.40	0.39	0.20	0.40	2.00	2.07	0.75	3.25
High	0.40	0.39	0.20	0.40	2.00	2.04	0.75	4.00
School Size^a								
Small	0.40	0.39	0.25	0.40	2.00	1.87	0.27	3.50
Medium	0.40	0.39	0.20	0.40	2.00	1.97	0.25	3.50
Large	0.40	0.39	0.20	0.40	2.25	2.13	0.75	4.00
Urbanicity								
Urban	0.40	0.39	0.20	0.40	2.25	1.94	0.27	3.25
Suburban	0.40	0.39	0.25	0.40	2.00	2.04	0.25	4.00
Rural	0.40	0.39	0.25	0.40	2.00	1.74	0.75	3.25
District Child Poverty Level								
Low (< 30%)	0.40	0.39	0.25	0.40	2.00	2.03	0.25	4.00
Higher (≥ 30%)	0.40	0.39	0.20	0.40	2.00	1.72	0.27	3.00
Number of Schools	720				768			

Source: School Nutrition Dietary Assessment Study-IV, Foodservice Manager Survey, school year 2009-2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Note: Seventy schools that offered free lunches to all students were excluded from the tabulations. Eight schools that reported charging more than \$0.40 for a reduced-price lunch (the maximum allowed by law) were also excluded. In the analysis of reduced-price lunches, 37 schools were excluded because they were missing the price of a reduced-price lunch. In the analysis of paid lunches, 38 schools were excluded because they were missing the price of a paid lunch.

^aSmall = fewer than 500 students; Medium = 500 to 999 students; Large = 1,000 or more students.

Table 2.5. Changes in Prices Charged for Reduced-Price and Paid Lunches Since SY 2004–2005

Type of Lunch/ Change in Price	Percentage of SFAs that Changed Prices in...		
	Elementary Schools	Middle Schools	High Schools
Reduced-Price Lunch			
Increased	7.4	8.8	8.6
Decreased	0.4	0.4	0.8
No change	76.4	75.5	75.8
Don't know	7.8	7.8	7.2
Missing	8.1	7.5	7.6
Paid Lunch			
Increased	54.8	53.9	54.6
Decreased	0.8	0.8	0.5
No change	32.6	32.6	33.4
Don't know	7.8	7.8	7.2
Missing	4.1	4.9	4.3
Number of SFAs	545	547	554

Source: School Nutrition Dietary Assessment Study-IV, School Food Authority Director Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Note: Thirty-three SFAs reported that they had no elementary schools, 31 had no middle schools, and 24 had no high schools.

SY = school year.

2. Prices Charged for Reduced-Price and Paid Breakfasts

The maximum allowable price for a reduced-price breakfast is \$0.30. In SY 2009–2010, the average price charged for a reduced-price breakfast was \$0.30, overall and for most subgroups of schools (Table 2.6). Most schools reported charging the maximum allowable price, but some schools reported charging only \$0.20. The average price charged for a reduced-price breakfast has increased slightly over the years, from \$0.28 in SY 1998–1999 (SNDA-II; Fox et al. 2001) to \$0.29 in SY 2004–2005 (SNDA-III; Gordon et al. 2007) to \$0.30 in SY 2009–2010. Less than 10 percent of all SFAs reported increasing the price charged for a reduced-price breakfast between SY 2004–2005 and SY 2009–2010 (Table 2.7).⁹

⁹ Data were more often missing for breakfast prices than for lunch prices. This was likely attributable to the format and/or wording of a lead-in question on the self-administered FSM survey, which apparently caused many respondents to inadvertently skip the question on breakfast prices.

Table 2.6. Prices Charged for Reduced-Price and Paid Breakfasts

	Prices for Reduced-Price Breakfasts				Prices for Paid Breakfasts			
	Mode	Mean	Minimum	Maximum	Mode	Mean	Minimum	Maximum
All Schools	\$0.30	\$0.30	\$0.20	\$0.30	\$1.00	\$1.13	\$0.26	\$2.00
School Type								
Elementary	0.30	0.30	0.20	0.30	1.00	1.11	0.26	2.00
Middle	0.30	0.30	0.20	0.30	1.00	1.19	0.50	2.00
High	0.30	0.29	0.20	0.30	1.00	1.16	0.30	2.00
School Size^a								
Small	0.30	0.30	0.25	0.30	1.00	1.12	0.26	2.00
Medium	0.30	0.29	0.20	0.30	1.00	1.12	0.26	2.00
Large	0.30	0.30	0.20	0.30	1.00	1.23	0.50	2.00
Urbanicity								
Urban	0.30	0.30	0.20	0.30	1.00	1.12	0.26	2.00
Suburban	0.30	0.30	0.25	0.30	1.25	1.20	0.26	2.00
Rural	0.30	0.30	0.25	0.30	1.00	1.05	0.30	1.75
District Child Poverty Level								
Low (< 30%)	0.30	0.30	0.25	0.30	1.25	1.18	0.26	2.00
Higher (≥ 30%)	0.30	0.30	0.20	0.30	1.00	1.02	0.26	1.75
Number of Schools	474				601			

Source: School Nutrition Dietary Assessment Study-IV, Foodservice Manager Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Notes: Table includes only schools that participated in the SBP. One hundred and forty schools that offered free breakfasts to all students were excluded from the tabulations. Nineteen schools that reported charging more than \$0.30 for a reduced-price breakfast (the maximum allowed by law) were also excluded. In the analysis of reduced-price breakfasts, 100 schools were excluded because they were missing the price of a reduced-price breakfast. In the analysis of paid breakfasts, 65 schools were excluded because they were missing the price of a paid breakfast.

^aSmall = fewer than 500 students; Medium = 500 to 999 students; Large = 1,000 or more students.

Overall, the average price charged for a paid breakfast in SY 2009–2010 was \$1.13 (Table 2.6). The modal price was \$1.00 and the range was \$0.26 to \$2.00. On average, the price for a paid breakfast was \$0.05 to \$0.08 higher in middle and high schools than in elementary schools (\$1.19 and \$1.16, respectively, versus \$1.11). Like the average price of a paid lunch, the average price of a paid breakfast varied by school size, urbanicity, and district poverty level. Prices were lowest in small- and medium-sized schools (fewer than 1,000 students), rural schools, and schools in high-poverty districts.

The SNDA-III study reported an average price of \$0.88 for a paid breakfast (Gordon et al. 2007). Thus, the average price of a paid breakfast increased 28 percent between SY 2004–2005 and SY 2009–2010.¹⁰ About 4 in 10 SFA directors reported increasing prices for paid breakfasts over this period (Table 2.7).

Table 2.7. Changes in Prices Charged for Reduced-Price and Paid Breakfasts Since SY 2004–2005

Type of Breakfast/ Change in Price	Percentage of SFAs that Changed Prices in...		
	Elementary Schools	Middle Schools	High Schools
Reduced-Price Breakfast			
Increased	6.2	7.0	6.9
Decreased	3.0	2.8	3.0
No change	73.8	73.5	73.8
Don't know	8.1	8.1	7.7
Missing	8.9	8.5	8.6
Paid Breakfast			
Increased	42.1	43.4	43.4
Decreased	1.4	1.0	0.5
No change	42.7	41.0	42.7
Don't know	8.1	8.1	7.7
Missing	5.8	6.5	5.8
Number of SFAs	526	529	531

Source: School Nutrition Dietary Assessment Study-IV, School Food Authority Director Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Note: Thirty-three SFAs reported that they had no elementary schools, 31 had no middle schools, and 24 had no high schools.

SY = school year.

3. Price Elasticity of Paid Meal Participation

The Healthy, Hunger-Free Kids Act of 2010 (PL 111-296) required schools to gradually increase the price charged for paid meals (with annual increases of no more than \$0.10) until the revenue per meal matches the per-meal Federal reimbursement for free meals.¹¹ Because research has shown that paid meal participation rates are inversely associated with meal price (Dragoset and Gordon 2010; Moore, Hulsey, and Ponza 2009; Fox et al. 2001; Gleason 1995), concerns have been raised that this requirement might affect participation.

To provide some insight on this issue, we estimated the price elasticity of paid meal participation. Price elasticity is a measure of the responsiveness, or elasticity, of the demand for a good or service to a change in price. In this case, we estimated the change in a school's paid meal

¹⁰ The inflation-adjusted increase, based on the Consumer Price Index, is 15 percent.

¹¹ FNS implemented new regulations to address this requirement, effective July 1, 2011 (see www.fns.usda.gov/cnd/Governance/Legislation/Pricing_Equity_Facts.pdf).

participation rate that would be expected to occur with a 10 percent increase in the price of a paid meal.

The multivariate model considered key factors that could affect the decision to purchase a paid school meal, including the following:

- The availability of alternative food sources:¹²
 - Whether the school had foods available for purchase on an a la carte basis in the cafeteria
 - Whether the school had vending machines
 - Whether the school had a school store that sold foods and beverages and/or a snack bar
- Indicators of the healthfulness of school meals that have previously been associated with students' participation decisions (Dragoset and Gordon 2010):
 - Whether french fries were served
 - Whether only low-fat and skim/nonfat milks were offered
 - Whether cold cereal was offered every day
- Key school-level characteristics:
 - Whether meals were prepared offsite
 - Whether the school had a high proportion of students in poverty
 - School size
 - Region

The price elasticity of paid meal participation varies for lunch and breakfast. Overall, a 10 percent increase in the price of a paid lunch is associated with a decline of 1.5 percentage points in the rate of paid meal participation (Table 2.8).¹³ Similarly, a 10 percent increase in the price of a paid breakfast is associated with a decline of 0.5 percentage points in the rate of paid meal participation. The relationship between meal price and paid meal participation is statistically significant for both the NSLP and SBP.

Price elasticity also varies by school type. Among students not eligible for meal benefits, participation rates in the NSLP are much higher than in the SBP (48 versus 10 percent) (Table 2.2). Even after controlling for other alternatives, paid meal participation in the NSLP is more responsive to price changes than paid meal participation in the SBP. For the select group of students who participate in the SBP but are not eligible for meal benefits, participation might be driven largely by

¹² The availability of an open campus policy was considered when the model was being developed, but was ultimately not included because so few schools had open campus policies (see Chapter 3, Table 3.17a).

¹³ Full results for the regression model are shown in Appendix Tables B.3 and B.4.

factors other than price (such as bus schedules). For the much larger group of students who purchase paid NSLP lunches, whose situations could be less constrained, the price might have a larger effect on their decision to participate. This is consistent with the lower price elasticities of paid meal participation within high schools, where participation rates are the lowest, compared with elementary and middle schools. Of course, it is possible that other factors not accounted for in our model are associated with both paid meal prices and paid meal participation rates. Therefore, these results are best interpreted as associations, not causal relationships.

Table 2.8. Price Elasticity of Paid Meal Participation

	Estimated Change in Paid Meal Participation Associated with a 10 Percent Increase in Meal Price (Percentage Points)			
	Elementary Schools	Middle Schools	High Schools	All Schools
NSLP Participation	-1.5**	-2.1*	-0.5	-1.5**
Number of Schools	255	241	230	726
SBP Participation	-0.6	-0.6**	-0.3	-0.5*
Number of Schools	209	209	202	620

Source: School Nutrition Dietary Assessment Study-IV, Menu Survey, Foodservice Manager Survey, and School Food Authority Director Survey, school year 2009-2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Notes: Participation is measured as the ratio of the average daily number of paid meals served to the number of students not eligible for free or reduced-price meal benefits (and therefore eligible for paid meals).

Control variables included alternative food sources (a la carte, vending machines, school store, or snack bar); healthy meal options (french fries not served, only 1% or skim milk offered, cereal served every day); school enrollment; off-site meal preparation; poverty status; and region.

The analysis included only schools that served paid meals. Paid meal participation rates could not be calculated for schools that lacked information on the number of students approved for free and reduced-price meal benefits or for schools that had conflicting data on enrollment and student eligibility for meal benefits. Eighty-eight schools were excluded from the lunch analysis and 52 schools were excluded from the breakfast analysis because of missing/conflicting data.

NSLP = National School Lunch Program; SBP = School Breakfast Program.

* $p < 0.05$; ** $p < 0.01$.

E. Menu Planning and Meal Production

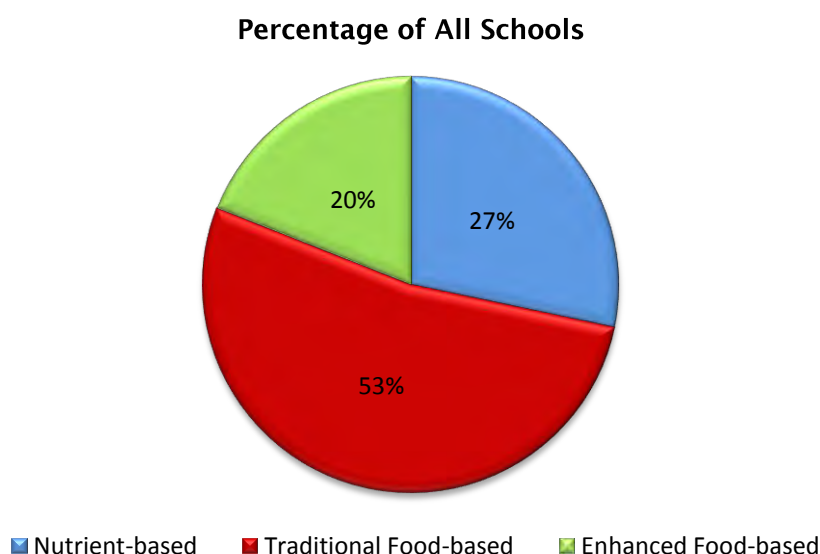
1. Menu-Planning Systems

In SY 2009–2010, SFAs participating in the NSLP had five options for planning menus. Two of the menu-planning systems were food-based and included requirements for food groups (meal components) to be included in each meal as well as minimum acceptable serving sizes for children in different grades. The traditional and enhanced food-based menu-planning systems were similar, but the enhanced food-based system required more servings of bread or grain products over the course of a week and larger servings of fruit and vegetables. SFAs also had the option to use nutrient-based

menu planning, referred to as nutrient standard menu planning (NSMP). NSMP required that SFAs use one of several USDA-approved computerized nutrient analysis systems to plan menus and imposed few food-based menu requirements. A variant of NSMP known as assisted nutrient standard menu planning (ANSMP) allowed SFAs to arrange for external sources to assist with menu planning and/or nutrient analysis. Finally, SFAs could use any other reasonable approach to plan menus, as long as the menus met the nutrition standards.¹⁴

In SY 2009–2010, 73 percent of schools used food-based menu planning (Figure 2.1). More than half of all schools (53 percent) used traditional food-based menu planning and another 20 percent used enhanced food-based menu planning. About a quarter of all schools (27 percent) used nutrient-based menu planning.^{15,16} Changes in the use of the different menu-planning systems since SY 2004–2005 are discussed in Chapter 11.

Figure 2.1. Menu-Planning Systems Used in SY 2009–2010



Source: School Nutrition Dietary Assessment Study–IV, School Food Authority Director Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Note: Nutrient-based menu planning includes both nutrient standard menu planning (NSMP) and assisted nutrient standard menu planning (ANSMP).

SY = school year.

¹⁴ Details about the specific requirements of each menu-planning approach are provided in Appendix A.

¹⁵ Nutrient-based menu planning includes both NSMP and ANSMP. Menu-planning systems were reported by SFA directors. Six schools (about 1 percent of the weighted sample) reportedly used an “other reasonable approach” to plan menus. Based on the descriptions provided and information available from school district websites, we categorized these approaches into one of the main menu-planning systems.

¹⁶ Appendix Table B.5 presents data on menu-planning system by school type. There is relatively little variation by school type because most SFAs use the same menu-planning system for all schools.

2. Menu-Planning Practices and Procedures

By a wide margin, most menus were planned at the SFA level. According to SFA directors, only 4 percent of schools planned their own menus (Table 2.9). SFAs that elected to use food-based menu planning were not required to analyze the nutrient content of planned menus. They were, however, expected to meet the nutrition standards defined under SMI. Consequently, many SFAs that used food-based menu planning analyzed the nutrient content of their menus to assess compliance with SMI standards. In SY 2009–2010, menus planned for almost two-thirds (63 percent) of the nation’s schools were analyzed for nutrient content.

Table 2.9. Menu-Planning Practices and Procedures

Practice/Procedure	Percentage of Schools			
	Elementary Schools	Middle Schools	High Schools	All Schools
School Planned Their Own Menus	3.4	4.0	6.2	4.1
Menus Were Assessed Using Computerized Nutrient Analysis	63.9	64.0	57.8	62.7
Among Schools Where Computerized Nutrient Analysis was Conducted (n = 566)				
Type of Analysis Conducted				
Weighted (meals <i>served</i>)	50.4	50.4	48.4	50.1
Unweighted (meals <i>offered</i>)	27.4	25.6	27.5	27.1
Both weighted and unweighted	20.1	20.8	19.3	20.1
Missing	2.1	3.1	4.8	2.8
Analysis of Breakfast and Lunch				
Analyze breakfast and lunch separately	68.7	69.1	70.9	69.2
Analyze breakfast and lunch together	10.9	11.4	7.8	10.4
Analyze only lunch	0.0	0.0	0.0	0.0
Analyze only breakfast	18.8	16.4	18.0	18.2
Missing	1.6	3.1	3.2	2.2
Software System Used				
NUTRIKIDS	86.5	84.0	84.7	85.7
Meal Tracker	0.8	0.9	0.9	0.8
Visual B.O.S.S.	3.2	4.0	3.0	3.3
TrakNOW	1.5	0.3	1.0	1.2
PCS Revenue Control Systems	1.4	1.3	1.2	1.3
Meals Plus Menus	1.2	1.6	1.2	1.2
Other	3.8	5.5	5.4	4.4
Missing	1.7	2.4	2.6	2.0
Number of Schools	300	272	270	842

Source: School Nutrition Dietary Assessment Study–IV, School Food Authority Director Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Note: SFA director responses were applied to each sampled school in the SFA.

The nutrient content of planned menus can be assessed using two different approaches. A weighted nutrient analysis incorporates information about students' food selection patterns and gives more weight to the nutrient content of foods and beverages selected most frequently. As such, a weighted nutrient analysis provides a picture of the nutrient content of the average meal *served* to students. An unweighted analysis is a simple average that gives equal weight to all foods and beverages offered within specific meal component categories. An unweighted analysis provides a picture of the nutrient content of the average meal *offered* to students.

Among schools where computerized nutrient analysis was used to assess planned menus, the nutrient analysis was most often weighted. Menus in 50 percent of schools were assessed using only a weighted analysis (Table 2.9). Menus in another 20 percent of schools were assessed using both weighted and unweighted analyses, meaning that, overall, menus in 70 percent of schools underwent weighted nutrient analysis. In contrast, menus in 47 percent of schools were assessed using an unweighted analysis, either alone (27 percent of schools) or in combination with a weighted analysis (20 percent).

In most schools (69 percent) where computerized nutrient analysis was used, separate analyses were conducted for breakfast and lunch menus (Table 2.9). In 18 percent of schools, only the breakfast menu was analyzed. This might reflect the fact that many schools had difficulty meeting the SMI standard for calories in breakfasts (see Chapter 7). The vast majority of schools that used computerized nutrient analysis to assess planned menus used NUTRIKIDS software.

Menus were analyzed for nutrient content in 52 percent of schools that used traditional food-based menu planning and 44 percent of schools that used enhanced food-based menu planning (Table 2.10). Most schools that used nutrient-based menu planning (65 percent) conducted only a weighted nutrient analysis.¹⁷ Among schools that used food-based menu planning and also assessed nutrient content, there was more diversity in the analytic approach used.

Twenty-two percent of schools that used nutrient-based menu planning conducted a combined nutrient analysis (analyzing breakfast and lunch together) (Table 2.10). This approach to nutrient analysis was rare among schools that used food-based menu planning.¹⁸ For most schools that used food-based menu planning and also assessed nutrient content, both breakfast and lunch menus were analyzed and the analyses were conducted separately. However, for almost one-third (30 percent) of the traditional food-based menu planning schools in this group, only breakfast menus were analyzed.

¹⁷ Among schools that used NSMP or ANSMP, survey responses in a small number of schools (3 percent) indicated that a nutrient analysis was not conducted.

¹⁸ SMI regulations permitted schools that used nutrient-based menu planning to conduct a combined analysis as long as the analysis was weighted.

Table 2.10. Menu-Planning Practices and Procedures, by Menu-Planning System

	Percentage of Schools		
	Traditional Food-Based	Enhanced Food-Based	Nutrient-Based
Menus Were Assessed Using Computerized Nutrient Analysis	51.8	44.0	96.6
Among Schools Where Computerized Nutrient Analysis was Conducted (n = 566)			
Type of Analysis Conducted			
Weighted (meals <i>served</i>)	41.6	31.8	64.6
Unweighted (meals <i>offered</i>)	32.1	25.2	22.5
Both weighted and unweighted	23.1	35.3	12.1
Missing	3.2	7.6	0.8
Analysis of Breakfast and Lunch			
Analyze breakfast and lunch separately	64.8	77.8	71.0
Analyze breakfast and lunch together	2.0	0.0	22.4
Analyze only lunch	0.0	0.0	0.0
Analyze only breakfast	30.0	16.3	6.6
Missing	3.2	6.0	0.0
Number of Schools	432	161	249

Source: School Nutrition Dietary Assessment Study-IV, School Food Authority Director Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Notes: SFA director responses were applied to each sampled school in the SFA.

Nutrient-based menu planning includes schools that used nutrient standard menu planning (NSMP) and assisted nutrient standard menu planning (ANSMP).

3. Recipe Modification

SFA directors were asked whether they had modified any recipes since SY 2004–2005 (when the SNDA-III study was conducted) to adjust calorie or nutrient content. Most SFA directors (89 percent) reported modifying some recipes (Table 2.11). Among SFAs that modified recipes, prepared entree items were modified most often, followed by sandwiches, vegetable side dishes, and desserts.¹⁹ Three-fourths or more of SFAs that modified recipes focused on calorie, fat, saturated fat, and/or whole grain content. More than half focused on sodium, trans fat, sugar, and/or dietary fiber content. Almost two-thirds of SFAs that modified recipes (65 percent) reported adjusting portion sizes.

¹⁹ There were no marked differences in the prevalence or focus of recipe modification by menu-planning system (data not shown in table).

Table 2.11. Recipe Modifications Since SY 2004–2005

	Percentage of SFAs
Have Modified Recipes Since SY 2004–2005	89.1
Among SFAs that Modified Recipes (n = 525)	
Recipes Targeted	
Prepared entree items	83.5
Sandwiches	60.5
Vegetable side dishes	57.0
Desserts	56.5
Sauces and gravies	47.6
Prepared salads	47.3
Other	6.7
Nutrients/Food Components Targeted	
Calories	81.2
Fat	80.1
Saturated fat	79.4
Whole grains	75.1
Sodium	69.9
Trans fat	66.6
Portion or serving size	64.8
Sugar	62.8
Dietary fiber	56.5
Cholesterol	38.9
Protein	37.7
Vitamin C	30.0
Vitamin A	26.9
Calcium	26.3
Iron	23.6
Other	1.5
Number of SFAs	578

Source: School Nutrition Dietary Assessment Study–IV, School Food Authority Director Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Note: Multiple responses were allowed.

SFA = School Food Authority; SY = school year.

4. Food Purchasing Practices

SFA directors were asked about use of specific food purchasing practices that might affect the nutritional quality of school meals or the overall school food environment. In the mid-1990s, USDA and the Department of Defense (DoD) collaborated on formation of the DoD Fresh Fruit and Vegetable Program (DoD Fresh). This program makes use of military distribution channels to increase the availability of fresh produce to schools as USDA commodities. Almost a third (31 percent) of SFAs reported participating in the DoD Fresh program in SY 2009–2010 (Table 2.12). This is almost double the proportion of SFAs that reported participation in the DoD Fresh program in SY 2004–2005 (SNDA-III; Gordon et al. 2007). SFAs may also participate in farm-to-school programs, which help schools serve healthy meals by connecting them with local farms. Only 13 percent of SFAs reported participating in programs of this kind in SY 2009–2010.²⁰ This is just a slight increase over the proportion of SFAs that reported participating in farm-to-school programs in SY 2004–2005 (10 percent; Gordon et al. 2007).

SFAs may purchase foods from national or regional brand-name or chain restaurants. Fewer than 20 percent of SFAs reported purchasing such foods in SY 2009–2010 (Table 2.12). Among SFAs that purchased restaurant foods, most (85 percent) offered these foods in reimbursable meals. This was reported most often for high schools (83 percent of SFAs that purchased restaurant foods) and least often for elementary schools (51 percent). Most SFAs that purchased restaurant foods purchased pizza—four of the five most common brand-name restaurants were pizza restaurants.

More than one-fourth of SFAs (27 percent) reported having a pouring rights contract (Table 2.12). These contracts allow schools to earn revenue by granting soft drink manufacturers exclusive rights to sell beverages (other than milk) in specific locations within a school.²¹ Most SFAs that have pouring rights contracts have contracts that affect all schools in the district. Almost two-thirds (63 percent) of the SFAs with pouring rights contracts had contracts that limited the beverages sold in foodservice areas. Use of the revenue earned from these contracts varied.²² More than one-quarter (27 percent) of directors in SFAs with pouring rights contracts reported that the revenue went to the school foodservice account. Most often (in 39 percent of SFAs with pouring rights contracts), revenue reportedly went to individual school accounts. Nineteen percent of SFA directors with pouring rights contracts were not sure where the revenue went.

²⁰ The survey question, which is the same as the question used in SNDA-III, asked about “State Farm-to-School” programs. It is possible that directors of SFAs that participated in a farm-to-school program that was not coordinated or sponsored by the State did not respond affirmatively to this question. However, the SNDA-IV estimate is consistent with data reported by the National Farm to School Network, with whom USDA is working cooperatively to promote farm-to-school partnerships. The National Farm to School Network estimated that, in 2009, 2000 farm-to-school programs were operating in 40 States (see <http://www.farmtoschool.org/files/F2SChronology3.09.pdf>). More current information reported on their web page (<http://www.farmtoschool.org>) shows that there is roughly a 1-to-1 ratio between the number of farm-to-school programs and the number of school districts involved. Thus, if we assume that each of the 2000 programs active in 2009 served one SFA, and that there were approximately 15,600 SFAs in SY 2009–2010 (see Table 1.5), this equates to 13 percent of all SFAs.

²¹ SFAs may also have broader vending contracts that control snack items as well as beverages. The survey question asked specifically about “pouring rights” contracts and restrictions on beverage vendors.

²² The survey did not collect information on the amount of revenue earned from pouring rights contracts.

Table 2.12. Food Purchasing Practices

Purchasing Practice	Percentage of SFAs
SFA Purchases Foods Through DoD Fresh Program	31.1
SFA Purchases Foods Through State Farm-to-School Program	13.3
One or More Schools in SFA Offer Foods from Brand-Name or Chain Restaurants	16.8
SFA Has Pouring Rights Contract	27.1
District-wide	18.0
Only some schools	9.0
Among SFAs with Schools Offering Foods from Brand-Name or Chain Restaurants (n = 112)	
These Items Are Offered in Reimbursable Meals	84.7
Schools Offering These Items	
Elementary schools	51.4
Middle schools	67.8
High schools	82.8
Brand-Name or Chain Restaurants Providing Food^a	
Domino's Pizza	32.1
Pizza Hut	23.9
Subway	16.8
Papa John's Pizza	12.7
Little Caesar's Pizza	7.8
Other pizza vendors	20.1
All other responses	11.0
Among SFAs With Pouring Rights Contracts (n = 188)	
Contract Limits Types or Brands of Beverages Sold in Foodservices Areas	63.2
Income from Contract Goes to^a	
Individual school funds	39.1
Athletic department	27.9
School foodservice account	27.1
District fund	24.0
Other	3.5
Don't know	18.8
Number of SFAs	578

Source: School Nutrition Dietary Assessment Study-IV, School Food Authority Director Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

^aMultiple responses were allowed.

DOD = Department of Defense; SFA = School Food Authority.

Use of Purchasing Specifications

One way SFAs can influence the nutritional quality of school meals is to incorporate nutrient-focused requirements in the purchasing specifications they provide to vendors. There was a relatively high level of missing data for the survey item that asked about such specifications. However, for each nutrient included in the survey question, 34 to 56 percent of SFAs reported purchasing specifications (for at least some foods) that included per-serving requirements (Table 2.13). SFAs most frequently reported nutrient-focused purchasing specifications for fat content,

including total fat (56 percent), trans fat (54 percent), and saturated fat (52 percent). More than 4 in 10 SFAs reported purchasing specifications that included per-serving requirements for whole grains (46 percent), calories (45 percent), sugar (44 percent), and sodium (42 percent), and about one-third (34 percent) reported purchasing specifications that included per-serving requirements for dietary fiber.

Table 2.13. Use of Food Purchasing Specifications that Include Per-Serving Requirements for Specific Nutrients

Nutrient	Percentage of SFAs		
	Yes	No	Missing
Total Fat	56.1	33.1	10.8
Trans Fat	53.5	35.0	11.5
Saturated Fat	51.5	37.5	11.0
Whole Grains	45.5	42.1	12.4
Calories	44.9	44.5	10.6
Total or Added Sugar	43.5	44.3	12.2
Sodium	41.9	46.4	11.7
Dietary Fiber	34.0	54.2	11.8
Other	2.3	n.a.	n.a.
Number of SFAs	578		

Source: School Nutrition Dietary Assessment Study–IV, School Food Authority Director Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

SFA = School Food Authority.

5. Meal Preparation and Production Systems

Most schools (80 percent) prepared food on site, and almost three-fourths (72 percent) prepared meals for their school only (Table 2.14). One in five schools received partially prepared or fully plated meals from a separate base or central kitchen—16 percent of schools received partially prepared meals and 4 percent received fully plated meals. Partially prepared meals were more common among elementary schools than middle or high schools (21 percent versus 10 and 4 percent, respectively). In contrast, high schools were more than four times as likely as elementary schools to prepare meals for shipment to other schools (21 versus 5 percent).

6. Use of USDA Resources and Guidance Materials

USDA makes available a wide variety of resources and guidance materials to assist SFAs in planning menus, modifying recipes, and developing food purchasing specifications. SFA directors were asked about their use of specific materials since SY 2004–2005. Almost all SFA directors (94 percent) reported using one or more of these materials (Table 2.15). SFAs made the most use of the Food Buying Guide for Child Nutrition Programs (65 percent), Recipes for Schools (62 percent), and guidance materials related to OVS requirements (58 percent).

Table 2.14. Meal Preparation and Production Systems

	Percentage of Schools			
	Elementary Schools	Middle Schools	High Schools	All Schools
Meals Prepared On Site for Serving Only at that School	69.4	80.3	70.5	71.6
Receives Partially Prepared Meals from a Separate Base or Central Kitchen	21.2	9.5	3.7	15.5
Meals Prepared On Site for Serving at that School and Shipment to Other Schools	4.8	8.1	21.3	8.8
Receives Fully Plated Meals from a Separate Base or Central Kitchen	4.8	2.0	4.5	4.2
Number of Schools	315	284	277	876

Source: School Nutrition Dietary Assessment Study–IV, Foodservice Manager Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Table 2.15. Use of USDA Resources and Guidance Materials Since SY 2004–2005

Resource/Guidance Material	Percentage of SFAs
Food Buying Guide for Child Nutrition Programs	64.8
Recipes for Schools	62.0
Offer–Versus–Serve	58.0
Fact Sheets for Healthier School Meals	43.4
Menu Planner for Healthy School Meals	39.5
Fruits and Vegetables Galore	36.1
Road to SMI Success: A Guide for School Food Service Directors	26.0
SMI Frequently Asked Questions	25.8
New School Lunch and Breakfast Recipes/Tool Kit for Healthy School Meals	23.4
HealthierUS School Challenge Whole Grains Resource	22.9
Changing the Scene: Improving the School Nutrition Environment	17.7
Team Nutrition Guide to Purchasing Food Service Equipment	16.1
Choice Plus: A Reference Guide for Foods and Ingredients	13.7
Nutrient Analysis Protocols: How to Analyze Menus for USDA’s School Meals Programs	13.4
Making it Happen! School Nutrition Success Stories	13.3
First Choice (Second Edition)	8.6
Menu Planning Tools—South Dakota Team Nutrition	3.0
Other	1.4
None of the Above	5.6
Number of SFAs	578

Source: School Nutrition Dietary Assessment Study–IV, School Food Authority Director Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Note: Multiple responses were allowed.

SFA = School Food Authority; SMI = School Meals Initiative for Healthy Children; SY = school year.

7. Use of Foodservice Management Companies

Some school districts contract with FSMCs to operate all or part of their school meal programs. In SY 2009–2010, FSMCs were used by fewer than 1 in 5 SFAs (19 percent) (Table 2.16).²³ Use of FSMCs was more common in medium-sized districts, districts with low levels of child poverty, and urban and suburban districts. FSMCs were notably more prevalent in the mid-Atlantic and Northeast than in other areas of the country (39 and 31 percent of SFAs, respectively, versus 2 to 22 percent). FSMCs were rare (2 percent) in the Southeast. In most SFAs that used FSMCs (77 percent), FSMC staff planned menus. In 20 percent of SFAs that used FSMCs, FSMC and school district staff shared responsibility for menu planning.

Table 2.16. Use of Foodservice Management Companies

	Percentage of SFAs
All Public SFAs	18.7
SFA Size	
Small (fewer than 1,000 students)	13.5
Medium (1,000 to 4,999 students)	25.6
Large (more than 5,000 students)	19.6
District Child Poverty Level	
Low (< 30 percent)	21.1
Higher (≥ 30 percent)	12.8
Urbanicity	
Urban	30.0
Suburban	25.4
Rural	8.6
FNS Region	
Northeast	31.4
Mid-Atlantic	38.8
Southeast	2.3
Midwest	22.0
Southwest	13.6
Mountain Plains	9.1
West	13.4
Among SFAs Using a Foodservice Management Company (n = 112)	
Menu Planning Performed by:	
School district	2.8
Foodservice management company	77.4
Shared by district and foodservice management company	19.8
Number of SFAs	578

Source: School Nutrition Dietary Assessment Study–IV, School Food Authority Director Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

FNS = Food and Nutrition Service; SFA = School Food Authority.

²³ This is up 6 percentage points since SY 2004–2005 (Gordon et al. 2007).

F. Meal Service Practices

1. Locations Where Students Eat Breakfast

Schools sometimes serve breakfast in locations other than the school cafeteria in order to facilitate student participation and/or make it easier to feed large groups of students in a short time. For example, some schools serve breakfast in classrooms or offer grab-and-go breakfasts that children can pick up and bring with them to class. In SY 2009–2010, use of these alternative methods of breakfast service were not very common. Most schools (82 percent) served breakfast only in the cafeteria (Table 2.17). Only 9 percent of schools reported serving breakfast in classrooms and only 7 percent reported offering grab-and-go options. The survey question included a response option for serving breakfast on school buses. No respondents reported serving breakfast this way.²⁴

Table 2.17. Locations Where Students Eat Breakfast

Location	Percentage of Schools			
	Elementary Schools	Middle Schools	High Schools	All Schools
Cafeteria Only	79.1	87.6	83.4	81.5
Classrooms	11.7	4.8	4.0	8.9
Grab and Go	7.4	5.7	8.4	7.3
School Buses	0.0	0.0	0.0	0.0
Other	2.9	1.5	4.5	3.0
Number of Schools	282	265	259	806

Source: School Nutrition Dietary Assessment Study–IV, Foodservice Manager Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Notes: Table includes only schools that participated in the School Breakfast Program. Multiple responses were allowed.

²⁴ These results are based on the FSM survey. The pattern of findings was similar for the principal survey, which included a similar question; however the point estimates were somewhat different. Principals in more than 90 percent of schools reported that students ate breakfast in the cafeteria or some other foodservice area and principals in 12 percent of schools reported that students ate breakfast in classrooms.

2. Use of the Offer-Versus-Serve Option

OVS allows students to take fewer than the minimum number of meal components that must be offered in reimbursable meals. The dual goals of the policy are to minimize food waste and to allow students to make choices about their meals. OVS allows students to refuse one or more of the items offered, while still allowing the school to count the meal as reimbursable.²⁵ By law, all high schools must use OVS at lunch. In SY 2009–2010, most elementary and middle schools used the OVS option for both lunch and breakfast (Table 2.18). Most schools (71 percent for lunch and 75 percent for breakfast) made the option available to all students.

Table 2.18. Use of the Offer-Versus-Serve Option

Use of Offer-versus-Serve	Percentage of Schools		
	Elementary Schools	Middle Schools	All Elementary and Middle Schools
Uses Offer-Versus-Serve Option for Lunch			
Yes, for all students	68.8	76.7	70.6
Yes, but only for some students	9.3	5.4	8.4
No	9.5	4.1	8.3
Missing	12.4	13.8	12.7
Number of Schools	315	284	599
Uses Offer-Versus-Serve Option for Breakfast			
Yes, for all students	72.6	82.2	74.8
Yes, but only for some students	3.2	0.5	2.6
No	12.0	4.7	10.3
Missing	12.3	12.6	12.3
Number of Schools	282	265	547

Source: School Nutrition Dietary Assessment Study-IV, Foodservice Manager Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Note: Foodservice managers in high schools were not asked about use of the Offer-Versus-Serve (OVS) option because OVS is mandatory for high schools at lunch.

3. Meal-Counting Practices

Schools use a variety of methods to determine, at the point of sale, which students are eligible to receive free or reduced-price meals and thereby track and count reimbursable meals. In SY 2009–2010, most schools (65 percent) used personal identification numbers (PINs) for this purpose (Table

²⁵ In SY 2009–2010, students in schools that used food-based menu planning were required to take at least three of the five components offered at lunch and at least three of the four components offered at breakfast. Under nutrient-based menu planning, at least three menu items (an entree, one or more sides, and fluid milk) had to be offered at lunch, but additional menu items might be needed to meet nutrient standards. At least three menu items had to be offered at breakfast. Students were required to take at least two menu items and could decline no more than two menu items at lunch and only one item at breakfast (USDA, FNS 2004).

2.19). Other less common automated approaches to student identification included bar codes or magnetic strips (11 percent of schools), unspecified automated systems (7 percent), and finger scans (1 percent). Almost one-third (31 percent) of schools used nonelectronic systems to determine student eligibility, such as cashier lists (15 percent), identification cards (6 percent), verbal identification (5 percent), and tickets or tokens (5 percent). These nonelectronic methods were used more often by elementary schools than middle or high schools. For example, 19 percent of elementary schools used cashier lists to identify students versus 9 percent of middle schools and 10 percent of high schools.

Table 2.19. Methods Used by Cashiers to Identify Students Eligible for Free and Reduced-Price Meals

Method	Percentage of Schools			
	Elementary Schools	Middle Schools	High Schools	All Schools
Personal ID Numbers (PINs)	60.8	71.2	70.2	64.6
Cashier Lists	18.8	8.5	9.6	15.1
Bar Code/Magnetic Strip	11.2	12.8	10.0	11.2
Coded Identification Cards	6.1	6.2	4.5	5.8
Verbal Identification	6.6	3.9	2.6	5.3
Coded Tickets or Tokens	5.9	3.9	1.8	4.7
Other	9.0	8.1	7.6	8.5
Automated computer or point of sale system, not further specified	7.8	5.5	4.7	6.8
Finger scan	0.4	2.0	1.5	0.9
Number of Schools	315	284	277	876

Source: School Nutrition Dietary Assessment Study–IV, Foodservice Manager Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Note: Multiple responses were allowed.

G. Food Safety and Sanitation

The Child Nutrition and WIC Reauthorization Act of 2004 (PL 108-265) required that all SFAs implement a food safety program by the beginning of SY 2005–2006. The food safety program must be based on Hazard Analysis and Critical Control Point (HACCP) principles and conform to guidance issued by USDA (USDA, FNS 2005). USDA required that SFAs have a written food safety plan for all of their food preparation and service sites (USDA, FNS 2005).

In SY 2009–2010, directors in 91 percent of SFAs reported that all of their schools had the required food safety plan (Table 2.20). SFA directors who reported having the required food safety plan for all of their schools were asked whether the plan included certain components required under USDA guidance. Most of these SFA directors reported that the required components were present. The list of components included a nonsense item (procedures for assessing mercury levels in cooked foods), which was meant to provide a barometer of the relative reliability of respondents' self-reports. The fact that few SFA directors (9 percent) responded affirmatively to the nonsense item suggests that their responses about food safety plan content are reliable.

Table 2.20. Food Safety and Sanitation Practices

Food Safety/Sanitation Practice	Percentage of SFAs
All Schools Have Food Safety Plan Based on HACCP Principles	91.0
Foodservice Personnel Are Required to Have Food Safety Certification	67.4
Have Policies and Procedures to Accommodate Students with Food Allergies	91.7
Among SFAs with Food Safety Plans in All Schools (n = 550)	
Components Included in Food Safety Plan^a	
Monitoring of food safety procedures	94.5
Written standard operating procedures	92.8
Recordkeeping	92.0
Documentation of hazards or HACCP category for menu items served	85.7
Procedures for correcting problems	85.0
Periodic review and revision of the food safety plan	79.2
Procedures for assessing mercury levels in cooked foods	9.2
Among SFAs that Require Food Safety Certification (n = 406)	
Personnel Required to Have Food Safety Certification^a	
Managers	86.7
Cooks	67.4
Assistant Managers	42.4
Other	18.2
Among SFAs with Policies/Procedures for Students with Food Allergies (n = 534)	
Policies and Procedures Used^a	
Procedures to identify students in the serving line	73.6
Special training for foodservice staff	59.1
Special sanitation procedures in the kitchen and/or dining area	39.9
Separate tables	33.1
Other	11.3
Number of SFAs	578

Source: School Nutrition Dietary Assessment Study–IV, School Food Authority Director Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

^aMultiple responses were allowed.

HACCP = hazard analysis and critical control point; SFA = School Food Authority.

Two-thirds (67 percent) of SFA directors reported that food safety certification is required for at least some foodservice personnel (Table 2.20). Among SFAs that require food safety certification, most (87 percent) require that managers have certification and two-thirds require that cooks have certification. Forty-two percent of SFAs that require food certification require it for assistant managers and 18 percent require it for other foodservice staff.

Almost all SFAs directors (92 percent) reported that they have policies and procedures to accommodate students with food allergies (Table 2.20). About three-quarters of these SFA directors reported that they had procedures in place to identify children with allergies when they are in the serving line; more than half (59 percent) reported that they provide special training on dealing with food allergies to foodservice staff; and 40 percent reported having special sanitation procedures to protect students with food allergies. One-third of SFA directors who reported having policies and

procedures related to student food allergies reported having separate tables for these students. Additionally, 4 percent of SFA directors volunteered that they eliminate certain known allergens from their menus, such as peanuts (data not shown in table).

H. Education, Experience, and Credentials of SFA Directors, Foodservice Managers, and Menu Planners

Almost one-third (32 percent) of SFA directors and FSMs reported that they had some college education, but no degree (Table 2.21). Almost half (45 percent) of SFA directors had some type of college degree—17 percent reported a bachelor’s degree, 16 percent reported a graduate degree, and 12 percent reported an associate’s degree. About one-fourth of FSMs had a college degree (11 percent bachelor’s, 10 percent associate’s, and 5 percent graduate degree). Overall, SFA directors and FSMs were highly experienced. On average, SFA directors had been in their positions for 10 years and FSMs had been in theirs for 16 years. There was a wide range of experience, however, including some directors and FSMs who were new to their jobs and some who had been in their present positions for 40 years or more.

Table 2.21. Education and Experience of SFA Directors and Foodservice Managers

	Percentage of SFA Directors	Percentage of Foodservice Managers
Highest Level of Education Completed		
Some college, no degree	31.6	32.2
High school	21.5	38.0
Bachelor’s degree	17.4	10.9
Graduate degree	15.5	4.7
Associate’s degree	11.6	9.8
Less than high school	0.3	1.9
Missing	2.1	2.5
Years in Position		
Mean	10	16
Mode	3	10
Minimum	0	0
Maximum	40	42
Number of SFAs/Schools	578	876

Source: School Nutrition Dietary Assessment Study-IV, School Food Authority Director Survey and Foodservice Manager Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

SFA directors and FSMs reported the specific credentials that they held. SFA directors also reported this information for the staff member with primary responsibility for planning menus. For about 60 percent of those in each group, the reported credential (which was offered as a response option on the surveys) was on-the-job training (Table 2.22). Twenty-nine percent of SFA directors and menu planners and 45 percent of FSMs reported having State foodservice certification and 14 to 18 percent of those in each group had School Nutrition Association (SNA) certification. Menu planners were most likely to possess nutrition-related credentials, such as being a registered dietitian (11 percent), licensed nutritionist (4 percent), or master’s-level nutritionist (5 percent).

Table 2.22. Credentials of SFA Directors, Menu Planners, and Foodservice Managers

Credentials Held	Percentage of SFA Directors	Percentage of Menu Planners	Percentage of Foodservice Managers
On-the-Job Training	62.5	61.9	61.1
State Foodservice Certificate	28.9	28.5	44.8
School Nutrition Specialist or SNA certified	18.1	17.2	13.5
Bachelor's Degree in Consumer Science, Hotel/Restaurant Management, Bakery/Culinary Arts, or Related Field	15.5	15.1	9.2
Associate's Degree in Consumer Science, Hotel/Restaurant Management, Bakery/Culinary Arts, or Related Field	8.2	8.1	7.3
Registered Dietitian	5.5	10.7	3.7
Licensed Nutritionist	3.4	4.3	1.7
Master's-Level Nutritionist	3.3	4.8	2.4
Other	9.7	8.6	14.8
Number of SFAs/Schools	578	578	876

Source: School Nutrition Dietary Assessment Study-IV, School Food Authority Director Survey and Foodservice Manager Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Note: Multiple responses were allowed.

SFA = School Food Authority; SNA = School Nutrition Association.

Three-fourths of SFA directors reported that they had other responsibilities in addition to those associated with their role as SFA director (Table 2.23). More than 40 percent of SFA directors also worked as FSMs in one or more schools on a full-time (38 percent) or part-time (5 percent) basis. A small percentage of SFA directors (8 percent) also worked as the district business manager or transportation director (4 percent). One-fourth of SFA directors reported myriad other responsibilities; however, no other single type of responsibility was reported by more than 2 percent of respondents.

Table 2.23. Other Responsibilities of SFA Directors

Other Responsibilities	Percentage of SFA Directors
Full-Time School Foodservice Manager in One or More Schools	38.3
No Other Responsibilities	25.0
Business Manager (District)	7.5
Part-Time School Foodservice Manager in One or More Schools	5.3
Transportation Manager (District)	4.4
Other	24.8
Number of SFAs	578

Source: School Nutrition Dietary Assessment Study-IV, School Food Authority Director Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Note: Multiple responses were allowed.

SFA = School Food Authority.

CHAPTER 3

CHARACTERISTICS OF SCHOOL FOOD AND PHYSICAL ACTIVITY ENVIRONMENTS

Historically, the USDA, which administers the NSLP and the SBP, has had limited control over school-level policies and practices that, while not directly associated with the school meal programs, may influence children's dietary intakes and overall health. This includes, for example, policies and practices related to nutrition education and promotion; physical education; opportunities for physical activity; availability of foods outside of the school meals programs (for example through vending machines and school stores); and meal scheduling. In concert with characteristics of the meals offered to students through the NSLP and SBP, these policies and practices constitute a school's food and physical activity environment. Research has shown that school environments are associated with students' dietary behaviors, physical activity levels, and body weight (Centers for Disease Control and Prevention [CDC] 2011; Fox et al. 2009b; Perry et al. 2004; Lanningham-Foster et al. 2008). For this reason, changing school environments has been suggested as a population-based approach to reducing childhood obesity (CDC 2011; IOM 2004 and 2007).

In recent years, Congress has enhanced USDA's ability to have a broader influence on schools' food and physical activity environments. The Child Nutrition and WIC Reauthorization Act of 2004 (PL 108-265) required that all SFAs participating in the NSLP implement a comprehensive school wellness policy beginning in SY 2006–2007. The Healthy, Hunger-Free Kids Act of 2010 (PL 111-296) expanded the scope of these wellness policies; required additional stakeholder involvement in the development, implementation and review of the policies; and required public updates on the content and implementation of the policies.¹ The intent of the new provisions was to strengthen school wellness policies so they become useful tools in evaluating, establishing, and maintaining healthy school environments (USDA, FNS July, 2011). Schools were expected to review their existing policies and begin planning for the required changes in SY 2011–2012. In addition, the Healthy, Hunger-Free Kids Act of 2010 requires that USDA establish nutrition standards for all foods sold or served in schools at any time during the school day.

This chapter presents information about a variety of topics related to schools' food and physical activity environments. Most of the data were obtained from surveys of SFA directors, principals, and FSMs. All surveys were implemented between January and June 2010. The SFA director and principal surveys were web-based. The SFA director survey included SFA directors from both the SFA-only sample and the SFA-plus-school sample (see Chapter 1). Maximum sample sizes for data collected in the SFA director survey vary depending on whether the data element was collected at the SFA level, in which case all SFAs responded to the question, or for sampled schools within the SFA, in which case only SFA directors in the SFA-plus-school sample responded to the question, providing information for all sampled schools. The FSM survey was self-administered and was included in the packet of materials FSMs received for the menu survey (see Chapter 1). Technical

¹ SFAS are now required to permit teachers of physical education and school health professionals as well as parents, students, representatives of the school board, school administrators, and the public to participate in the development of wellness policies. The Act also expanded the purpose of the team of collaborators beyond the development of a local wellness policy to also include the implementation of the local wellness policy with periodic review and updates (USDA, FNS July, 2011).

assistants who trained FSMs to complete the menu survey and provided assistance and support in completing the menu survey were also available to assist with the FSM survey.

Data about the availability of foods outside of the school meal programs were collected from principals and FSMs. In addition, three separate checklists were used to obtain detailed data about the types of foods and beverages available in alternative venues. The a la carte checklist was completed by FSMs and documented the availability of a la carte foods and beverages at breakfast and lunch. The vending machine checklist and the other sources of foods and beverages checklist were completed in hard copy by a school staff member appointed by the principal and faxed to Mathematica's survey operations center. Some schools completed the competitive foods checklists by telephone. In these cases, data collection was limited to documenting the types of competitive food venues available; detailed information about the specific foods and beverages offered in the various venues was not collected.

Maximum sample sizes for analysis vary depending on the instrument from which data were obtained, as summarized in Table 3.1. Sample sizes for individual tables or subsections within a table may vary because of conditional analysis samples and item nonresponse. All statistics are weighted to be nationally representative of public SFAs or public schools participating in the NSLP. School-level data are generally presented separately by school type—defined by grade level (elementary, middle, and high schools)—and for all schools combined. In some cases, comparable questions were asked of more than one respondent. In reporting findings for these overlapping questions, we generally focus on the respondent expected to have the most complete knowledge about the topic and describe responses provided by additional respondents in footnotes.

Table 3.1. Maximum Sample Sizes

Instrument	Maximum Sample Size
SFA Director Survey	
SFA-level data	578 SFAs
School-level data	842 schools
Foodservice Manager Survey	876 schools
A la Carte Checklist	895 schools
Principal Survey	721 schools
Vending Machine Checklist	680 schools
Other Sources of Foods and Beverages Checklist	732 schools

SFA = School Food Authority.

A. Summary of Findings

Presence and Implementation of Local Wellness Policies

- The Child Nutrition and WIC Reauthorization Act of 2004 (PL 108-265) required schools to implement local wellness policies beginning in SY 2006–2007. In SY 2009–2010, SFA directors in 96 percent of SFAs reported that a district-level wellness policy was in place, and most SFAs (73 percent) had a designated wellness coordinator.

- Directors in more than three-quarters of SFAs reported that required wellness policy components related to nutrition education, physical education, and daily physical activity were fully or partially implemented. In another 4 to 9 percent of SFAs, these components were still being planned.
- Wellness policies are required to include nutrition standards for all foods and beverages offered on school campuses. SFAs may elect to establish nutrition standards for school meals that are more restrictive than current Federal regulations. In SY 2009–2010, more than one-third (36 percent) of SFA directors reported that their districts had fully implemented nutrition standards for school meals that exceeded the Federal requirements in place at the time. An additional 21 percent reported that standards of this kind were partially implemented (16 percent) or being planned (5 percent).
- The vast majority of SFAs had some type of ban or restriction on sweetened beverages or snack foods in place during SY 2009–2010. More than 80 percent of SFAs had a ban or restriction related to sweetened beverages and more than 75 percent had a ban or restriction related to snack foods. These bans or restrictions were most commonly implemented on a district-wide basis rather than in specific schools or types of schools.

School Requirements for Nutrition Education, Physical Education, and Opportunities for Physical Activity

- A majority of schools, ranging from 61 percent of elementary schools to 72 percent of middle schools, required some amount of classroom-based nutrition education in SY 2009–2010. Among schools requiring classroom-based nutrition education, 89 percent required nutrition education for all grades.
- Overall, 95 percent of schools required that students attend structured physical education (PE) classes. High schools were more likely than either elementary or middle schools to not require PE classes (10 percent versus 3 percent). Most schools (83 percent) had requirements that called for PE throughout the school year.
- Based on principals' reports of the average amount of time students spend in PE, 18 percent of all schools and 22 percent of schools that required year-round PE met or exceeded guidelines from the National Association for Sport and Physical Education (NASPE), which recommend that schools provide 150 minutes of instructional PE for elementary school students and 225 minutes for middle and high school students each week of the school year.
- About two-thirds (66 percent) of all schools reported offering students regular opportunities for physical activity during the school day in settings other than PE classes. This practice was much more common among elementary schools than either middle or high schools (86 versus 45 and 28 percent, respectively).

School Activities and Student Mobility During Meal Times

- About one in five schools (21 percent) sometimes scheduled activities such as tutoring sessions, club meetings or fundraisers during meal times. The proportion of middle and high schools that engaged in this practice was roughly two times greater than the proportion of elementary schools (33 and 28 percent, respectively, versus 15 percent). Tutoring was, by far, the most common activity scheduled during meal times.

- The majority of elementary and middle schools (97 and 92 percent, respectively) require students to go to the cafeteria or foodservice area during their lunch period. In contrast, 30 percent of high schools do not require that students go to the cafeteria or foodservice area during their lunch period.
- Overall, only 5 percent of schools had an open-campus policy, meaning that students were allowed to leave school grounds during their lunch period. The vast majority of schools with an open campus policy were high schools. Overall, 19 percent of high schools had open campuses, compared with less than 3 percent of elementary and middle schools. Most schools with open campus policies were located close to supermarkets, convenience stores, or other stores (84 percent) and fast-food restaurants (75 percent) where students could purchase foods and beverages.
- Nearly all elementary schools (96 percent) and just over one-third (34 percent) of middle schools had a scheduled recess. Schools scheduled recess both before and after lunch, and some schools had both types of recess periods. However, more schools had recess periods after lunch (79 percent) than before lunch (37 percent).

Competitive Foods

- Foods that are made available to students outside of school meals are referred to as competitive foods. Competitive foods may be offered through a la carte sales in school cafeterias or through other venues, including vending machines, school stores, snack bars, and fundraisers. In SY 2009–2009, students in most schools (82 percent of elementary schools, 95 percent of middle schools, and 90 percent of high schools), were able to purchase a la carte foods and beverages during lunch. A la carte foods and beverages were available at breakfast in more than half (58 percent) of elementary schools and close to three-quarters of middle and high schools (74 and 70 percent, respectively).
- During a typical school week in SY 2009–2010, schools collected an average of \$925 per 1,000 students in revenue from sales of a la carte foods and beverages. Average weekly revenue from a la carte sales in middle and high schools was roughly three times higher than in elementary schools (\$1,618 and \$1,647 per 1,000 students, respectively, versus \$495 per 1,000 students).
- A comparison of average weekly a la carte revenue for quartiles of overall NSLP participation showed an inverse relationship between a la carte revenue and NSLP participation. Average weekly a la carte revenue ranged from a low of \$466 per 1,000 students among schools where the average daily NSLP participation rate was 80 percent or more to a high of \$1,503 per 1,000 students among schools where the average NSLP participation rate was less than 40 percent.
- Vending machines were widely available in high schools (85 percent), but were somewhat less common in middle schools (67 percent) and rare in elementary schools (13 percent).²

² Point estimates of the percentages of schools with vending machines differ slightly for different data collection instruments (principal survey and vending machine checklist).

- The available data suggest a decrease in the availability of almost all vending items since SY 2004–2005, when the SNDA-III study was conducted. However, comparisons between SNDA-IV and SNDA-III must be made with great caution because of differences in the data collection approaches used in the two studies.³ The suggested decrease in the availability of sugar-sweetened beverages since SY 2004–2005 is dramatic. This pattern is consistent with the increased focus during this period on school wellness policies and improving the school food environment, including the large percentage of SFAs that reported having bans or restrictions on the availability of sweetened beverages. However, the actual magnitude of the decrease over time is less certain because of methodological differences in the two studies.
- On average, middle schools that had beverage vending machines in SY 2009–2010 allocated more space to 100% juice and water (58 percent of available vending space) than to other beverages, excluding milk (this included carbonated sodas, energy/sports drinks, juice drinks, and chocolate drinks) (41 percent of available vending space). In addition, the amount of space allocated to water was roughly equivalent to the amount allocated to sugar-sweetened beverages (40 versus 36 percent). High schools allocated less space to 100% juice and water than to other beverages (44 versus 52 percent) and less space to water than to sugar-sweetened beverages (33 versus 41 percent).
- Schools that had snack machines in SY 2009–2010 allocated the majority (85 percent, on average) of the available space to snacks such as candy, snack chips, and crackers, and allocated less space to baked goods and other types of food. Snack chips accounted for an average of 32 percent of the available space in snack machines. In middle schools, low-fat chips were more prevalent than regular chips (22 versus 15 percent); in high schools the two types of chips were equally prevalent (16 to 17 percent).
- Based on principals' reports, school stores that sold foods and beverages and snack bars were available in 13 and 4 percent of all schools, respectively. Both of these competitive food venues were available in more middle schools than elementary schools and more high schools than middle schools.

B. School Wellness Policies and Practices

The Child Nutrition and WIC Reauthorization Act of 2004 (PL 108-265) required schools to implement local wellness policies beginning in SY 2006–2007. At a minimum, these policies are required to include:

- Goals for nutrition education, physical activity, and other school-based activities designed to promote student wellness.

³ The SNDA-III data were collected by on-site field interviewers, while the SNDA-IV data were provided by a school staff member appointed by the principal. It is possible that SNDA-III field interviewers overestimated the availability of vending machine items by counting machines that were not actually available to students during school hours and/or machines that were available only to faculty and staff. Conversely, it is possible that SNDA-IV checklist respondents underreported the presence of vending machines and/or underreported the availability of less healthy items. Comparisons between SNDA-III and SNDA-IV are also complicated by the fact that the lists of items included in the checklists were not identical.

- Nutrition guidelines for all foods available on school campuses during the school day.
- A plan for measuring implementation, including designation of one or more persons with operational responsibility for ensuring that schools meet wellness policy requirements.
- Assurances that requirements for reimbursable meals were not less restrictive than current Federal requirements.
- Plans for involving parents, students, and other stakeholders in the development of the wellness policy.

In SY 2009–2010, SFA directors in 96 percent of SFAs reported that a district-level wellness policy was in place (Table 3.2).^{4,5} Most SFAs (73 percent) had a designated wellness coordinator. Nearly all of these designated wellness coordinators (94 percent) had another job in the district. Almost half (46 percent) of all wellness coordinators were employed as school or district administrators and about one-fifth (21 percent) were school nurses.⁶

1. Content and Implementation of Local Wellness Policies

SFA directors were asked about the content of wellness policies and the degree to which different policy components had been implemented. Some of the components SFA directors were asked about were not explicitly required in the legislation that mandated local wellness policies, but are of interest to policymakers and the school nutrition community. This included, for example, questions about defining a minimum amount of time for students to eat lunch and the availability of staff wellness programs. Additional information about selected policy components (nutrition standards for foods offered in schools, nutrition promotion activities, nutrition education, physical education, and physical activity) are provided in subsequent sections of this chapter.

⁴ Only 76 percent of all principals reported a district wellness policy (data not shown in table). This discrepancy may reflect lack of awareness on the part of principals, and is consistent with results reported by Belansky et al. (2009). In that study, only about half of the principals in a convenience sample of elementary schools in low-income, rural Colorado reported being familiar with their district's wellness policy.

⁵ Principals were also asked whether their schools had a school-specific wellness policy. About 28 percent of all principals reported such policies, with little variation among elementary, middle, and high schools (data not shown in table).

⁶ SFA directors were asked about the amount of time wellness coordinators dedicated to this job. Data were missing for more than one-quarter (27 percent) of SFAs. Among SFAs that did respond to this question, wellness coordinators devoted an average of 6 hours per week to the job, with a broad range of 1 to 50 hours per week (data not shown in table).

Table 3.2. Presence of District-Level Wellness Policies and Designated Wellness Coordinators

	Percentage of SFAs
School District Has a Wellness Policy	96.1
Among Districts with a Wellness Policy (n= 567):	
District Has a Designated Wellness Coordinator	72.8
Among Districts with a Designated Wellness Coordinator (n= 422):	
Person Has Another Job in the District	93.9
Among Districts Where Wellness Coordinator Has Another Job in the District (n= 390):	
Other Positions Held^a	
School or district administrator	45.5
School nurse	20.8
Nutrition professional or foodservice manager/worker	12.0
Health, physical education, or nutrition-related teacher, including coaches and athletic directors	3.1
Other teacher	4.7
Other	2.7
Missing	11.2
Number of SFAs	578

Source: School Nutrition Dietary Assessment-IV, School Food Authority Director Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public SFAs offering the National School Lunch Program.

^aSFA directors provided free responses that were subsequently categorized. Multiple responses were allowed.

SFA = School Food Authority.

In SY 2009–2010, directors in more than three-quarters of SFAs reported that wellness policy components related to physical education, daily physical activity, and nutrition education were fully or partially implemented (Table 3.3).⁷ These components were still being planned in another 4 to 9 percent of SFAs. More than half of SFAs reported that policy components related to the minimum amount of time for students to eat lunch, students' access to competitive foods, parent involvement, staff wellness, and community involvement were fully or partially implemented. These components were still being planned in another 5 to 16 percent of SFAs. However, sizeable proportions of SFA directors (14 to 23 percent) indicated that one or more of these components were not addressed in their wellness policies. More than 20 percent of SFA directors reported that their wellness policies did not address access to competitive foods, the minimum amount of time for students to eat lunch, or staff wellness programs. None of these components are specifically required under PL 108-265.

About half (49 percent) of SFAs reported having a plan for measuring the implementation of their wellness policy, as required under the PL 108-265. About one-quarter (24 percent) of SFAs

⁷ It is important to note that the relative strength of wellness policies varies widely across SFAs (Metos and Nanney 2007; Moag-Stahlberg et al. 2008; Schwartz et al. 2009). Factors that influence the relative strength of a policy include the level of detail and specificity in the language and the inclusion of explicit mandates and requirements, as opposed to suggestions and encouragement.

reported that these measurement plans were fully implemented and another quarter reported that measurement plans were partially implemented. Nineteen percent of SFAs were still developing plans for measuring implementation, and 17 percent of SFA directors reported that their wellness policy did not include a plan for measuring implementation. More than 40 percent of SFA directors reported that plans to measure the impact of their local wellness policy were fully or partially implemented. Finally, 32 percent of SFAs had fully or partially implemented wellness policy requirements related to use of food as a reward, and 8 percent were still planning this component of their policy. The law does not mandate that local wellness policies address use of food as a reward, and policies in 45 percent of SFAs did not address this issue.

Table 3.3. Content and Implementation of Local Wellness Policies

Policy Component/Extent to Which Requirements Have Been Implemented	Percentage of SFAs
Physical Education^a	
Addressed in policy and fully implemented	55.1
Addressed in policy and partially implemented	26.5
Still being planned	4.1
Not addressed in policy	2.4
Missing	9.6
No local wellness policy	2.3
Daily Physical Activity	
Addressed in policy and fully implemented	51.4
Addressed in policy and partially implemented	24.7
Still being planned	8.5
Not addressed in policy	2.6
Missing	10.5
No local wellness policy	2.3
Minimum Amount of Time for Students to Eat Lunch^a	
Addressed in policy and fully implemented	44.6
Addressed in policy and partially implemented	11.7
Still being planned	6.6
Not addressed in policy	22.3
Missing	12.3
No local wellness policy	2.3
Nutrition Education	
Addressed in policy and fully implemented	40.3
Addressed in policy and partially implemented	39.3
Still being planned	6.0
Not addressed in policy	3.9
Missing	8.2
No local wellness policy	2.3
Access to Competitive Foods During School Hours^a	
Addressed in policy and fully implemented	38.4
Addressed in policy and partially implemented	18.5
Still being planned	4.9
Not addressed in policy	23.4
Missing	12.5
No local wellness policy	2.3

Table 3.3 (continued)

Policy Component/Extent to Which Requirements Have Been Implemented	Percentage of SFAs
Parent Involvement	
Addressed in policy and fully implemented	28.9
Addressed in policy and partially implemented	28.5
Still being planned	16.4
Not addressed in policy	13.8
Missing	10.1
No local wellness policy	2.3
Staff Wellness Program^a	
Addressed in policy and fully implemented	28.6
Addressed in policy and partially implemented	22.1
Still being planned	14.6
Not addressed in policy	21.3
Missing	11.1
No local wellness policy	2.3
Community Involvement	
Addressed in policy and fully implemented	26.7
Addressed in policy and partially implemented	25.9
Still being planned	15.8
Not addressed in policy	18.6
Missing	10.7
No local wellness policy	2.3
Plan for Measuring Implementation	
Addressed in policy and fully implemented	24.2
Addressed in policy and partially implemented	25.2
Still being planned	19.1
Not addressed in policy	16.7
Missing	12.6
No local wellness policy	2.3
Plan for Measuring Impact^a	
Addressed in policy and fully implemented	18.1
Addressed in policy and partially implemented	23.9
Still being planned	21.5
Not addressed in policy	19.7
Missing	14.5
No local wellness policy	2.3
Use of Food as Student Reward^a	
Addressed in policy and fully implemented	14.6
Addressed in policy and partially implemented	17.8
Still being planned	8.3
Not addressed in policy	45.1
Missing	11.9
No local wellness policy	2.3
Number of SFAs	578

Source: School Nutrition Dietary Assessment-IV, School Food Authority Director Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public SFAs offering the National School Lunch Program.

^aNot explicitly required in the Child Nutrition and WIC Reauthorization Act of 2004 (PL 108-265), the legislation that mandated local wellness policies.

SFA = School Food Authority.

2. Nutrition Standards for Foods Offered on School Campuses

As noted above, the Child Nutrition and WIC Reauthorization Act of 2004 required that SFAs develop nutrition guidelines for all foods available on school campuses during the school day. In so doing, SFAs were expected to ensure that guidelines for school meals (and afterschool snacks) were no less restrictive than existing Federal requirements, but had the option of incorporating standards that exceeded (that is, were more stringent than) these requirements. In SY 2009–2010, the only nutrition-focused requirement affecting specific foods offered in school meals or snacks was the requirement that schools offer low-fat or nonfat/skim milks. SFAs that elected to implement more restrictive nutrition standards for foods offered in school meals may have established per-serving requirements for total calories, total fat, saturated fat, cholesterol, sodium, whole grains, dietary fiber or other nutrients for selected foods or groups of foods (see Chapter 2, Table 2.13).

More than one-third (36 percent) of SFA directors reported fully implemented nutrition standards for foods offered in school meals that exceeded Federal requirements (Table 3.4). In addition, 21 percent reported that such standards were partially implemented or being planned (16 and 5 percent, respectively). One-third of SFA directors reported no such standards for school meals and no plans to develop them.

Table 3.4. Nutrition Standards in School Wellness Policies: School Meals and Afterschool Snacks

Wellness Policy Includes Nutrition Standards That Exceed Federal Requirements	Percentage of SFAs	
	School Meals	Afterschool Snacks ^a
Yes, and They Are Fully Implemented	35.6	32.1
Yes, and They Are Partially Implemented	16.4	4.6
Will Have Such Standards, but They Are Still Being Planned	5.3	5.4
No Such Standards in Place or Planned	33.4	42.1
Missing	7.1	11.5
No Local Wellness Policy	2.3	4.4
Number of SFAs	578	363

Source: School Nutrition Dietary Assessment-IV, School Food Authority Director Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public SFAs offering the National School Lunch Program.

^aExcludes SFAs that do not offer reimbursable afterschool snacks.

SFA = School Food Authority.

For afterschool snacks, nutrition standards that exceeded Federal requirements were somewhat less common. Thirty-two percent of SFAs reported that they had fully implemented nutrition standards for foods offered in afterschool snacks that exceeded Federal requirements (Table 3.4). However, 42 percent did not have such standards and had no plans to develop them.

In SY 2009–2010, USDA had little control over foods and beverages offered outside of the school meal programs. Federal regulations in place at the time prohibited the sale of foods of minimal nutritional value—including carbonated beverages, water ice, gum, and certain candies—in the foodservice area during breakfast and lunch periods, but did not prohibit the sale of these foods elsewhere on school grounds. The requirement that wellness policies include nutrition standards for

all foods available on school campuses during the school day, including a la carte offerings and foods available in vending machines, schools stores and other non-foodservice venues, was designed to address the availability of such foods at the local level.⁸

In SY 2009–2010, only 12 to 13 percent of SFA directors reported that their wellness policies did not have nutrition standards for a la carte offerings and foods available in vending machines, school stores, and other non-foodservice venues, and that they did not plan to develop such standards (Table 3.5).⁹ SFAs were less likely to have nutrition standards for foods offered in classroom or school celebrations, foods used in fundraising activities, and foods available at staff or parent meetings. Twenty percent of SFA directors reported that their wellness policies did not have nutrition standards for foods used in classroom or school celebrations and that no such standards were planned. Roughly one-third (34 percent) of SFA directors reported that their wellness policy did not include and was not expected to include nutrition standards for foods used in fundraising activities. One-half of SFA directors provided a comparable response for nutrition standards related to foods and beverages offered in staff/parent meetings.

Table 3.5. Nutrition Standards in School Wellness Policies: Other School Settings

Wellness Policy Includes Nutrition Standards for Items Offered in Other School Settings	Setting/Percentage of SFAs				
	A la Carte Offerings	Vending Machines, School Stores ^a	Classroom or School Celebrations	Fundraising Activities	Staff or Parent Meetings
Yes, and They Are Fully Implemented	41.4	36.2	20.1	14.6	8.8
Yes, and They Are Partially Implemented	13.3	22.2	29.6	22.4	14.6
Will Have Such Standards, but They Are Still Being Planned	2.4	5.4	10.2	10.3	7.6
No Such Standards in Place or Planned	12.6	12.1	20.0	33.6	50.1
Not Available/Allowable in District	20.5	13.4	8.5	6.3	7.9
Missing	7.5	8.4	9.3	10.5	8.6
No Wellness Policy	2.3	2.3	2.3	2.3	2.3
Number of SFAs	578				

Source: School Nutrition Dietary Assessment-IV, School Food Authority Director Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public SFAs offering the National School Lunch Program.

^aOr other non-foodservice venues.

SFA = School Food Authority.

⁸ The Healthy, Hunger-Free Kids Act of 2010 expanded USDA’s control over foods sold outside of the school meal programs. The Act requires that USDA establish nutrition standards for all food sold or served in schools any time during the school day.

⁹ Twenty-one percent of SFA directors reported that a la carte foods and beverages were not available in their schools. Based on data reported by FSMs and discussed later in this chapter, it appears that SFA directors may have checked this response if any of the schools in their district restricted a la carte sales. According to FSMs, a la carte foods and beverages were available at lunch in 82 percent of elementary schools, 95 percent of middle schools, and 90 percent of high schools (see Table 3.19).

3. Policies Related to Availability of Sweetened Beverages and Snack Foods

SFA directors were asked whether the district or any individual schools in the district had a ban or restriction on the types of beverages or snack foods that can be sold to students on school grounds.¹⁰ According to SFA directors, the vast majority of SFAs had some type of ban or restriction on sweetened beverages or snack foods in place during SY 2009–2010. More than 80 percent of SFAs had some type of ban or restriction related to sweetened beverages and more than 75 percent had a ban or restriction related to snack foods (Table 3.6).

Table 3.6. Bans or Restrictions on Availability of Sweetened Beverages and Snack Foods

Ban or Restriction Imposed Since School Year (SY) 2006–2007	Percentage of SFAs
Ban or Restriction on Sweetened Beverages^a	
Yes, district wide	43.7
Yes, in some schools	12.6
Had a district-wide ban or restriction before SY 2006–2007	9.7
Had a school-level ban or restriction before SY 2006–2007	2.8
No (there are no district- or school-level bans or restrictions)	14.1
Never offered sweetened beverages	13.3
Missing	3.7
Ban or Restriction on Snack Foods	
Yes, district wide	40.8
Yes, in some schools	16.4
Had a district-wide ban or restriction before SY 2006–2007	4.7
Had a school-level ban or restriction before SY 2006–2007	3.0
No (there are no district- or school-level bans or restrictions)	20.4
Never offered snacks or other items outside of the school meal programs	11.7
Missing	3.0
Number of SFAs	578

Source: School Nutrition Dietary Assessment-IV, School Food Authority Director Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public SFAs offering the National School Lunch Program.

^aSweetened beverages mentioned in the survey question were soda, soft drinks, and sweetened fruit beverages (less than 100% juice).

SFA = School Food Authority; SY = school year.

Although sweetened beverages and snack foods were reportedly never available in 12 to 13 percent of SFAs and 8 to 13 percent of SFAs reported having some type of ban or restriction prior to SY 2006–2007, the majority of the reported restrictions were implemented since SY 2006–2007, when the mandate for local school wellness policies took effect. Most of these new bans/restrictions were district-wide. Forty-four percent of SFAs reported that a district-wide ban/restriction on sweetened beverages had been imposed since (during or after) SY 2006–2007 and 41 percent reported a similarly timed district-wide ban/restriction on snack foods (Table 3.6). In addition,

¹⁰ The question read: “Other than the USDA restriction on selling soft drinks during meals, has your school district, or any school in your district, imposed a ban or restriction on [the types of soda, soft drinks, or sweetened fruit beverages (less than 100% juice)] or [the types of food or snack items] that may be sold to students in schools or on school grounds (including [vending machines] or [school store and vending machines]) since school year 2006–2007?”

school-level bans/restrictions on sweetened beverages and snack foods were imposed for some schools since SY 2006–2007—in 13 and 16 percent of SFAs respectively. The percentage of SFAs reporting district-wide bans or restrictions on sweetened beverages or snack foods in SY 2009–2010 was dramatically higher than it was in SY 2004–2005, when only 6 and 10 percent of SFA directors reported district-wide bans or restrictions on sweetened beverages or snack items, respectively (Gordon et al. 2007; also see Chapter 11 in this report).

4. Classroom-based Nutrition Education

School wellness policies may address the required nutrition education component by mandating nutrition education as part of the classroom curricula.¹¹ An analysis of local wellness policies in the 100 largest school districts in the U.S. found that 97 percent of districts required classroom-based nutrition education for at least some grade levels (School Nutrition Association 2006). Changing or establishing requirements that affect classroom curricula requires the full support and involvement of district and school administrators. This may explain why 45 percent of all SFAs had only partially implemented or were still planning the nutrition education component of their local wellness policy in SY 2009–2010 (Table 3.3).

To obtain a more complete picture of school-level nutrition education practices in SY 2009–2010, principals were asked whether their school had a requirement that students receive nutrition education in class. In schools where there was a requirement for classroom-based nutrition education, principals were asked whether the requirement applied to all grades in the school or only to some grades, and about the amount of nutrition education students receive. Findings indicate that a majority of schools, ranging from 61 percent of elementary schools to 72 percent of middle schools, required some amount of classroom-based nutrition education in SY 2009–2010 (Table 3.7). Among schools requiring classroom-based nutrition education, close to 90 percent required nutrition education for all grades.

5. Nutrition Promotion Activities

In addition to classroom-based nutrition education, schools may provide nutrition education through multi-component nutrition/wellness programs and initiatives. These initiatives may include a classroom component and/or other components such as efforts to improve school meals, promotion of physical activity, parent and community involvement, and school- or community-wide educational campaigns. USDA's Team Nutrition is one example of such an initiative. Team Nutrition is an integrated, behavior based, comprehensive plan for promoting children's nutritional health (see www.fns.usda.gov/tn/about.html).¹² Schools are the key focal point of Team Nutrition, but the initiative also involves parents and the community. Because Team Nutrition includes goals for nutrition education and physical activity, principal involvement is an important requirement for success.

¹¹ Wellness policies may also address the nutrition education requirement through out-of-classroom activities, including education that takes place in the school cafeteria or as part of community-based programming, and/or by providing nutrition-focused professional development for teachers (Moag-Stahlberg et al. 2008).

¹² A cross-sectional comparison of national samples of elementary schools that did and did not participate in Team Nutrition found that schools that participated in Team Nutrition were more likely to offer healthier foods—and less likely to offer unhealthy foods—at lunch (Ohri-Vachaspati, Turner and Chaloupka 2012).

Table 3.7. Requirements for Classroom-based Nutrition Education

	Percentage of Schools			
	Elementary Schools	Middle Schools	High Schools	All Schools
School Requires Students to Receive Nutrition Education in Class	60.9	71.5	65.2	63.7
Among Schools Requiring Nutrition Education in Class (n=455):				
Grades Required to Receive Nutrition Education				
Every grade	88.3	87.6	89.7	88.5
Some grades	11.7	12.4	10.3	11.5
Number of Hours of Nutrition Education per Year				
Fewer than 5 hours	21.0	15.2	11.0	17.7
5 to 10 hours	40.5	25.3	21.0	33.3
11 to 20 hours	16.7	10.7	11.0	14.3
21 to 100 hours	12.1	23.2	19.0	15.8
More than 100 hours	0.6	10.8	15.4	5.8
Missing	9.1	14.8	22.6	13.2
Number of Schools	265	230	226	721

Source: School Nutrition Dietary Assessment-IV, Principal Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

To provide FNS with some perspective on principals' awareness of Team Nutrition, we asked principals whether they had ever heard of the initiative and whether teachers had made use of Team Nutrition materials (which are available to all schools). Overall and in each type of school, 43 to 45 percent of principals had heard of Team Nutrition (Table 3.8). Among principals who had heard of Team Nutrition, 42 percent reported that teachers in their schools had used Team Nutrition materials (data not shown in table). Use of Team Nutrition materials was most frequently reported for elementary schools (46 percent versus 37 and 32 percent for middle and high schools, respectively). (Data not shown in table.)

Principals were also asked about their school's participation in a number of well-known nutrition/wellness initiatives. In addition to Team Nutrition, the survey asked about programs sponsored by the Alliance for a Healthier Generation, the Centers for Disease Control and Prevention, Action for the Healthy Kids, and the Robert Wood Johnson Foundation among others (see Table 3.8 for the complete list). Overall, 45 percent of principals indicated that their school did not participate in any of the specific initiatives mentioned in the survey or in any comparable initiatives. In addition, a quarter of principals reported that they did not know whether their school participated in any nutrition/wellness initiatives. Thus, based on principal reports, 30 percent of schools participated in one or more of the queried nutrition/wellness initiatives. Among the initiatives specifically mentioned in the survey, school involvement was reported most frequently for

the Alliance for a Healthier Generation's Healthy Schools Program (10 percent of all schools) and USDA's Team Nutrition (6 percent).¹³

Table 3.8. Principal Awareness of Team Nutrition and Principal-Reported Participation in Nutrition/Wellness Initiatives

	Percentage of Schools			
	Elementary Schools	Middle Schools	High Schools	All Schools
Principal Has Heard of Team Nutrition	42.6	44.9	42.6	43.0
Nutrition/Wellness Initiatives in Which School Is Involved^a				
None	45.8	40.0	47.1	45.0
Don't Know	21.8	30.4	31.1	25.3
Alliance for a Healthier Generation's Healthy Schools Program	8.5	11.8	10.9	9.6
USDA's Team Nutrition	7.5	3.5	5.7	6.4
Healthy Kids Challenge	3.7	3.1	2.4	3.3
PE4Life	2.8	2.0	1.0	2.3
CATCH (Coordinated Approach to Child Health)	3.4	0.8	0.0	2.2
USDA's HealthierUS School Challenge	1.3	3.1	0.6	1.5
Action for Healthy Kid's Game On! The Ultimate Wellness Challenge	1.1	0.4	2.3	1.2
Robert Wood Johnson Foundation's Healthy Kids Healthy Communities	1.3	0.6	1.4	1.2
CDC's Steps to a Healthier US	0.5	0.2	0.8	0.5
Robert Wood Johnson Foundation's Healthy Eating by Design	0.3	1.1	0.0	0.4
Robert Wood Johnson Foundation's Active Living by Design	0.3	0.6	0.0	0.3
Action for Healthy Kid's ReCharge! Energizing Afterschool	0.0	0.4	0.0	0.1
Other	2.0	0.4	0.3	1.4
Number of Schools	265	230	226	721

Source: School Nutrition Dietary Assessment-IV, Principal Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

^aMultiple responses were allowed.

¹³ FSMs were asked the same question about nutrition/wellness initiatives. A majority of FSMs (65 percent) reported that their schools did not participate in any nutrition/wellness initiatives (data not shown in table). Similar to principal reports, the two most commonly identified programs were the Alliance for a Healthier Generation's Healthy Schools Program and Team Nutrition. Differences in reporting may be due to principals and FSMs having different levels of awareness about programs being implemented in schools.

School foodservice staff can play an active role in promoting nutrition awareness and/or good nutrition. FSMs were asked about staff participation in a variety of nutrition promotion activities during the preceding 12 months and about whether they routinely provided information about the nutrient content of school meals. The results show that school foodservice programs in a majority of schools were involved in some type of nutrition promotion activity in SY 2009–2010. Seventy-two percent of schools provided parents and families with information about the school meal programs and 64 percent invited family members to consume a school meal (Table 3.9). Invitations to consume a school meal were more common among elementary schools than middle or high schools (71 versus 55 and 52 percent, respectively). The other nutrition promotion activities queried in the survey were less common—reported by fewer than half of all schools. FSMs in less than one-third of all schools reported that foodservice staff had conducted a nutrition education activity in a foodservice area (31 percent) or participated in a nutrition education activity in a classroom (28 percent).

Table 3.9. Strategies Used by Foodservice Staff to Promote Good Nutrition or Nutrition Awareness

Promotion Activities	Percentage of Schools			
	Elementary Schools	Middle Schools	High Schools	All Schools
Specific Activities in the Past 12 Months				
Provided families with information about school foodservice program	74.2	67.5	68.4	71.8
Invited family members to consume a school meal	70.6	54.9	52.0	64.0
Participated in a school meeting about local wellness policy	42.4	44.2	49.9	44.3
Participated in a district meeting about local wellness policy	38.8	42.6	40.7	39.9
Attended a PTA or other parent group meeting to discuss school foodservice program	33.6	33.0	36.6	34.1
Conducted a nutrition education activity in the foodservice area	32.1	29.0	28.3	30.8
Participated in nutrition education activity in the classroom	27.3	23.9	32.2	27.7
Routinely Makes Information About Nutrient Content Available to Students or Parents	66.9	61.1	66.0	65.7
Among Schools that Routinely Make Information About Nutrient Content Available (n= 585):				
How Nutrition Information Is Shared				
Post information online	66.2	65.7	69.6	66.8
Send menus or flyers home	72.1	52.9	47.0	63.7
Post information in school	50.4	58.7	56.4	53.0
Post information in newspapers	8.5	14.3	11.4	10.0
Post information on television	4.9	5.1	5.2	5.0
Other	4.6	2.7	1.9	3.7
Number of Schools	315	284	277	876

Source: School Nutrition Dietary Assessment-IV, Foodservice Manager Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Note: Multiple responses were allowed.

PTA = Parent Teacher Association.

Findings for these less-common nutrition promotion activities were generally comparable for all three types of schools. However, participation in school meetings related to local wellness policies was reported more frequently for high schools than for elementary or middle schools (50 versus 42 and 44 percent, respectively) (Table 3.9). Participation in classroom nutrition education activities was also reported more frequently for high schools than for elementary or middle schools (32 versus 27 and 24 percent, respectively).

Overall, about two-thirds (66 percent) of schools routinely made information about the nutrient content of school meals available to students or parents (Table 3.9). Among schools that provided such information, the most common communication strategy was to post the information online (67 percent of schools), followed by sending menus or flyers home with students (64 percent), and posting the information in the school (53 percent). Relatively few schools used newspapers or television to communicate information about the nutrient content of school meals (10 and 5 percent of schools, respectively). The pattern of findings was generally similar across school types. However, elementary schools sent menus or flyers home with students more often than middle or high schools (72 versus 53 and 47 percent, respectively).

6. Physical Education and Physical Activity

Local wellness policies are required to include goals for physical activity. School districts may address this requirement through structured physical education (PE) classes and/or through providing opportunities for unstructured physical activity during the school day (Moag-Stahlberg et al. 2008). Principals were asked to describe their schools' PE requirements as well as their typical practices related to providing opportunities for unstructured physical activity. Although the policies and practices described by principals were not necessarily part of the district's school wellness policy, they provide a useful picture of the physical activity environment in the Nation's school in SY 2009–2010.

a. Physical Education

Overall, 95 percent of schools had a requirement for PE (Table 3.10). (This compares to 64 percent of schools for classroom-based nutrition education [Table 3.7]). High schools were more likely than either elementary or middle schools to not have a PE requirement (10 percent versus 3 percent). The vast majority of elementary schools (95 percent) had requirements that called for PE throughout the school year. The same was true for most middle and high schools (68 and 60 percent, respectively). However, some middle and high schools required PE for only one semester (17 and 23 percent, respectively) or one quarter (7 and 2 percent, respectively).

Table 3.10. Physical Education Requirements in School Year 2009–2010

Physical Education Requirements	Percentage of Schools			
	Elementary Schools	Middle Schools	High Schools	All Schools
School Requires Physical Education				
Yes	96.7	97.2	89.3	95.2
No	2.9	2.7	9.7	4.3
Missing	0.4	0.1	1.0	0.5
Portion of the Year Students Take Physical Education				
All year	95.3	68.4	59.5	83.1
One semester	0.0	16.8	23.4	7.9
One quarter	0.6	7.0	1.5	1.9
Some other schedule	0.6	5.0	5.0	2.3
Physical education is not required	2.9	2.7	9.7	4.3
Missing	0.4	0.1	1.0	0.5
Number of Schools	265	230	226	721

Source: School Nutrition Dietary Assessment-IV, Principal Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Elementary schools allotted an average of 93 minutes per week to PE classes (Table 3.11).¹⁴ On average, middle schools devoted roughly twice as much time to PE as elementary schools (179 minutes per week versus 93 minutes) and high schools devoted more than twice as much time (192 minutes per week). The modal (most frequently reported) amount of time for PE was 60 minutes per week for elementary schools, 225 minutes per week for middle schools, and 250 minutes per week for high schools.

Because some middle and high schools required PE classes for only part of the year, we looked at results separately for these two groups of schools. The reported mean, median, and minimum weekly time for PE was consistently higher among middle and high schools that did not require PE all year, relative to schools with full-year requirements (Table 3.11). This difference may suggest that some schools that do not require year-round PE compensate with longer or more frequent classes during the period of the year students do participate in PE.

The National Association for Sport and Physical Education (NASPE) recommends that schools provide 150 minutes per week of instructional PE for elementary school students and 225 minutes per week for middle school and high school students, *each week of the school year* (NASPE 2011). Based on principal reports about PE requirements and the amount of time allocated to PE classes, fewer than one in five schools (18 percent) met or exceeded these guidelines in SY 2009–2010 (Table 3.11). Findings varied by school type, with fewer elementary schools meeting the NASPE recommendation than middle or high schools (15 versus 20 and 26 percent, respectively). Among

¹⁴ In a small number of schools, principals reported that some grades had no PE requirement. These zero values were excluded from the calculations of minutes of required PE per week. Weekly time for PE is slightly overestimated for these schools because some children have no PE exposure.

schools with year-round PE requirements (a key component of the NASPE recommendation), 30 percent of middle schools and 44 percent of high schools met the NASPE recommendation.

Table 3.11. Minutes per Week Spent in Physical Education Classes

	Minutes per Week			
	Elementary Schools	Middle Schools	High Schools	All Schools
Mean	93	179	192	128
Median	85	200	205	100
Mode	60	225	250	225
Minimum	0	0	0	0
Maximum	250	450	540	540
Meets or Exceeds NASPE Physical Education Guidelines (Percentage of Schools) ^a	14.9	20.3	26.2	18.2
Among Schools with Year- Round Physical Education Classes (n= 542):				
Mean	96	171	195	122
Median	89	190	205	100
Mode	60	225	250	225
Minimum	20	30	35	20
Maximum	250	340	540	540
Meets or Exceeds NASPE Physical Education Guidelines (Percentage of Schools) ^a	15.7	29.7	43.9	21.9
Among Schools with Physical Education for Only a Portion of the Year (n= 144):^b				
Mean	--	216	252	225
Median	--	225	238	225
Mode	--	225	450	250
Minimum	--	45	45	41
Maximum	--	450	460	460
Number of Schools	265	230	226	721

Source: School Nutrition Dietary Assessment-IV, Principal Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Notes: Principals reported values separately for each grade level. These values were then combined to create a school-level average. In 10 schools, some grade levels were not required to take physical education classes, and principals reported zero minutes per week for those grades. In estimating school-level averages for these schools, the zero values were excluded.

Data were tabulated with and without potential outliers (defined as schools that reported more than 300 or 450 minutes of physical education per week, respectively, for schools that required physical education year-round and schools that required it for only a portion of the year). Potential outliers had little effect on the results, so they were not excluded from the analysis.

Twenty-four schools were missing data on weekly minutes of physical education.

^aNational Association for Sport and Physical Education (NASPE) guidelines are 150 minutes of weekly physical education instruction for elementary schools and 225 minutes of weekly instruction for middle schools and high schools, each week of the school year.

^bBy definition, schools that required physical education for only a portion of the school year did not meet NASPE guidelines.

-- Sample size is too small to produce reliable estimate.

b. Opportunity for Physical Activity during the School Day

About two-thirds (66 percent) of all schools reported offering students regular opportunities for physical activity during the school day in settings other than PE classes (Table 3.12). This practice was much more common among elementary schools than middle and high schools (86 versus 45 and 28 percent, respectively). Among elementary schools that reported offering opportunities for

physical activity outside of PE, recess was the most commonly used activity by a wide margin (97 percent of schools). Other response options included in the principal survey were reported for substantially smaller shares of the elementary schools that offer opportunities for physical activity. These included free play in gymnasiums or on playing fields (39 percent), staff-led walks (34 percent), faculty-led games or activities (26 percent), and aerobic or active stretch breaks (28 percent).

Table 3.12. Opportunities for Physical Activity During School Hours, Excluding Physical Education Classes

	Percentage of Schools			
	Elementary Schools	Middle Schools	High Schools	All Schools
School Regularly Provides Opportunities for Physical Activity During School Hours	85.6	44.9	28.2	66.4
Among Schools That Provide Opportunities for Physical Activity During School Hours (n= 393):				
Types of Activities Provided^a				
Recess	97.0	49.9	20.4	84.6
Free play in gymnasium or on playing fields	38.7	50.9	38.1	40.1
Staff-led walks	33.7	23.6	14.7	30.8
Faculty-led games or activities	25.6	33.6	22.1	26.3
Aerobic or active stretch breaks	28.3	12.8	14.2	25.2
Other	6.0	2.6	19.7	6.8
Missing	0.1	0.7	9.2	1.0
Number of Schools	265	230	226	721

Source: School Nutrition Dietary Assessment-IV, Principal Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

^aMultiple responses were allowed.

Among middle and high schools that reported offering opportunities for physical activity outside of PE classes, the most frequently reported activity was free play in the gym or on playing fields (51 and 38 percent, respectively) and the least frequently reported activity was aerobic or active stretch breaks (13 and 14 percent, respectively) (Table 3.12). One in five high schools that reported offering opportunities for physical activity reported activities that were not explicitly queried in the principal survey question. The other activities that were most commonly reported include: (1) athletics and intramural programs; (2) classes and extracurricular activities that have integrated physical activity, such as dance, some vocational classes, and marching band; and (3) military-based programs such as the National Guard or Reserve Officers' Training Corps. These activities were reported by 20 percent, 12 percent, and 5 percent, respectively, of high schools that reported other types of opportunities for physical activity (data not shown in table).

Based on principals' reports, elementary schools provided students with the opportunity to be physically active (outside of PE class) 100 minutes per week, on average, with a wide range of 0 to 375 minutes (Table 3.12a). Among middle and high schools, the reported average was substantially lower, at 41 and 47 minutes, respectively, and both the median and mode were 0 minutes. Among the subgroup of schools that reported providing regular opportunities for physical activity outside of PE class, principals estimated that students had the opportunity to be active for about two hours per week (119 minutes), on average. Findings varied by school type and ranged from an average of 94

minutes per week for middle schools to 179 minutes per week for high schools. Among high schools, the mode was 300 minutes per week. This is likely due to the fact that, as noted above, many high school principals included athletics, intramural sports, dance classes, and other optional activities in their estimates. Because not all students participate in these extracurricular activities and classes, the opportunity for physical activity in high schools is likely overestimated.¹⁵

Table 3.12a. Minutes per Week of Physical Activity During School Hours, Excluding Physical Education Classes

	Minutes per Week			
	Elementary Schools	Middle Schools	High Schools	All Schools
Mean	100	41	47	79
Median	100	0	0	60
Mode	150	0	0	0
Minimum	0	0	0	0
Maximum	375	350	425	425
Among Schools That Provide Opportunities for Physical Activity During School Hours (n= 393):				
Mean	117	94	179	119
Median	100	75	200	100
Mode	150	60	300	150
Minimum	15	10	20	10
Maximum	375	350	425	425
Number of Schools	265	230	226	721

Source: School Nutrition Dietary Assessment-IV, Principal Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Notes: Data were tabulated with and without potential outliers (defined as schools that reported an average of more than 300 minutes of physical activity [excluding physical education classes] per week). Potential outliers had little effect on the results, so they were not excluded from the analysis.

Twenty-four schools that reported providing opportunities for physical activity during school hours were missing data on the amount of time provided for such activity.

C. Meal Scheduling and Student Mobility

Meal scheduling policies may influence students' participation in the school meal programs. For example, the length of lunch periods and the time students have to wait in line to get their meals may influence their decision to eat a school meal. In addition, students assigned to lunch periods that are early in the day may not be hungry at the time lunch is available to them and students assigned to lunch periods late in the day may decide to forego lunch. The presence of competing activities during meal time, recess schedules, policies about student mobility during scheduled lunch periods, and the use of open campus policies may also affect student participation.

¹⁵ It was not possible to separate the amount of time principals associated with different types of activities because the survey included one item that asked about the average number of minutes per week available for physical activity outside of PE and one item that asked about the activities used to provide opportunities for physical activity.

1. Lunch Schedules

Virtually all students had a scheduled lunch period every day in SY 2009–2010 (Table 3.13). As reported by FSMs, lunch service started before 11:00 a.m. in 38 percent of schools and between 11:00 a.m. and 1:30 p.m. in 58 percent of schools. Perhaps to accommodate larger student bodies, 53 percent of large schools (enrollments of 1,000 or more students) started lunch service before 11:00 a.m. No schools reported starting lunch service after 1:30 p.m.

Lunch periods were scheduled for an average of 31 minutes (range = 21 to 44 minutes). Average duration did not vary in a meaningful way by school size or type (Table 3.11).¹⁶ On average, students waited in line about 5 minutes to get their lunch. The majority of FSMs and principals (95 and 93 percent, respectively; data not shown in table) reported that the serving lines in their schools could accommodate students during the first half of each lunch period.

Among schools with multiple lunch periods, the most common (modal) start time for the first period was 11:00 a.m. and the most common start time for the last period was 12:15 p.m. (Table 3.11). Among large schools, the modal start time for the first lunch period was earlier, at 10:30 a.m., and the modal start time for the last lunch was later, at 12:50 p.m. Some schools started the first lunch as early as 8:58 a.m. (one school) and some started the last lunch as late as 2:22 p.m.

¹⁶ There were some problems with the data reported for start and end times. Schools that were determined to have implausibly short or long lunch periods based on these data were excluded from estimates of minimum, maximum, and mean lunch period lengths. See footnote f in Table 3.13.

Table 3.13. Lunch Schedules

	School Size ^a			School Type			All Schools
	Small	Medium	Large	Elementary Schools	Middle Schools	High Schools	
All Students Have a Scheduled Lunch Period Every Day (Percentage of Schools) ^b	99.9	98.5	98.3	99.1	100.0	98.8	99.2
Time Lunch Service Starts (Percentage of Schools)^c							
Before 11:00 a.m.	28.5	48.0	53.4	37.6	44.0	35.7	38.4
Between 11:00 a.m. and 1:30 p.m.	68.2	47.3	44.3	59.0	52.5	59.4	57.9
Length of Lunch Period (Minutes)^c							
Mean	31	30	32	30	31	31	31
Minimum	21	21	22	21	21	21	21
Maximum	44	44	44	44	44	44	44
Time Students Wait in Line to Get Lunch (Minutes)^{c,d,e}							
Mean	5	6	7	5	6	6	5
Minimum	0	1	1	0	1	1	0
Maximum	30	25	20	30	25	20	30
Among Schools with Multiple Lunch Periods (n= 521):^{c,f}							
Start Time of First Lunch							
Mean	11:07	10:58	10:51	11:02	11:00	11:02	11:01
Mode	11:00	11:00	10:30	11:00	10:55	11:40	11:00
Minimum	10:10	9:58	8:58	10:00	9:58	8:58	8:58
Maximum	12:30	12:17	12:20	12:15	12:17	12:30	12:30
Start Time of Last Lunch							
Mean	12:13	12:28	12:28	12:19	12:26	12:22	12:21
Mode	12:15	12:30	12:50	12:30	12:15	12:20	12:15
Minimum	11:00	11:10	10:49	11:00	10:49	11:10	10:49
Maximum	1:30	1:33	2:22	1:33	1:31	2:22	2:22
Number of Schools	353	317	206	315	284	277	876

Source: School Nutrition Dietary Assessment-IV, Foodservice Manager Survey and Principal Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Notes: Statistics on the length of lunch periods were based on reported starting and ending times for each lunch period. Schools were excluded from these estimates if the reported times resulted in implausibly short (20 minutes or less; 74 schools) or long (45 minutes or more; 157 schools) average lunch periods. Most schools with an implausibly long lunch period (110 of 157 schools) reported only one starting time and one ending time. It is likely that this time span covered all lunch periods rather than a single, long lunch period.

Reported sample sizes are for the School Foodservice Manager Survey, from which most data in the table were obtained.

^aSmall = fewer than 500 students; Medium = 500 to 999 students; Large = 1,000 or more students.

^bReported by principals.

^cReported by foodservice managers.

^dExcluding made-to-order items.

^eExcludes 5 schools with reported wait times of 40 minutes or longer.

^fExcludes 117 schools that reported implausibly short (20 minutes or less; 70 schools) or long (45 minutes or more; 47 schools) lunch periods.

2. Breakfast Schedules

As reported by FSMs, the most common (modal) start time for breakfast service was 7:30 a.m. (Table 3.14). This was consistent across schools of different sizes and types. The earliest reported starting time for breakfast service was 6:30 a.m., except in elementary schools, where the earliest starting time was 6:50 a.m. Twenty FSMs reported starting breakfast between 9:00 a.m. and 10:00 a.m. and 6 reported starting breakfast after 10:00 a.m. These uncommon start times likely reflect the use of mid-morning breaks to serve breakfast, a breakfast service model that is referred to as “breakfast after first period”.¹⁷ With this model of breakfast service, students eat breakfast during a mid-morning break, usually between 9:00 am and 10:00 am. Typically, reimbursable breakfasts are individually packaged in grab 'n' go bags and are generally picked up from mobile carts or tables located in high traffic areas. According to FSMs, students spend little time waiting in line for breakfast—3 minutes on average.

Table 3.14. Breakfast Schedules

	School Size ^a			School Type			
	Small	Medium	Large	Elementary Schools	Middle Schools	High Schools	All Schools
Time Breakfast Service Starts							
Mean	7:43	7:41	7:31	7:46	7:38	7:29	7:41
Mode	7:30	7:30	7:30	7:30	7:30	7:30	7:30
Minimum	6:30	6:30	6:30	6:50	6:30	6:30	6:30
Maximum ^b	10:00	10:00	10:36	10:00	10:25	10:36	10:36
Minutes Students Wait in Line to Get Breakfast							
Mean	3	3	4	3	3	4	3
Minimum	0	0	0	0	0	0	0
Maximum ^c	30	20	60	30	20	60	60
Number of Schools	326	287	193	282	265	259	806

Source: School Nutrition Dietary Assessment-IV, Foodservice Manager Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Note: Table includes only schools that participate in the School Breakfast Program.

^aSmall = fewer than 500 students; Medium = 500 to 999 students; Large = 1,000 or more students.

^bTwenty foodservice managers reported starting breakfast service between 9:00 a.m. and 10:00 a.m. and 6 reported starting breakfast service after 10:00 a.m.

^cThe maximum values were clear outliers, but they had little impact on the estimated mean. Only 6 foodservice managers reported wait times longer than 15 minutes, and only 1 reported 60 minutes. In 4 of these schools, breakfast was served only in the cafeteria (rather than through faster service options such as “grab and go” breakfasts).

In 40 percent of schools, the doors opened for students prior to the beginning of breakfast service (Table 3.15). This practice was most common among large schools (56 percent) and high schools (66 percent) and least common among medium-sized schools (34 percent) and elementary schools (30 percent). In more than half (56 percent) of schools where students arrived by bus, the

¹⁷ See www.fns.usda.gov/cnd/breakfast/expansion/expansionstrategies.htm#basic.

first bus arrived before or at the same time as breakfast service started. However, only 13 percent of schools had all buses arrive before or at the same time as breakfast started. So, in most schools, at least some students had less than the full time interval between the beginning of breakfast service and the first class period to eat breakfast.

Table 3.15. Meal-Scheduling Policies Related to Breakfast

	Percentage of Schools						
	School Size ^a			School Type			
	Small	Medium	Large	Elementary Schools	Middle Schools	High Schools	All Schools
Doors Open Before Breakfast Starts	41.3	33.8	55.7	30.1	44.7	66.1	40.2
Breakfast Starts Before or at Same Time as First Class	94.2	93.8	87.0	95.8	93.8	85.2	93.2
Among Schools with Morning Buses (n= 597):							
First Bus Arrives Before or at Same Time as Breakfast Starts	52.7	57.0	66.0	51.9	61.6	60.8	55.6
Last Bus Arrives Before or at Same Time as Breakfast Starts	14.3	13.3	8.9	13.0	9.6	18.1	13.4
Number of Schools	326	287	193	282	265	259	806

Source: School Nutrition Dietary Assessment-IV, Foodservice Manager Survey and Principal Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Notes: Table includes only schools that participate in the School Breakfast Program.

Among schools with morning buses, arrival time for the first bus was missing for 3 percent of all schools and arrival time for the last bus was missing for 7 percent of all schools.

^aSmall = fewer than 500 students; Medium = 500 to 999 students; Large = 1,000 or more students.

Among schools that opened doors to students before or at the same time as the beginning of breakfast service, doors opened an average of 18 minutes before the meal (Table 3.15a). The interval was much longer among large schools (31 minutes) and high schools (30 minutes) and was shortest for elementary schools (12 minutes). In schools where breakfast service started before or during the first class period, students had an average of 34 minutes between the start of breakfast service and the beginning of the first class.

Table 3.15a. Schedules for School Door Opening, Breakfast Service, and First Class

	Percentage of Schools						
	School Size ^a			School Type			
	Small	Medium	Large	Elementary Schools	Middle Schools	High Schools	All Schools
Among Schools Where Doors Open Before or at the Same Time as Breakfast Starts (n= 481):							
Minutes Between Doors Opening and Breakfast Starting							
Mean	17	14	31	12	21	30	18
Minimum	0	0	0	0	0	0	0
Maximum	190	120	183	145	175	190	190
Among Schools Serving Breakfast Before or During First Class (n= 595):							
Minutes Between When Breakfast Starts and First Class Starts							
Mean	34	34	33	34	33	34	34
Minimum	0	0	0	0	0	0	0
Maximum	110	80	116	75	116	110	116
Number of Schools	326	287	193	282	265	259	806

Source: School Nutrition Dietary Assessment-IV, Foodservice Manager Survey and Principal Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Note: Table includes only schools that participate in the School Breakfast Program.

^aSmall = fewer than 500 students; Medium = 500 to 999 students; Large = 1,000 or more students.

3. Scheduling of School Activities During Meal Times

According to principals, about one in five schools (21 percent) scheduled activities such as tutoring sessions, club meetings, or fundraisers during meal times (Table 3.16). The proportion of middle and high schools that engaged in this practice was roughly two times greater than the proportion of elementary schools (33 and 28 percent, respectively, versus 15 percent). Among schools that scheduled activities during meal time, 63 percent had an activity during lunch at least once per week and 44 percent had an activity during breakfast at least once per week.

Tutoring was, by far, the most common activity scheduled during meal times. Close to half (46 percent) of the schools that scheduled activities during meal times reported that tutoring sessions were scheduled during lunch at least weekly. Club meetings were the next most common lunch-time activity, reported by about a quarter (24 percent) of schools that scheduled activities during meal times. The other activities queried in the survey (fundraisers that included food; bake sales; and pep rallies) were notably less common—occurring on at least a weekly basis in fewer than 10 percent of schools that scheduled activities during meal times. The types of activities scheduled during breakfast generally mirrored the patterns observed for lunch. However, club meetings were notably less frequent during breakfast than lunch (9 versus 24 percent).

Table 3.16. Scheduling of School Activities During Meal Times

	Percentage of Schools			
	Elementary Schools	Middle Schools	High Schools	All Schools
Activities Are Sometimes Scheduled During Meal Times	15.0	32.8	27.5	20.8
Among Schools Where Activities Are Sometimes Scheduled During Meal- Times:				
How Often Activities Are Scheduled During Lunch (n= 184):				
At least once per week	62.1	72.7	55.8	63.3
Less than once per week or never	36.6	24.4	38.8	33.8
Missing	1.3	2.9	5.4	2.9
Specific Activities Scheduled At Least Once Per Week During Lunch (n = 184):				
Tutoring sessions	35.5	63.1	44.4	45.7
Club meetings	24.1	22.7	24.3	23.7
Fundraisers that include snack foods	9.5	7.1	7.6	8.3
Bake sales	0.0	3.0	8.9	3.3
Fundraisers that include pizza or other foods	0.0	3.7	5.9	2.7
Pep rallies	0.0	2.2	0.0	0.6
Other activities	9.5	9.9	0.7	7.2
How Often Activities Are Scheduled During Breakfast (n= 166):^a				
At least once per week	28.7	53.2	56.2	44.0
Less than once per week or never	52.6	44.4	39.7	46.3
Missing	18.7	2.4	4.1	9.7
Specific Activities Scheduled At Least Once Per Week During Breakfast (n = 166):^a				
Tutoring sessions	21.7	45.1	36.3	32.7
Club meetings	2.0	13.1	14.9	9.1
Fundraisers that include snack foods	4.7	2.0	10.1	5.6
Bake sales	0.0	0.0	8.6	2.7
Fundraisers that include pizza or other foods	0.0	2.7	4.4	2.1
Pep rallies	0.0	1.6	0.0	0.4
Other activities	1.0	5.6	2.2	2.7
Number of Schools	265	230	226	721

Source: School Nutrition Dietary Assessment-IV, Principal Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Note: Responses for specific activities queried in the Principal Survey were missing for 14 to 29 percent of elementary schools, 7 to 27 percent of middle schools, and 7 to 12 percent of high schools. Respondents may have skipped activities that were never offered. However, because this could not be firmly established, percentages reported for specific activities should be considered lower-bound estimates.

^aPercentages for breakfast are based on schools that participate in the School Breakfast Program and sometimes schedule school activities during meal times.

4. Student Mobility During Lunch

The majority of elementary and middle schools (97 and 92 percent, respectively) require students to go to the cafeteria or foodservice area during their lunch period (Table 3.17). In contrast, 30 percent of high schools do not require that students go to the cafeteria or foodservice area during their lunch period. Nearly all schools (96 percent) allow students into the dining area even if they do not bring or buy a lunch.

Table 3.17. Policies Related to Student Mobility During Lunch

	Percentage of Schools			
	Elementary Schools	Middle Schools	High Schools	All Schools
Students Are Required to Go to Cafeteria or Foodservice Area During Their Lunch Period	96.7	91.5	70.2	90.2
Students Who Do Not Bring or Buy Lunch Are Allowed in Area Where Students Eat Lunch				
Yes, all students	95.0	98.7	94.9	95.6
Yes, some students	0.5	0.0	1.4	0.6
No	3.2	1.3	3.1	2.8
Missing	1.4	0.0	0.6	1.0
Students Are Allowed to Visit Other Tables During Meal Times				
Yes, all students	11.4	41.2	84.3	31.9
Yes, some students	10.1	4.3	2.8	7.6
No	77.6	54.2	12.3	59.8
Missing	1.0	0.2	0.6	0.7
Students Are Allowed to Leave Lunch Area After a Certain Time				
Yes, all students	27.0	31.5	35.8	29.6
Yes, some students	9.1	13.5	9.1	9.9
No	63.5	54.7	54.1	60.0
Missing	0.5	0.3	1.0	0.5
Among Schools Where Not All Students Are Required to Go to the Lunch Area (n= 108):				
Where Students Can Go During Lunch^a				
Cafeteria or other places meals are served	--	--	87.8	90.8
Classroom but only with teacher permission	--	--	60.0	55.6
Off-campus/home	--	--	61.5	51.1
Outside, on campus	--	--	61.7	50.5
Other designated area on campus	--	--	43.7	37.6
Library	--	--	27.0	27.3
Classrooms open to students during lunch period	--	--	27.2	21.9
Computer lab or other media center	--	--	21.4	17.9
Gymnasium	--	--	9.5	11.8
Anywhere on campus	--	--	8.9	5.7
Among Schools Where Some or All Students May Leave the Lunch Area After a Certain Time (n= 301):				
Students May Leave Lunch Area at Any Time				
Yes, all students	15.1	29.7	65.0	29.9
Yes, some students	23.7	33.3	24.1	25.7
No	61.3	34.5	9.9	43.6
Missing	0.0	2.5	1.0	0.7
Number of Schools	265	230	226	721

Source: School Nutrition Dietary Assessment-IV, Principal Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

^aMultiple responses were allowed.

-- Sample size is too small to produce reliable estimate.

Students' privileges related to mobility during the lunch period increased with age. For example, only 22 percent of elementary schools allowed some or all students to visit other tables in the dining area, compared to 46 percent of middle schools and 87 percent of high schools (Table 3.17). Middle and high schools were also more likely than elementary schools to allow some or all students to leave the lunch area after a certain amount of time (45 versus 36 percent).

Among schools that did not require all students to go to the foodservice area during lunch, students could go to a wide variety of locations on campus, such as classrooms, the library, gymnasium, or media center (Table 3.17). About half (51 percent) of all schools and 62 percent of high schools in this group had an open-campus policy, meaning they allowed students to leave campus during their lunch period. Among schools that allowed students to leave the lunch area after a certain amount of time, middle and high schools were more likely than elementary schools to allow some or all students to leave any time during the lunch period (63 and 89 percent, respectively, versus 39 percent).

Overall, only 5 percent of schools had an open-campus policy (Table 3.17a). The vast majority of these schools were high schools. Less than 3 percent of either elementary or middle schools had an open-campus policy, compared to 19 percent of high schools. Most schools with open campus policies (92 percent) were located within walking or driving distance of students' homes or a relative's home where students could go for lunch. Most were also located close to stores (84 percent) and fast-food restaurants (75 percent) where students could purchase foods and beverages.

Table 3.17a. Open Campus Policies During Lunch

	Percentage of Schools			
	Elementary Schools	Middle Schools	High Schools	All Schools
School Follows an Open Campus Policy	1.9	1.3	18.7	5.3
Among Schools with an Open Campus Policy (n=55):				
Off-Campus Food Sources Close Enough to Walk or Drive During Lunch^a				
Home or home of relative or friend	--	--	--	91.5
Supermarkets, convenience stores, or other stores	--	--	--	83.7
Fast food restaurants	--	--	--	74.9
Other restaurants, cafeterias, or diners	--	--	--	50.1
Off-campus lunch wagons or push carts	--	--	--	0.9
Number of Schools	265	230	226	721

Source: School Nutrition Dietary Assessment-IV, Principal Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

^aMultiple responses were allowed.

-- Sample size is too small to produce reliable estimate.

5. Recess Schedules

Nearly all elementary schools (96 percent) and just over one-third of middle schools (34 percent) had a scheduled recess (Table 3.18). (High school principals were not asked about recess). Schools scheduled recess both before and after lunch, and some schools had both types of recess periods. However, more schools had recess after lunch (79 percent) than before lunch (37 percent). Among schools where some students have recess immediately after lunch, about a quarter (24

percent) of elementary schools and more than one-half (58 percent) of middle schools allowed students to go to recess prior to the end of their official lunch period. Almost all of these schools had rules about when students may go to recess. Forty-four percent specified a set time interval that students must remain in the cafeteria, and 25 percent required that students eat their lunches before they go out to recess. These findings should be interpreted with caution because sample sizes were small and responses were open-ended.

Table 3.18. Policies Related to Recess

	Percentage of Schools		
	Elementary Schools	Middle Schools	All Elementary and Middle Schools
Has a Scheduled Recess	95.9	34.1	82.1
Among Schools with Recess (n= 323):			
Some Students Have Recess Immediately <i>Before</i> Lunch	38.6	22.5	37.1
Some Students Have Recess Immediately <i>After</i> Lunch	78.5	80.2	78.7
Among Schools with Recess Immediately After Lunch (n= 252):			
Students Are Allowed to Go Out to Recess Before the Official End of Their Lunch Period			
Yes, without rules	1.9	7.8	2.5
Yes, with rules	22.3	50.5	25.0
No	75.8	41.7	72.6
Among Schools with Rules About When Students May Go Out to Recess Before the Official End of Their Lunch Period (n=67):			
Types of Rules^a			
Students may leave after a specified time interval	--	--	44.2
Students must eat lunch first	--	--	25.2
Students are dismissed in a group	--	--	13.7
Rules vary by grade	--	--	9.6
Teachers/lunchroom staff have discretion	--	--	7.1
Adult supervision must be available	--	--	3.2
Other	--	--	7.4
Number of Schools	265	230	495

Source: School Nutrition Dietary Assessment-IV, Principal Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Note: High school principals were not asked about recess.

^aPrincipals provided open-ended responses describing the rules. These responses were then categorized; some responses were coded into more than one category.

-- Sample size is too small to produce reliable estimate.

D. Competitive Foods

Information about the availability of competitive foods was collected in multiple instruments, including surveys of principals and FSMs and checklists that were completed by a school staff member designated by the principal. Sources of information about competitive foods included:

- **FSM survey.** The FSM survey collected information about the availability vending machines in the foodservice area.
- **Principal survey.** The principal survey collected information about the availability of and student access to vending machines, school stores, snack bars, and fundraisers.¹⁸
- **A la carte checklist.** The a la carte checklist documented whether foods and beverages were available to students for a la carte purchase during breakfast or lunch and, if so, the specific foods and beverages that were available. FSMs completed the checklist on one randomly assigned day during the target week.
- **Competitive foods checklists.** A member of the school staff designated by the principal completed the competitive foods checklists. The **vending machine checklist** documented the presence of vending machines and the **other sources of foods and beverages checklist** documented the presence of school stores that sold food and/or beverages, as well as snack bars, fundraisers and other sources of foods and beverages. Both competitive foods checklists documented the specific foods available in each venue.

1. Types and Combinations of Competitive Food Sources

Table 3.19 presents information about the types and combinations of competitive food sources available in schools in SY 2009–2010.¹⁹ In more than 80 percent of elementary schools and ninety percent or more of middle and high schools, students had the option to purchase foods and beverages on an a la carte basis during lunch. Smaller percentages of schools (58 to 74 percent) had a la carte foods and beverages available at breakfast. Vending machines were widely available in high schools (85 percent), but were somewhat less common in middle schools (67 percent) and were rare in elementary schools (13 percent). Other types of competitive food sources (including school stores, snack bars, food carts, and fundraisers) were available in substantially fewer schools. Such competitive food venues were available in roughly 30 percent of middle and high schools, but only 12 percent of elementary schools. These estimates should be considered lower bounds, however, because information on the availability of one or more of these other sources of competitive foods was missing for 11 percent of schools overall.

¹⁸ Principals were asked about fundraisers that took place during meal periods, including bake sales and other fundraisers that included the sale of snack foods, pizza, or other foods.

¹⁹ As noted in the introduction to this chapter, samples for the various instruments that collected information about competitive foods varied (that is, not all schools completed all instruments). To obtain information about the combinations of competitive food sources available in schools, we used the sample of schools that had completed the FSM survey and drew on responses from all of the instruments identified in the bulleted list above. Data were weighted to provide nationally representative estimates of schools participating in the NSLP.

Among schools with complete information about the availability of competitive foods, 89 percent of elementary schools, and 98 to 99 percent of middle and high schools had at least one source of competitive foods (Table 3.19). Most elementary schools (65 percent) had only a la carte foods and beverages (hereafter referred to as a la carte) available. In contrast, 44 percent of middle schools and one-half of high schools had both a la carte and vending machines available. Another 27 percent of middle schools and 31 percent of high schools had a la carte, vending, and at least one other source of competitive foods.

Table 3.19. Types and Combinations of Competitive Food Sources Available in Schools

Competitive Food Sources	Percentage of Schools			
	Elementary Schools	Middle Schools	High Schools	All Schools
Any A la Carte				
Offered a la carte at breakfast	58.2	74.3	70.1	63.5
Offered a la carte at lunch	82.2	94.6	90.0	86.0
Any Vending Machines	13.1	66.7	84.8	37.4
Any Other Alternative Food Sources ^a	12.2	29.7	30.9	19.2
Missing	11.4	11.1	9.7	11.0
Number of Schools	315	284	277	876
Among Schools With Complete Information About Competitive Foods:				
Any Competitive Food Source (Vending Machines, A la Carte, or Alternative Food Sources^a)	89.4	98.7	97.9	92.8
Combinations of Sources				
A la carte only	65.2	19.5	8.1	45.2
Vending machines and a la carte	7.9	44.0	49.5	23.0
Vending machines, a la carte, and other alternative food sources ^a	1.9	26.8	31.4	12.5
A la carte and other alternative food sources ^a	8.2	5.8	2.1	6.5
Vending machines only	2.6	1.8	6.0	3.2
Other alternative food sources only ^a	2.3	0.5	0.0	1.5
Vending machines and other alternative food sources ^a	1.4	0.4	0.8	1.1
Number of Schools	273	250	237	760

Source: School Nutrition Dietary Assessment-IV, Foodservice Manager Survey, Principal Survey, A la Carte Checklist, Vending Machine Checklist, and Other Sources of Foods and Beverages Checklist, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

^aAlternative food sources include school stores, snack bars, or fundraisers reported by principals as well as school stores, snack bars, food carts, fundraisers, or other sources of competitive foods documented on the other sources of foods and beverages checklist.

2. A la Carte Foods and Beverages

Principals were asked whether schools had rules about when students could purchase a la carte foods. Slightly more than half (54 percent) of the schools that offered a la carte at either breakfast or

lunch had rules about when students could purchase a la carte foods (Table 3.20). Such rules were more common in elementary and middle schools than in high schools (59 and 54 percent of schools with a la carte, respectively, versus 43 percent). Rules generally applied to all students; relatively few schools (5 percent) set rules for only some students. The most commonly reported rules limited a la carte purchases to students who: (1) brought lunch from home (43 percent of schools with rules governing a la carte purchases), (2) had eaten their meal (37 percent), or (3) had taken a reimbursable meal (36 percent). Almost 20 percent of schools with rules about a la carte purchases allowed such purchases only after all students had had an opportunity to take a reimbursable meal.

Table 3.20. Policies Related to A la Carte Purchases

	Percentage of Schools			
	Elementary Schools	Middle Schools	High Schools	All Schools
Among Schools with A la Carte (n=646):				
School Has Rules about When Students May Buy A la Carte Items				
Yes, for all students	55.5	48.1	36.4	49.9
Yes, for some students	3.1	6.0	7.1	4.5
No	38.7	45.9	56.5	44.0
Missing	2.8	0.0	0.0	1.6
Among Schools with Rules About A la Carte Purchases (n=332):				
A la Carte Foods May be Purchased When:^a				
Student brings lunch from home	43.0	42.0	43.2	42.9
Student has eaten his or her meal	34.4	42.4	40.8	37.1
Student takes a reimbursable meal	30.2	45.9	47.4	36.2
All students have had the opportunity to take a reimbursable meal	12.4	31.3	29.9	19.1
Other	7.3	5.4	9.7	7.3
Missing	5.1	3.3	5.1	4.8
Number of Schools	265	230	226	721

Source: School Nutrition Dietary Assessment-IV, Principal Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

^aMultiple responses were allowed.

a. Types of A la Carte Foods and Beverages Available at Lunch

FSMs provided information about the types of foods and beverages available for a la carte purchase. They did so by completing the a la carte checklist for one randomly assigned day.²⁰

²⁰ Of the 895 schools that completed the a la carte checklist, 65 schools that reported having a la carte at lunch and 73 schools that reported a la carte at breakfast did not complete the portion of the form that collected information about the specific foods and beverages available at each meal. To account for this item-level nonresponse, separate weights were developed for use in estimating the percentages of schools in which different types of foods and beverages were available on an a la carte basis at lunch and breakfast (see Volume II).

Eighteen percent of schools sold only milk on an a la carte basis at lunch (Table 3.21). Elementary schools were more likely than either middle or high schools to limit a la carte sales to milk (25 percent versus 8 and 5 percent, respectively). Other schools sold a wide variety of a la carte foods and beverages at lunch. Almost all items were more commonly offered in middle and high schools than elementary schools. This pattern is influenced by differences in the foods offered as well as the fact that, relative to middle and high schools, fewer elementary schools offered a la carte at lunch and more elementary schools limited their a la carte sales to milk.

Key findings about the types of foods and beverages sold on an a la carte basis at lunch include the following (Table 3.21):

- Sold in 80 percent of all schools, milk was the most commonly available a la carte item at lunch and the most common beverage (Table 3.21). Water or 100% fruit or vegetable juice was available at lunch in more than half (56 percent) of all schools. In middle and high schools, water was offered more frequently than 100% juice.
- Thirty percent of schools offered beverages other than milk, water, or 100% juice. This included energy or sport drinks (20 percent of schools), juice drinks and other sweetened drinks (19 percent), hot or cold chocolate drinks (4 percent), and carbonated soft drinks (both sugar-sweetened and diet varieties). Carbonated soft drinks were sold a la carte in about 1 percent of schools overall. Most of the schools that sold these beverages were high schools.
- Baked desserts, bread/grain products, and frozen or dairy desserts were each available in more than three of ten schools (38, 32, and 36 percent, respectively). Within each of these groups of foods, schools offered both regular and low-fat varieties, and the percentages offering each variety were often roughly equivalent. For example, low- and regular-fat cookies were each sold in 20 percent of all schools; low-fat and regular muffins were each sold in 5 to 6 percent of all schools; and regular and low-fat ice cream, frozen yogurt, and sherbet were sold in 20 to 21 percent of all schools.
- Fruit was available for a la carte purchase in close to half (47 percent) of all schools, and fresh fruit was offered more frequently than canned or dried fruit (41 versus 30 and 6 percent, respectively).
- More than half (55 percent) of all schools sold entrees on an a la carte basis. Meat items and mixed dishes were equally common (43 and 44 percent of schools, respectively). Meat-alternate entrees such as peanut butter, cheese, or egg sandwiches, were less common (31 percent).
- The most common meat-based entree items were breaded poultry (such as chicken nuggets) and cheeseburgers and hamburgers, followed by hot dogs or corn dogs; sandwiches with breaded meat, poultry, or fish; sandwiches with cold cuts; and sandwiches with unbreaded meat, poultry or fish.
- Pizza, with and without meat, entree salads, and Mexican dishes such as tacos, nachos, and quesadillas were the most commonly offered mixed dishes.

Table 3.21. Percentage of Schools Offering Different Foods and Beverages for A la Carte Purchase at Lunch

Foods and Beverages	Percentage of Schools			
	Elementary Schools	Middle Schools	High Schools	All Schools
Specific Items Available for A la Carte Purchase at Lunch				
Milk	77.6	84.6	84.7	80.3
Milk Only	24.9	7.9	4.7	17.8
100% Juice and Water	44.2	72.4	74.8	55.5
100% fruit or vegetable juice	31.9	51.7	50.1	39.1
Bottled water (plain, flavored, or sparkling)	32.1	66.2	71.5	46.2
Other Beverages	15.0	50.2	57.6	29.9
Energy and sports drinks	5.2	34.7	51.1	19.8
Juice drinks and other sweetened drinks	10.5	30.1	34.6	18.9
Hot or cold chocolate drinks	1.6	9.3	8.7	4.4
Other	0.7	1.3	2.4	1.2
Carbonated diet soft drink	0.0	0.2	3.6	0.8
Carbonated sweetened soft drink	0.0	0.2	1.1	0.3
Baked Goods/Desserts	24.3	57.2	62.9	38.0
Low-fat cookies	13.4	29.2	30.0	19.6
Regular cookies	10.7	31.7	35.6	19.5
Low-fat cakes, cupcakes, or brownies	4.6	13.0	11.5	7.5
Regular cakes, cupcakes, or brownies	1.6	8.6	15.9	5.8
Regular pies, turnovers, or toaster pastries	2.9	7.9	12.6	5.8
Doughnuts	0.4	7.0	6.7	2.9
Low-fat pies, turnovers, or toaster pastries	1.7	2.9	4.9	2.6
Other	0.0	1.9	3.0	0.9
Bread or Grain Products	22.1	45.0	48.9	31.6
Regular bread, rolls, bagels, or tortillas	10.4	24.9	30.3	17.0
Whole grain bread, rolls, bagels, or tortillas	11.4	20.7	22.4	15.3
Other bread items (e.g., biscuits, croissants, or hot pretzels)	4.9	18.3	23.9	11.1
Low-fat muffins	4.3	7.0	10.2	6.0
Regular muffins	1.9	7.6	11.6	4.9
Ready-to-eat breakfast cereal	1.5	5.7	14.3	4.8
Pancakes, waffles, or French toast	2.8	3.4	3.9	3.1
Other	0.2	0.8	2.0	0.7
Candy or Gum	0.8	2.6	4.4	1.8
Frozen or Dairy Desserts	26.5	50.5	52.3	36.0
Low-fat ice cream, frozen yogurt, or sherbet	17.1	28.4	24.9	20.7
Regular ice cream, frozen yogurt, or sherbet	14.8	24.5	30.4	19.7
Frozen fruit bars or popsicles	16.1	21.3	24.8	18.8
Pudding	4.1	7.5	13.3	6.6
Milkshakes, smoothies	0.8	11.2	12.5	5.0

Table 3.21 (continued)

Foods and Beverages	Percentage of Schools			
	Elementary Schools	Middle Schools	High Schools	All Schools
Fruit	37.2	58.1	66.5	46.9
Fresh fruit	29.8	53.4	62.3	40.6
Canned fruit	25.1	39.0	37.8	30.2
Dried fruit	5.8	6.2	6.5	6.0
Entrees	43.5	72.4	73.2	54.7
Meat Entrees	31.2	57.9	63.9	42.6
Breaded chicken/turkey (nuggets, patties, strips, parts)	15.0	36.6	41.9	24.3
Cheeseburger or hamburger	14.2	31.3	41.6	22.8
Hot dog or corn dog	9.4	26.5	26.6	16.0
Sandwich with breaded meat, poultry, or fish	8.0	26.0	30.5	15.8
Sandwich with cold cuts	7.2	22.8	34.6	15.5
Sandwich with unbreaded meat, poultry, or fish	9.6	18.1	23.9	14.0
Unbreaded chicken/turkey (nuggets, patties, strips, parts)	8.1	7.6	17.0	9.8
Breaded fish (nuggets, patties, strips, sticks)	6.7	11.8	13.1	8.9
Chili	4.7	11.5	16.4	8.3
Unbreaded beef/pork (nuggets, patties, strips)	4.4	9.8	12.7	7.0
Breaded beef/pork (nuggets, patties, strips)	3.5	6.8	9.4	5.3
Sausage or bacon	4.9	4.1	6.7	5.1
Unbreaded fish (nuggets, patties, strips, sticks)	0.3	1.8	0.9	0.7
Meat Alternate Entrees	22.3	38.1	48.8	30.5
Peanut butter sandwich (including with jelly)	15.3	23.5	31.5	20.1
Cheese	10.2	21.1	29.2	16.0
Cheese sandwich	10.4	12.7	13.9	11.5
Eggs	1.8	4.8	5.5	3.1
Egg sandwich or breakfast burrito	1.5	4.4	6.0	2.9
Mixed Dish Entrees	32.3	60.1	63.9	43.7
Pizza with meat	16.1	43.0	45.4	26.9
Pizza without meat	15.5	33.0	43.1	24.2
Entree salad (chef's, Cobb, Caesar)	16.6	28.2	36.4	22.6
Other Mexican foods (tacos, nachos, quesadillas)	9.3	25.3	31.8	16.7
Spaghetti	8.2	15.0	19.5	11.7
Macaroni and cheese	7.9	13.9	15.5	10.5
Burritos	6.1	12.5	19.3	9.9
Soup with meat or beans (chicken, clam chowder, minestrone)	5.1	7.8	15.7	7.8
Lasagna	4.4	6.7	7.7	5.5
Chinese food	2.6	8.7	10.2	5.2
Other Entrees	6.3	16.9	20.2	11.0
Vegetables	34.5	61.6	65.1	45.6
Raw vegetables	17.0	29.9	37.5	23.5
Side salads	16.6	32.1	36.7	23.4

Table 3.21 (continued)

	Percentage of Schools			
	Elementary Schools	Middle Schools	High Schools	All Schools
Foods and Beverages				
French fries (including tater tots) – baked	9.6	27.0	38.2	18.5
Other cooked vegetables	14.2	22.1	27.8	18.4
Potatoes (other than French fries/tater tots)	11.7	15.3	25.5	15.1
Corn	9.7	18.1	25.1	14.4
Prepared salads (potato salad, coleslaw, three bean)	6.2	10.5	15.8	8.9
Carrots (cooked)	6.6	7.0	16.7	8.7
Vegetable soup	6.0	11.5	12.0	8.2
French fries (including tater tots) - deep-fried	1.9	7.5	12.9	5.1
Snacks	34.0	67.5	70.8	47.5
Low-fat baked chips	26.3	59.5	60.5	39.2
Fruit snacks	14.7	33.3	32.5	21.7
Pretzels	13.6	29.2	36.5	21.0
Crispy rice bars or treats	11.3	32.7	32.4	19.5
Other types of crackers	14.8	23.1	21.4	17.7
Popcorn	11.0	21.0	26.3	15.9
Low-fat granola bars, cereal bars, or energy bars	7.5	23.1	28.3	14.5
Regular chips	8.9	19.6	24.3	13.9
Nuts or seeds	3.6	14.3	21.0	9.1
Regular granola bars, cereal bars, or energy bars	4.9	12.0	18.3	8.9
Cracker sandwiches with cheese or peanut butter	4.4	8.5	12.4	6.7
Meat snacks	3.0	10.9	14.0	6.7
Other	2.1	2.7	3.9	2.6
Yogurt	11.8	21.3	34.6	18.1
Number of Schools	290	276	264	830

Source: School Nutrition Dietary Assessment-IV, A la Carte Checklist, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Notes: Percentages reflect all schools (not just schools that offered a la carte).

Sixty-five schools were excluded from the tabulation because they offered a la carte foods and beverages at lunch but did not provide information about the specific foods and beverages available. To account for this item-level nonresponse, a separate weight was applied to the remaining schools (see Volume II).

Food items are listed as they appeared on the checklist.

- Forty-six percent of schools sold vegetable items a la carte. Raw vegetables and side salads were the most prevalent items, followed by baked french fries, other cooked vegetables, and other types of potatoes. Deep-fried french fries were rare, offered in only 5 percent of all schools. Most of the schools that offered deep-fried french fries were high schools and middle schools.

- Forty-eight percent of schools sold snack foods a la carte. Schools offered both regular and low-fat varieties and low-fat options were generally offered more frequently. For example, low-fat baked chips were more than three times as common as regular chips (39 percent of schools versus 14 percent) and low-fat granola, cereal, or energy bars were offered in more schools than the regular varieties (15 versus 9 percent).

b. Types of A la Carte Foods and Beverages Available at Breakfast

Thirteen percent of schools sold only milk on an a la carte basis at breakfast (Table 3.22). As noted for lunch, elementary schools were more likely than either middle or high schools to limit a la carte sales to milk (18 percent versus 8 and 6 percent, respectively).

Compared to lunch (Table 3.21), schools sold a more limited array of a la carte foods and beverages at breakfast (Table 3.22). Milk, available in 58 percent of schools, was the most commonly available item at breakfast and the most common beverage. Water or 100% fruit or vegetable juice was available in 43 percent of schools. The pattern was the reverse of that observed for lunch, with 100% juice offered in a larger share of schools than water (39 percent of schools versus 21 percent).

Other key findings about the types of foods and beverages offered for a la carte sale at breakfast are summarized below (Table 3.22):

- Bread and grain products were available for a la carte purchase at breakfast in more than one-third (37 percent) of all schools. After milk, this group of foods was the most commonly offered at breakfast. Ready-to-eat breakfast cereal was the most common item in this group (30 percent of schools), followed by pancakes, waffles and french toast (14 percent).
- More than one quarter (26 percent) of schools offered fruit; fresh fruit was the most commonly offered type of fruit.
- Candy, gum, and frozen or dairy desserts were rarely offered at breakfast, particularly among elementary schools. However, more than one in ten schools (16 percent) offered snacks (including chips, pretzels, crispy rice bars/treats, granola/cereal/energy bars and similar foods) at breakfast.²¹ These foods were more commonly offered in middle and high schools than elementary schools.

²¹ See Table 3.21 for a complete list of the items included in the snacks category on the a la carte checklist.

Table 3.22. Percentage of Schools Offering Different Foods and Beverages for A la Carte Purchase at Breakfast

Foods and Beverages	Percentage of Schools			
	Elementary Schools	Middle Schools	High Schools	All Schools
Specific Items Available for A la Carte Purchase at Breakfast				
Milk	53.4	68.2	64.0	58.2
Milk Only	17.5	8.1	5.6	13.4
100% Juice and Water	33.8	55.3	58.3	42.7
100% fruit or vegetable juice	32.0	48.5	53.8	39.4
Bottled water (plain, flavored, or sparkling)	11.5	31.3	38.7	20.7
Other Beverages	4.3	20.6	28.7	12.2
Energy and sports drinks	1.9	16.4	23.3	8.9
Juice drinks and other sweetened drinks	1.1	11.0	16.8	6.1
Hot or cold chocolate drinks	0.6	2.7	8.8	2.7
Other	0.7	0.3	2.7	1.1
Carbonated diet soft drink	0.0	0.0	0.5	0.1
Carbonated sweetened soft drink	0.0	0.0	0.3	0.1
Baked Goods/Desserts	5.6	22.5	25.2	12.7
Regular pies, turnovers, or toaster pastries	1.8	7.5	13.1	5.1
Doughnuts	2.0	8.5	8.2	4.4
Regular cookies	0.4	6.0	7.5	2.9
Low-fat cookies	0.7	5.4	5.7	2.6
Low-fat pies, turnovers, or toaster pastries	1.6	2.9	4.9	2.5
Other	1.3	3.1	3.1	2.0
Low-fat cakes, cupcakes, or brownies	0.3	2.6	4.0	1.4
Regular cakes, cupcakes, or brownies	0.0	1.9	2.3	0.8
Bread or Grain Products	29.2	47.5	49.0	36.6
Ready-to-eat breakfast cereal	24.1	38.7	41.7	30.3
Pancakes, waffles, or French toast	10.5	19.6	20.7	14.2
Regular bread, rolls, bagels, or tortillas	5.6	14.9	20.5	10.4
Low-fat muffins	6.5	14.8	17.7	10.3
Other bread items (e.g., biscuits, croissants, or hot pretzels)	8.1	13.8	12.5	10.0
Regular muffins	6.5	9.7	15.9	9.0
Whole grain bread, rolls, bagels, or tortillas	5.1	12.1	12.2	7.8
Candy or Gum	0.0	0.1	0.9	0.2
Frozen or Dairy Dessert	0.7	3.1	8.0	2.6
Fruit	17.9	38.2	38.3	25.7
Fresh fruit	15.9	35.4	35.0	23.3
Canned fruit	8.1	16.8	17.4	11.5
Dried fruit	2.7	3.6	2.8	2.9
Entrées	19.3	28.9	38.4	24.9
Vegetables	1.4	6.2	6.1	3.2
Snacks	9.6	25.4	27.8	16.2
Yogurt	7.9	15.7	18.6	11.5
Number of Schools	291	259	255	805

Source: School Nutrition Dietary Assessment-IV, A la Carte Checklist, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Table 3.22 (continued)

Notes: Percentages reflect all schools (not just schools that offered a la carte).

Seventy-three schools were excluded from the tabulation because they offered a la carte foods and beverages at breakfast but did not provide information about the specific foods and beverages offered. To account for this item-level nonresponse, a separate weight was applied to the remaining schools (see Volume II).

Food items are listed as they appeared on the checklist.

c. Revenue from A la Carte Foods

FSMs reported the total revenue from a la carte sales each day during the week they completed the menu survey. To compare a la carte revenue across schools, we first created a weekly total for each school. We then normalized the weekly totals by enrollment and expressed a la carte revenue as dollars (per week) per 1,000 students. Table 3.23 presents data on average weekly a la carte revenue (including \$0 for schools that did not offer a la carte) for all schools and for schools with different characteristics. Data are also presented for the subset of schools that offered a la carte at either lunch or breakfast.

Table 3.23. Average Weekly A La Carte Sales By School Characteristics

School Characteristics	Average Dollars Per Week Per 1,000 Students			
	Elementary Schools	Middle Schools	High Schools	All Schools
All Schools	\$495	\$1,618	\$1,647	\$925
District Urbanicity				
Urban	\$393	\$1,689	\$1,355	\$782
Suburban	\$630	\$1,897	\$2,071	\$1,141
Rural	\$366	\$1,011	\$1,272	\$703
District Child Poverty Level				
Low (Less than 30 percent)	\$593	\$1,838	\$1,903	\$1,067
Higher (30 Percent or more)	\$290	\$1,197	\$1,173	\$641
Among Schools Offering A la Carte (n= 742):				
All Schools	\$605	\$1,713	\$1,838	\$1,081
District Urbanicity				
Urban	\$455	\$1,802	\$1,524	\$888
Suburban	\$733	\$1,939	\$2,183	\$1,270
Rural	\$536	\$1,137	\$1,534	\$932
District Child Poverty Level				
Low (Less than 30 percent)	\$699	\$1,929	\$2,023	\$1,206
Higher (30 Percent or more)	\$385	\$1,289	\$1,441	\$804
Number of Schools	300	269	263	832

Source: School Nutrition Dietary Assessment-IV, Menu Survey (Daily Meal Counts Form), school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Note: Fifty-two schools were excluded from the analysis because they did not have five days of data on a la carte revenue. These schools either did not complete the menu survey for five days or had one or more days of missing data for a la carte revenue.

During a typical school week in SY 2009–2010, schools collected an average of \$925 per 1,000 students in a la carte revenue (Table 3.23).²² A la carte revenue varied substantially by school type. The average weekly revenue in middle and high schools was more than three times greater than the average weekly revenue in elementary schools (\$1,618 and \$1,647 per 1,000 students versus \$495). This is consistent with the patterns described in the preceding sections about the availability of a la carte and the range of a la carte items offered in different types of schools.

Average weekly revenue from a la carte sales was lower for schools located in urban and rural areas than for schools in suburban areas (\$782 and \$703 per 1,000 students, respectively, versus \$1,141) (Table 3.23). Similarly, schools located in areas with lower levels of child poverty had higher weekly a la carte revenue, on average, than schools in areas with higher levels of child poverty (\$1,067 per 1,000 students versus \$641). These patterns were noted for elementary schools, middle schools, and high schools alike. Overall, schools that offered a la carte collected an average of \$1,081 per 1,000 students per week.

Previous research has shown an inverse relationship between a la carte revenue and school meal participation (Fox et al. 2001). With few exceptions, the data suggest that this relationship held true in SY 2009–2010 (Table 3.24). A comparison of average weekly a la carte revenue for quartiles of overall NSLP participation showed that revenue ranged from a low of \$466 among schools where the average daily NSLP participation rate was 80 percent or more to a high of \$1,503 among schools where the average NSLP participation rate was less than 40 percent. A comparable pattern was observed for overall SBP participation. An inverse relationship between a la carte revenue and school meal participation rates was generally observed for all three types of schools. Weekly a la carte revenue was consistently lower in schools with the highest participation rates, relative to those with the lowest participation rates. However, the relationship was not consistent across all quartiles of participation.

²² Appendix Table B.6 presents data on the average prices charged for components of reimbursable meals when purchased a la carte.

Table 3.24. Average Weekly A La Carte Sales By School Meal Participation Rates

Average Daily Participation Rate	Average Dollars Per Week Per 1,000 Students			
	Elementary Schools	Middle Schools	High Schools	All Schools
NSLP Participation				
Less than 40 percent	--	\$2,914	\$1,569	\$1,503
40 to 59 percent	\$818	\$1,542	\$2,232	\$1,273
60 to 79 percent	\$405	\$1,592	\$1,514	\$773
80 percent or more	\$398	\$844	--	\$466
Number of Schools	289	265	255	809
SBP Participation				
Less than 10 percent	--	\$2,324	\$1,942	\$1,480
10 to 19 percent	\$751	\$1,720	\$1,558	\$1,223
20 to 29 percent	\$456	\$938	\$1,467	\$698
30 percent or more	\$370	\$1,171	\$851	\$502
Number of Schools	259	249	243	751

Source: School Nutrition Dietary Assessment-IV, Menu Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Note: Fifty-two schools were excluded from the analysis because they did not have five days of data on a la carte revenue (see Table 3.23). An additional 23 schools were excluded from the lunch analysis and an additional 9 schools were excluded from the breakfast analysis because of missing data on participation rates.

3. Vending Machines

Both principals and FSMs provided information about availability of and student access to vending machines. Principals were asked to consider all vending machines in the school building(s) or on school grounds and FSMs were asked about vending machines in the foodservice area (defined as the indoor and/or outdoor areas where reimbursable meals are served/eaten).

Based on principal reports, vending machines were available to students in 39 percent of all schools and were available in considerably more middle and high schools than elementary schools (72 and 87 percent, respectively, versus 13 percent) (Table 3.25).²³ Among schools with vending machines, machines were most often located in indoor areas other than the foodservice area (68 percent of schools) or in the foodservice area (61 percent). Only 15 percent of the schools had vending machines in an outdoor area on school grounds. More than three-quarters (79 percent) of schools that had vending machines had between 1 and 5 *beverage* machines. Roughly one quarter (24

²³ Point estimates of vending machine availability based on principal reports vary slightly from those reported in Table 3.19, but are not materially different. Estimates in Table 3.25 are based on the sample of schools that completed the principal survey and consider only the relevant item included in that survey. Estimates in Table 3.19 are based on the sample of schools that completed the FSM survey and draw on relevant items in that survey, the principal survey, and the vending machine checklist.

percent) of high schools had between 6 and 25 beverage machines. No principals reported that their school had more than 25 beverage machines.²⁴

Principals provided information about when students were able to access vending machines outside the foodservice area. Separate questions were asked about access to (1) beverage machines that sold items other than milk, 100% juice or water and (2) snack machines. More than half of the schools with beverage and snack machines outside the foodservice area allowed students to access machines after the last regular class of the school day (59 and 56 percent, respectively) (Table 3.25). High schools were twice as likely as middle schools to allow students access to beverage machines outside the foodservice area at times other than their lunch period, including before school (52 versus 21 percent), before lunch (23 versus 12 percent), and after lunch, but before the end of the last regular class (32 versus 14 percent). A comparable pattern was noted for snack machines, but the differences between schools were smaller (middle schools tended to allow access to snack machines at times other than students' lunch periods more often than they allowed access to beverage machines).

FSMs provided information about student access to vending machines located in the foodservice area. Seven percent of elementary schools, 40 percent of middle schools, and 53 percent of high schools had vending machines located in the foodservice area (Table 3.25).²⁵ Compared to vending machines outside the foodservice area, students generally had less access to vending machines in the foodservice area before and after school and after the lunch period, and greater access during and between breakfast and lunch periods. As noted for vending machines outside the foodservice area, high school students tended to have greater access than middle school students.

²⁴ The item in the principal survey that asked about beverage machines had three pre-coded responses: 1 to 5 machines, 6 to 25 machines, and more than 25 machines.

²⁵ FSMs were asked if students were able to get reimbursable meals from vending machines. Only 7 respondents, almost all of them in high schools, responded affirmatively to this question.

Table 3.25. Policies Related to Vending Machines

	Percentage of Schools			
	Elementary Schools	Middle Schools	High Schools	All Schools
Principal Report				
Vending Machines Available in School or on School Grounds	13.1	71.8	87.1	39.0
Among Schools with Vending Machines (n=399):				
Location of Machines^a				
Indoor area(s) other than foodservice area	--	62.5	74.2	68.1
Foodservice area	--	63.1	60.3	60.5
Other outside area on school grounds	--	12.0	18.6	14.8
Number of Beverage Machines Available				
1 to 5	--	86.7	70.8	79.2
6 to 25	--	6.4	24.1	13.4
More than 25	--	0.0	0.0	0.0
Missing	--	6.9	5.1	7.4
Among Schools with Beverage Machines Outside the Foodservice Area (n=284):				
Times Students Can Use Beverage Machines That Sell Beverages Other than Milk, 100% Juice, or Water^a				
Before school	--	20.6	52.2	36.0
During breakfast	--	10.8	16.7	11.3
During school hours, before lunch	--	11.7	23.1	17.1
During lunch	--	27.7	23.4	19.9
After lunch, before end of last regular class	--	13.7	32.2	26.4
After last regular class	--	59.6	68.4	59.4
Other	--	4.9	0.4	2.2
Don't know	--	0.6	3.7	2.0
Among Schools with Snack Machines Outside the Foodservice Area (n=251):^a				
Times Students Can Use Snack Machines^a				
Before school	--	33.2	46.2	38.9
During breakfast	--	15.6	20.6	16.2
During school hours, before lunch	--	15.3	24.2	21.8
During lunch	--	28.8	26.9	25.8
After lunch, before end of last regular class	--	24.0	34.8	30.8
After last regular class	--	55.6	64.1	55.8
Other	--	1.8	0.0	0.8
Don't know	--	0.0	1.7	0.9
Number of Schools	265	230	226	721

Table 3.25 (continued)

	Percentage of Schools			
	Elementary Schools	Middle Schools	High Schools	All Schools
Foodservice Manager Report				
Vending Machines Available in Foodservice Area	7.1	39.9	52.9	22.3
Among Schools with Beverage Machines Inside the Foodservice Area (n=203):				
Times Students Can Use Beverage Machines That Sell Beverages Other than Milk, 100% Juice, or Water^a				
Before school	--	20.0	39.7	28.7
During breakfast	--	17.4	31.6	23.0
During school hours, before lunch	--	14.6	31.1	20.9
During lunch	--	33.7	37.6	34.0
After lunch, before end of last regular class	--	20.1	33.4	24.3
After last regular class	--	37.1	43.4	38.0
Other	--	0.9	0.0	0.3
Among Schools with Snack Machines Inside the Foodservice Area (n=181):				
Times Students Can Use Snack Machines^a				
Before school	--	22.9	36.2	28.7
During breakfast	--	15.6	34.3	25.0
During school hours, before lunch	--	14.0	34.6	23.5
During lunch	--	33.3	43.5	35.0
After lunch, before end of last regular class	--	23.7	29.0	23.0
After last regular class	--	31.6	38.7	31.4
Other	--	1.2	0.0	0.3
Number of Schools	315	284	277	876

Source: School Nutrition Dietary Assessment-IV, Principal Survey and Foodservice Manager Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

^aMultiple responses were allowed.

-- Sample size is too small to produce reliable estimate.

a. Types of Foods and Beverages Available in Vending Machines

Information about the types of foods and beverages available in vending machines was provided by a school staff member designated by the principal. Respondents were asked to complete the vending machine checklist, which documented the availability of beverage and snack machines and collected, for each available vending machine, information about the total number of slots or buttons in the machine and the number of slots/buttons allocated to different types of foods and beverages. These data allowed us to assess not only the types of foods and beverages available to students, but the relative proportion of available vending space allocated to different types of foods and beverages.

In some schools, the vending machine checklist was completed by phone. In these cases, the detailed data about foods available in the machines was not collected. In addition, some respondents who submitted a vending machine checklist did not complete the section of the form that collected

detailed information about the foods and beverages available in the machines. To deal with this item-level nonresponse, we developed a separate weight to use in estimating the percentage of schools that had different types of foods and beverages available in vending machines (see Volume II).

Vending machines were available in relatively few elementary schools (Table 3.25), so our discussion of the types of foods and beverages available in vending machines focuses primarily on middle and high schools. Key findings include the following (Table 3.26):

- A majority of middle and high schools (62 and 77 percent, respectively) had vending machines that sold 100% juice or water. Relatively few schools (9 percent of middle schools and 13 percent of high schools) had vending machines that sold milk. Schools that did sell milk in vending machines tended to sell flavored milk or whole or 2% unflavored milks.
- Forty-five percent of middle schools and 74 percent of high schools sold beverages other than water, 100% juice, or milk in vending machines. Energy and sport drinks were offered most frequently (33 percent of middle schools and 64 percent of high schools).
- Sugar-sweetened carbonated soft drinks were available in vending machines in 16 percent of middle schools and 24 percent of high schools, and diet soft drinks were available in 18 percent of middle schools and 38 percent of high schools.
- Sixteen percent of middle schools and 35 percent of high schools had baked goods/desserts available in vending machines. Cookies were the most frequently offered item in this group. Both regular and lower fat cookies were available; however, low-fat versions were offered in fewer schools (13 to 27 percent of middle and high schools for regular cookies versus 4 to 8 percent for low-fat/reduced-fat cookies).
- More than one-third (35 percent) of middle schools and almost one-half (48 percent) of high schools had snack foods available in vending machines. Both regular and lower fat/baked versions of snack chips were available and were offered in roughly equivalent shares of schools (24 to 28 percent of middle schools and 36 to 40 percent of high schools).
- Other types of food (for example, yogurt, fruits and vegetables, ice cream) were offered in relatively few schools (6 percent of middle schools and 11 percent of high schools).

Table 3.26. Percentage of Schools Offering Different Foods and Beverages in Vending Machines

Foods and Beverages	Percentage of Schools			
	Elementary Schools	Middle Schools	High Schools	All Schools
Beverages Sold in Vending Machines				
100% Juice and Water	10.8	61.8	76.8	33.2
Juice (100% juice)	3.8	36.4	42.0	17.3
Water (plain, flavored, or sparkling)	10.8	60.6	73.0	32.2
Milk	1.2	9.0	13.3	5.1
Flavored milk	0.8	9.0	10.7	4.3
Whole or 2% unflavored milk	0.7	2.5	8.4	2.6
Low-fat (1%) unflavored milk	0.0	4.1	0.3	0.7
Fat-free/skim, unflavored milk	0.0	0.0	0.3	0.1
Other Beverages	9.1	44.7	73.8	28.7
Any sugar-sweetened beverage (soft drink, juice drink, or sports drink)	9.1	44.7	71.6	28.2
Energy and sports drink	5.6	32.7	63.7	22.4
Diet carbonated soft drink	7.6	18.0	38.4	15.9
Juice drink (such as fruit drinks, lemonade, punch)	3.5	25.9	34.0	13.7
Regular carbonated soft drink	7.0	16.3	23.7	12.1
Hot or cold chocolate drinks	0.0	1.7	2.9	0.9
Foods Sold in Vending Machines				
Baked Goods	3.3	16.1	34.9	12.1
Cookies (regular)	2.6	12.6	26.5	9.4
Pies, turnovers, or toaster pastries (regular)	1.7	5.8	15.1	5.2
Cakes, cupcakes, or brownies (regular)	1.1	2.2	11.4	3.4
Cookies (low-fat/reduced-fat)	0.0	4.2	8.4	2.5
Doughnuts	0.0	3.0	8.1	2.2
Pies, turnovers, or toaster pastries (low-fat/reduced-fat)	0.4	0.8	5.4	1.5
Cakes, cupcakes, or brownies (low-fat/reduced-fat)	0.4	1.4	3.3	1.2
Bread, rolls, bagels, tortillas	0.4	1.8	1.3	0.8
Snacks	3.8	35.2	48.4	18.5
Snack chips (regular)	2.9	27.9	39.7	14.9
Snack chips (low-fat/reduced fat)	1.9	23.8	35.8	12.7
Candy	3.0	19.1	28.9	11.2
Cracker sandwiches with cheese or peanut butter	3.2	17.0	29.4	11.0
Fruit snacks (including Fruit Roll-Ups and fruit leather)	2.3	18.8	28.6	10.6
Pretzels	0.4	20.3	28.9	9.7
Nuts and/or seeds (almonds, peanuts, sunflower seeds, trail mix)	2.6	13.5	23.9	9.0
Other crackers (including animal crackers)	1.2	19.7	22.8	8.9
Granola, cereal, or energy bars (low-fat/reduced fat)	2.8	11.8	23.5	8.7
Crispy rice bars or treats	0.3	18.7	21.8	7.9

Table 3.26 (continued)

Foods and Beverages	Percentage of Schools			
	Elementary Schools	Middle Schools	High Schools	All Schools
Granola, cereal, or energy bars (regular)	2.3	12.0	20.9	7.8
Meat snacks (jerky, pork rinds)	1.9	9.1	17.9	6.5
Popcorn	1.6	10.0	16.3	6.1
Gum	1.6	3.1	6.4	2.9
Other Foods	0.5	6.4	11.3	3.8
Cheese	0.0	0.0	7.0	1.5
Yogurt	0.5	0.0	3.3	1.0
Ice cream, frozen yogurt or sherbet (regular)	0.0	1.8	1.7	0.7
Fruits or vegetables	0.0	0.0	3.0	0.6
Dried fruit	0.0	0.0	1.9	0.4
Frozen fruit bars or popsicles	0.0	1.6	0.2	0.3
Ice cream, frozen yogurt or sherbet (low-fat/reduced-fat)	0.0	0.8	0.7	0.3
Vegetables	0.0	0.0	1.1	0.2
Milk shakes, smoothies, or yogurt drinks	0.0	1.3	0.0	0.2
Canned fruit	0.0	0.0	0.0	0.0
Fresh fruit	0.0	0.0	0.0	0.0
Number of Schools	260	164	137	561

Source: School Nutrition Dietary Assessment-IV, Vending Machine Checklist, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Notes: Percentages reflect all schools (not just schools with vending machines).

A total of 119 schools were excluded from the tabulation because they had vending machines but did not provide information about the specific foods and beverages available. To account for this item-level nonresponse, a separate weight was applied to the remaining schools (see Volume II).

Food items are listed as they appeared on the checklist.

The question of how vending machine offerings have changed over time is of considerable interest. This issue is discussed in Chapter 11; however, comparisons between SNDA-IV and SNDA-III, which was conducted in SY 2004–2005, must be made with great caution because of differences in the data collection approaches used in the two studies. The SNDA-III data were collected by on-site field interviewers, while the SNDA-IV data were provided by a school staff member appointed by the principal. It is possible that SNDA-III field interviewers overestimated the availability of vending machine items by counting machines that were not actually available to students during school hours and/or machines that were available only to faculty and staff. Conversely, it is possible that SNDA-IV checklist respondents underreported the presence of vending machines in order to minimize response burden and/or underreported the availability of less healthy items. Comparisons between SNDA-IV and SNDA-III are also complicated by the fact that the lists of items included in the checklists were not identical.

The SNDA-IV data suggest a marked decrease in the availability of sugar-sweetened beverages since SY 2004–2005. For example, based on SNDA-III, regular (not diet) soft drinks were available

in vending machines in SY 2004–2005 in 49 percent of middle schools and 81 percent of high schools (see Gordon et al. 2007, Table IV.6), compared to 16 and 24 percent of middle and high schools, respectively, in SNDA-IV (Table 3.26). We believe it is likely that sugar-sweetened beverages were less available to students in SY 2009–2010 than they were in SY 2004–2005, particularly in elementary schools and middle schools. However, the magnitude of the decrease over time is less certain. A decrease in the availability of sugar-sweetened beverages is consistent with the increased focus during this period on developing and implementing school wellness policies and improving the school food environment. In addition, as noted previously in this chapter, the proportion of SFAs that reported having some type of ban or restriction in place related to sweetened beverages increased dramatically between SY 2004–2005 and SY 2009–2010.

The SNDA-IV data also suggest decreased availability of almost all vending items since the time the SNDA-III study was conducted (SY 2004–2005). However, differences in the availability of other items are less dramatic than for sugar-sweetened beverages. For example, the difference between SY 2004–2005 (see Gordon et al. 2007, Table IV.6) and SY 2009–2010 (Table 3.26) in the availability of regular cookies is less than 10 to 15 percentage points (21 versus 13 percent for middle schools and 40 versus 27 percent for high schools).

The availability of snack chips actually increased over time, particularly lower-fat varieties. Regular snack chips were available in 17 and 34 percent of middle and high schools, respectively, in SY 2004–2005, compared with 28 and 40 percent, respectively, in SY 2009–2010. The increase in the availability of lower-fat snack chips was notably sharper, increasing from 12 and 6 percent in SY 2004–2005 for middle and high schools, respectively, to 24 and 36 percent, respectively, in SY 2009–2010.

b. Proportion of Vending Space Allocated to Different Foods and Beverages

Rather than eliminate vending machines, schools may focus on ensuring that more healthful options are available. These efforts may involve token changes in vending machine offerings, for example, allocating one of 10 vending slots to low-fat chips, or more substantial changes, such as offering low-fat and regular chips in equal proportion or offering only low-fat chips. The vending machine checklist collected information about the total number of slots or buttons included in each machine and the number of slots or buttons filled with different foods and beverages. We used this data to calculate, for schools with vending machines, the proportion of slots/buttons in beverage and snack machines that were allocated to different items.

Overall, schools that had beverage machines in SY 2009–2010 split the available vending space roughly equally between 100% juice and water and other beverages (excluding milk) (48 to 49 percent each) (Table 3.27). However, this pattern was not observed in all schools. On average, middle schools allocated more space to 100% juice and water than to other beverages (58 versus 41 percent) and the amount of space allocated to water was roughly equivalent to the space allocated to sugar-sweetened beverages (40 versus 36 percent). High schools, on the other hand, allocated less space to 100% juice and water than to other beverages, on average (44 versus 52 percent) and less space to water than to sugar-sweetened beverages (33 versus 41 percent). On average, less than 5 percent of beverage vending space in either type of school was allocated to milk.

Table 3.27. Proportion of Vending Space Allocated to Different Items

Foods and Beverages	Percentage of Schools			
	Elementary School	Middle School	High School	All Schools
Items Offered in Beverage Machines				
100% Juice and Water	--	57.5	44.3	47.9
Water (plain, flavored, or sparkling)	--	39.9	32.6	35.3
Juice (100% juice)	--	17.7	11.7	12.6
Milk	--	1.8	3.8	2.8
Flavored milk	--	1.6	3.1	2.3
Whole or 2% unflavored milk	--	0.1	0.7	0.4
Low-fat (1%) unflavored milk	--	0.1	0.0	0.0
Fat-free/skim, unflavored milk	--	0.0	0.0	0.0
Other Beverages	--	40.7	51.9	49.3
Any sugar-sweetened beverage (soft drink, juice drink, or sports drink)	--	35.9	41.3	40.3
Energy and sports drink	--	15.4	29.5	22.5
Regular carbonated soft drink	--	10.7	5.6	10.5
Diet carbonated soft drink	--	4.8	10.6	9.0
Juice drink (such as fruit drinks, lemonade, punch)	--	9.5	6.0	7.2
Hot or cold chocolate drinks	--	0.3	0.2	0.2
Number of Schools	21	89	104	214
Items Offered in Snack Machines				
Baked Goods	--	5.3	10.6	8.8
Cookies (regular)	--	2.3	3.7	3.2
Pies, turnovers, or toaster pastries (regular)	--	1.2	2.6	2.2
Cakes, cupcakes, or brownies (regular)	--	0.2	1.3	1.2
Cookies (low-fat/reduced-fat)	--	0.9	0.8	0.7
Pies, turnovers, or toaster pastries (low-fat/reduced-fat)	--	0.3	0.9	0.6
Doughnuts	--	0.2	0.8	0.5
Bread, rolls, bagels, tortillas	--	0.2	0.3	0.2
Cakes, cupcakes, or brownies (low-fat/reduced-fat)	--	0.2	0.2	0.2
Snacks	--	92.1	82.8	85.0
Candy	--	18.2	17.8	17.1
Snack chips (low-fat/reduced fat)	--	21.7	15.9	16.9
Snack chips (regular)	--	14.9	16.8	15.5
Granola, cereal, or energy bars (low-fat/reduced fat)	--	3.4	5.3	5.0
Fruit snacks (including Fruit Roll-Ups and fruit leather)	--	5.0	3.9	4.5
Cracker sandwiches with cheese or peanut butter	--	3.4	4.1	4.4
Other crackers (including animal crackers)	--	5.6	3.2	4.4
Granola, cereal, or energy bars (regular)	--	4.5	3.3	3.7

Table 3.27 (continued)

Foods and Beverages	Percentage of Schools			
	Elementary School	Middle School	High School	All Schools
Nuts and/or seeds (almonds, peanuts, sunflower seeds, trail mix)	--	2.9	3.6	3.4
Crispy rice bars or treats	--	5.1	2.9	3.2
Pretzels	--	3.5	2.1	2.3
Meat snacks (jerky, pork rinds)	--	1.7	1.5	1.8
Popcorn	--	1.6	1.2	1.6
Gum	--	0.9	1.0	1.0
Other Foods	--	3.3	7.1	6.7
Yogurt	--	0.0	1.7	2.6
Cheese	--	0.0	3.0	1.6
Ice cream, frozen yogurt or sherbet (regular)	--	1.3	1.3	1.1
Ice cream, frozen yogurt or sherbet (low-fat/reduced-fat)	--	0.3	0.3	0.3
Frozen fruit bars or popsicles	--	0.8	0.0	0.2
Fruits or vegetables	--	0.0	0.2	0.1
Dried fruit	--	0.0	0.1	0.1
Milk shakes, smoothies, or yogurt drinks	--	0.2	0.0	0.1
Vegetables	--	0.0	0.1	0.0
Canned fruit	--	0.0	0.0	0.0
Fresh fruit	--	0.0	0.0	0.0
Other	--	0.7	0.7	0.6
Number of Schools	7	47~	74	128

Source: School Nutrition Dietary Assessment-IV, Vending Machine Checklist, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Note: Sample includes schools that had vending machines and provided detailed data about the items available.

-- Sample size is too small to produce reliable estimate.

~ Point estimates for snack machines in middle schools are less reliable than other estimates because of the small sample size.

Schools that had snack machines in SY 2009–2010 allocated the majority of the available space to snack foods (85 percent, on average, across all schools). Baked goods and other types of food accounted for an average of 9 and 7 percent of the available vending space, respectively. Snack chips alone accounted for an average of 32 percent of space available in snack machines. In middle schools, low-fat chips were more prevalent than regular chips (22 percent versus 15 percent), and in high schools the two types of chips were equally prevalent (16 to 17 percent). Candy was the next most commonly offered item in snack machines, accounting for an average of 17 percent of vending space overall.

4. School Stores and Snack Bars

In addition to a la carte sales and vending machines, some schools have school stores or snack bars that sell competitive foods. Based on principals' reports, 13 percent of all schools had a school

store that sold food and/or beverages (including snack foods) and 4 percent had a snack bar (Table 3.28). Both school stores and snack bars were available in more middle and high schools than elementary schools. Compared to elementary schools, almost three times as many middle schools and more than three times as many high schools had school stores (7 percent versus 19 and 26 percent, respectively). The pattern was similar for snack bars, but the difference between middle and high schools was more pronounced (2 percent versus 5 and 10 percent, respectively).

Table 3.28. Availability of and Policies Related to School Stores and Snack Bars

	Percentage of Schools			
	Elementary Schools	Middle Schools	High Schools	All Schools
School Has a Store That Sells Foods or Beverages	7.1	18.6	25.5	13.0
School Has a Snack Bar Outside Foodservice Area ^a	1.5	4.7	10.3	3.9
Among Schools with School Stores (n= 137):				
Number of Days Per Week Store is Usually Open				
One	--	--	2.5	8.1
Two to four	--	--	2.2	5.8
Daily	--	--	76.6	65.7
Various or no set schedule	--	--	13.9	14.5
Missing	--	--	4.8	5.9
Times School Store is Open to Students^b				
Before school	--	--	36.0	24.4
During breakfast	--	--	18.3	14.0
After breakfast, before lunch	--	--	26.5	20.9
During lunch	--	--	64.3	46.5
After lunch, before end of last regular class	--	--	24.9	24.7
After last regular class	--	--	18.4	16.8
Other	--	--	1.6	5.1
Who is Responsible for the School Store^b				
Student or parent organization/club	--	--	34.8	30.9
Principal	--	--	17.0	22.7
School foodservice	--	--	6.8	9.6
Athletic department	--	--	1.2	2.3
Other	--	--	43.7	32.9
Other school staff	--	--	14.9	17.0
Marketing/business or career/technical education class or department	--	--	14.4	6.2
Don't know	--	--	1.6	0.7
Number of Schools	265	230	226	721

Source: School Nutrition Dietary Assessment-IV, Principal Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

^aSnack bars were defined as "a place that prepares or serves food but does not offer reimbursable meals." Twenty-one principals reported no snack bar, but a food cart was reported on the Other Sources of Foods and Beverages checklist.

^bMultiple responses were allowed.

-- Sample size is too small to produce reliable estimate.

Among schools with school stores, the majority (66 percent) had stores that were open daily, with access most common during lunch (47 percent). In high schools, stores were also open before school (36 percent) and before (27 percent) and after (25 percent) lunch.²⁶ A variety of different entities were responsible for school stores. Student or parent organizations were responsible for close to one-third (31 percent) of school stores. Principals and the school foodservice department were responsible for 23 and 10 percent of school stores, respectively. Many principals reported that entities other than those identified in the survey question were responsible for school stores. The most common other entities were school staff other than the principal and, among high schools, the marketing/business or career/technical education class or department.

The sample size of schools that had a school store or a snack bar and completed the other sources of foods and beverages checklist was too small to produce reliable estimates for elementary schools and middle schools of the percentages of schools offering different types of foods and beverages. The items most commonly reported for both school stores and snack bars were beverages other than water and 100% juice and snack foods, including candy and snack chips (data not shown in table).

²⁶ The sample size for schools with snack bars was too small to produce reliable estimates about policies related to student access. However, the majority of schools with snack bars reported that they were available during lunch.

CHAPTER 4

FOODS OFFERED IN REIMBURSABLE SCHOOL MEALS

The type and variety of foods offered in school meal programs directly affects the nutrient content of school meals. These characteristics may also influence students' perceptions about the acceptability and taste of school meals. Ultimately students' perceptions about the appeal of school meals can affect their decision to eat a school meal—either as a general practice or on a particular day (Moore et al. 2009). USDA guidance materials encourage schools to strive for balance in planned menus (for example, balance in flavors, colors, textures, and shapes or sizes of food); to offer a wide variety of different foods from day to day; and to offer students the opportunity to make choices (USDA, FNS 2008). Offering a wide variety of foods and providing the opportunity to make choices allows students to select foods they like; choose healthy alternatives; try new foods; and, ultimately, develop healthy eating habits (USDA, FNS 2008).

This chapter describes the characteristics of the foods offered in school meals. It examines the extent to which NSLP and SBP meals allow students to make choices in selecting their meals, as well as the variety of foods presented to students each day and across a school week. In addition, it presents information about the types of food that are offered most frequently and the prevalence of specific types of food, including fresh fruits and vegetables, salad bars, and other types of self-serve bars.

All of the data presented are from the menu survey, which was completed by FSMs for five consecutive school days in the spring of SY 2009–2010 (January–June 2010).^{1,2} Data are presented separately by school type, defined by grade level (elementary schools, middle schools, and high schools), and by menu-planning system (traditional food-based, enhanced food-based, and nutrient-based). The statistical significance of differences between schools in these subgroups was tested using two-tailed *t*-tests.³ Table footnotes provide information about the specific comparisons that were made in these tests.

A. Summary of Findings

NSLP Lunches

- Most public schools offered students choices, within several broad food groups, and a variety of different items over the course of a five-day school week. The median daily NSLP menu included two types of milk, three different fruit/vegetable/juice options, and two entree choices. Middle and high schools offered significantly more opportunity for fruit/vegetable and entree choice than elementary schools, but were also more likely to repeat items over the course of the week.

¹ Because of school holidays or other school closures, some schools provided data for only four days. A very small number of schools provided data for only three days.

² A detailed description of the protocols used in collecting and processing menu survey data is provided in Volume II of this report.

³ Tests were conducted using SUDAAN statistical software, which adjusts standard errors for the study's complex sample design.

- NSLP menus offered in all types of schools varied the fruit, vegetable, and/or juice choices offered to students over the course of a school week. NSLP menus offered a median of 11 different types of fruit, vegetable, and juice during a week.
- Salad bars and other types of self-serve food bars were available at least once per week in 41 percent of high schools, one-third (33 percent) of middle schools, and about one in five (21 percent) of elementary schools. Entree salad bars and side salad bars were the most common types of self-serve bar offered at lunch.
- Virtually all daily lunch menus offered fluid milk. The most commonly offered milks were 1% unflavored (73 percent of all daily NSLP menus) and 1% flavored (63 percent). Whole milk was offered in fewer than five percent of all daily menus.
- Cooked vegetables were the most commonly offered type of vegetable in NSLP menus (76 percent of daily menus versus 59 percent for raw vegetables). Starchy vegetables (french fries, corn, other white potatoes and peas) were the most commonly offered cooked vegetables (50 percent of all daily lunch menus). However, side salads were the single most commonly offered vegetable (appearing in 27 percent of all daily lunch menus), followed by french fries and similar potato products, raw carrots, corn, and side salad bars.
- The majority (85 percent) of all daily NSLP menus offered some type of canned, fresh, frozen, or dried fruit. Canned fruit and fresh fruits were offered with the same frequency in NSLP lunches, appearing in about 60 percent of all daily lunch menus. Daily lunch menus in elementary schools offered fresh fruit less frequently than menus in middle or high schools (56 versus 63 and 66 percent, respectively), and the differences between schools were statistically significant.
- Virtually all schools offered fresh fruits or vegetables at lunch at least once per week. Nearly all schools offered fresh vegetables (raw or cooked) at least once per week and the vast majority (86 percent) offered fresh fruit at least once per week. More than two-thirds (67 percent) of schools offered fresh vegetables every day (in raw or cooked forms) and more than one-third (38 percent) offered fresh fruit every day.

SBP Breakfasts

- SBP menus offered fewer choices and less variety than NSLP menus. The median daily SBP menu included two types of milk, two different fruit/juice options, two grain/bread options, and no meat/meat alternate options.
- SBP menus also offered less variety in fruit/juice/vegetable choices over the course of a school week compared to NSLP menus (a median of 4 different types, compared with a median of 11 for the NSLP).
- Separate grain and bread items were offered in most daily breakfast menus (93 percent); three-quarters (76 percent) of breakfast menus included cold cereals.
- Fewer than half (41 percent) of all daily SBP menus included a separate meat/meat alternate, and the same proportion included a combination entree. Combination entrees were more common in high schools and middle schools than elementary schools (53 and 51 percent of all daily breakfast menus, respectively, versus 34 percent).

B. Foods Offered in National School Lunch Program Lunches

To be eligible for Federal reimbursement, all lunches served in the NSLP must meet a defined set of nutrition standards, as outlined in 7 CFR 210.10. In SY 2009–2010, schools could choose from five alternative systems in planning their lunch menus (see Chapter 1 and Appendix A). Each menu-planning system had different food-based requirements.

The traditional food-based menu-planning system required that lunches offered to students include five food items: fluid milk (as a beverage); two servings of fruit, 100% juice, and/or vegetables; one serving of meat or meat alternate; and one serving of a grain/bread product. The grain/bread and meat/meat alternate items are frequently offered together in a single entree item, such as a sandwich, pizza, or a burrito. The enhanced food-based menu-planning system was very similar to the traditional food-based system but required larger servings of fruits and vegetables and more servings of grain/bread products over the course of a week. The nutrient-based menu-planning systems had few food-based requirements. Under nutrient-based menu planning, lunches were required to offer fluid milk, at least one entree, and at least one side dish. Side dishes may include fruits, vegetables, grains/breads, desserts, or other items. More detailed information about menu-planning approaches used in SY 2009–2010 is provided in Appendix A.

1. Amount of Choice and Variety Offered to Students in NSLP Lunches

To assess the amount of choice and variety offered in NSLP lunches, we looked at the number of choices offered in daily lunch menus as well as the number of different items offered over the course of the five-day school week for which menu survey data were reported. We examined choice and variety within six food groups: milk; fruits, vegetables, and 100% juice; meat/meat alternates; combination entrees; grains/breads; and desserts. These food groups are based on the meal component groups used in the food-based menu-planning systems. Schools that used nutrient-based menu planning were not required to offer specific meal components; however, the lunches offered in these schools generally included the same basic food groups.

Table 4.1 presents data on the amount of choice and variety offered to students, overall, and in different types of schools. The table shows the proportion of *daily lunch menus* that offered different numbers of choices within each food group, as well as the median number of choices offered per day and the median number of different items offered per week. In the sections that follow, we discuss key findings within each food group.

a. Milk

Almost all daily lunch menus (97 to 99 percent) offered more than one type of milk (Table 4.1). More than one-quarter of daily lunch menus in all types of schools (27 percent to 32 percent) offered four or more types of milk. The median number of milks offered each day was two or three and, typically, the same milk choices were offered every day of the week.

Table 4.1. Choice and Variety in National School Lunch Program Lunches

	Percentage of Daily Lunch Menus			
	Elementary Schools	Middle Schools	High Schools	All Schools
Number of Types of Milk Offered per Day				
No more than 1	2 ^a	<3	2	2
2	30	30	30	30
3	40	37	40	40
4 or more	27	32	28	28
<i>Median number of different items per day</i>	2	3	2	2
<i>Median number of different items per week^a</i>	3	3	3	3
Number of Fruits/Vegetables/100% Juices Offered per Day^b				
No more than 2	35 ^a	22	22 ^y	30
3 to 4	34	32	29	33
5 to 7	20 ^a	31	28 ^y	24
8 or more	12	15 ^β	21 ^y	14
<i>Median number of different items per day</i>	3	4	4	3
<i>Median number of different items per week^a</i>	11	12	12	11
Number of Entrees Offered per Day^c				
1	26 ^a	16	15 ^y	22
2 to 3	46 ^a	26	27 ^y	39
4 to 5	20	22 ^β	13 ^y	19
6 or more	8 ^a	36 ^β	45 ^y	20
<i>Median number of different items per day</i>	2	4	4	2
<i>Median number of different items per week^a</i>	9	12	13	10
Number of Separate Grains/Breads Offered per Day^d				
None	58 ^a	51	49 ^y	55
1	33	37	35	34
2 or more	9	12	15 ^y	11
<i>Median number of different items per day</i>	0	0	0	0
<i>Median number of different items per week^a</i>	1	1	1	1
Number of Desserts Offered per Day^e				
None	81	81	77	80
1	17	16	20	18
2 or more	1	2	3 ^y	2
<i>Median number of different items per day</i>	0	0	0	0
<i>Median number of different items per week^a</i>	0	0	0	0
Number of Daily Menus	1,529	1,370	1,331	4,230
Number of Schools	318	287	279	884

Source: School Nutrition Dietary Assessment Study-IV, Menu Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Note: Differences in medians were not tested for statistical significance.

^aIncludes only schools that provided menu information for five days.

^bFruits and vegetables not included in combination entrees.

^cIncludes meats and meat alternates as well as combination entrees.

^dGrains and breads not included in combination entrees or served solely with a specific menu item.

^eUnder enhanced food-based menu planning, grain-based desserts may count toward the grains/breads requirement.

^aDifference between elementary and middle schools is significantly different from zero at the .05 level.

^βDifference between middle and high schools is significantly different from zero at the .05 level.

^yDifference between elementary and high schools is significantly different from zero at the .05 level.

Table 4.1 (*continued*)

<3 = Point estimate is considered less precise than estimates that are not flagged because the sample size is small or the coefficient of variation is large. The rules used in flagging estimates are described in Chapter 1. When these rules are applied, percentages close to 0 or 100 are often flagged. In this table, flagged percentages between 0 and 3 percent are displayed as <3.

b. Fruits and Vegetables

Seventy-one percent of all daily lunch menus included more than two types of fruit, vegetable, or 100% juice (Table 4.1). Elementary schools offered significantly fewer fruit and vegetable options than high schools and, to a lesser extent, middle schools. Thirty-five percent of daily lunch menus in elementary schools included two or fewer fruit, vegetable, and juice choices, compared with 22 percent of daily lunch menus in middle and high schools. On the opposite end of the choice spectrum, 20 percent of daily lunch menus in elementary schools included five to seven fruit, vegetable, and juice choices, and 12 percent included eight or more choices. Comparable statistics were 31 and 15 percent, respectively, for daily lunch menus in middle schools, and 28 and 21 percent, respectively, for daily lunch menus in high schools. The median number of fruit, vegetable, and juice choices per day was three for elementary schools and four for middle and high schools. The median number of different types of fruit, vegetables, and juice offered over the course of a five-day week was 11 to 12.

c. Combination Entrees (including Meats and Meat Alternates)

More than three-quarters (78 percent) of all daily lunch menus offered a choice of entrée (Table 4.1). Middle and high schools offered significantly more opportunity for entree choice than elementary schools. More than half (58 percent) of the daily lunch menus in middle and high schools included four or more entree choices, compared with 28 percent of daily lunch menus in elementary schools. In addition, more than one-third of daily lunch menus in middle and high schools (36 and 45 percent, respectively) included six or more entree choices. Only eight percent of daily lunch menus in elementary schools included this level of choice. The median number of entree choices in elementary school lunch menus was two, compared with four for middle and high schools. Data on the median number of different entree items offered per week indicate that middle and high schools repeat entree items during a five-day school week more frequently than elementary schools.

d. Separate Grains/Breads

Fewer than half (45 percent) of all daily lunch menus offered a separate grain/bread item—that is, a grain or bread item that was available to all students, regardless of their entree choice (Table 4.1). High schools were significantly more likely than elementary schools to offer a separate grain/bread item. Separate grain/bread items were offered in 42 percent of daily lunch menus in elementary schools, compared with 49 and 50 percent of daily lunch menus in middle and high schools, respectively. Desserts were not commonly offered in NSLP lunch menus—only 20 percent of all daily lunch menus included a dessert.

2. Availability of Self-Serve Food Bars in NSLP Lunches

Self-serve food bars are one way schools can increase the variety of foods offered to students. In particular, research has shown that schools that offer salad bars offer a wider variety of fruits and vegetables than schools that don't offer salad bars (USDA, FNS 2002a).

More than one-quarter (27 percent) of all schools offered some type of self-serve food bar at least once per week (Table 4.2)⁴. Roughly one in five schools (21 percent) offered one or more self-serve bars on a daily basis. Elementary schools were significantly less likely than either middle or high schools to offer self-serve food bars. Only 21 percent of elementary schools offered a self-serve bar at least once per week, compared with 33 and 41 percent of middle and high schools, respectively. Similarly, only 16 percent of elementary schools offered a self-serve bar every day, compared with 24 percent of middle schools and 30 percent of high schools.

Table 4.2. Availability of Self-Serve Food Bars in National School Lunch Program Lunches

	Percentage of Schools			
	Elementary Schools	Middle Schools	High Schools	All Schools
Any Self-Serve Food Bar				
At least once per week	21 ^a	33	41 ^y	27
Every day	16 ^a	24	30 ^y	21
Any Salad Bar				
At least once per week	19 ^a	26	33 ^y	23
Every day	15	17	22 ^y	17
Side Salad Bar				
At least once per week	17	19	21	18
Every day	13	13	16	13
Salad Bar as Entree				
At least once per week	<3 ^a	8 ^β	14 ^y	6
Every day	<3	5~	7 ^y	3
Sandwich/Deli Bar				
At least once per week	<3 ^a	12	13 ^y	6
Every day	<3 ^a	8	9 ^y	4
Other Entree Food Bars^a				
At least once per week	<3 ^a	10	14 ^y	6
Every day	<3 ^a	3~	<3 ^y	<3
Number of Schools	318	287	279	884

Source: School Nutrition Dietary Assessment Study-IV, Menu Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

^a Includes baked potato bars, nacho and taco bars, and Italian/pasta bars.

^α Difference between elementary and middle schools is significantly different from zero at the .05 level.

^β Difference between middle and high schools is significantly different from zero at the .05 level.

^y Difference between elementary and high schools is significantly different from zero at the .05 level.

~ Point estimate is considered less precise than estimates that are not flagged because the sample size is small or the coefficient of variation is large. The rules used in flagging estimates are described in Chapter 1. When these rules are applied, percentages close to 0 or 100 are often flagged. In this table, flagged percentages between 0 and 3 percent are displayed as <3.

⁴ Schools may offer self-serve food bars less frequently than once per week. These less-frequent food bars may not have been captured in the five-day menu survey. For this reason, the data reported in Table 4.2 on the proportion of schools offering self-serve foods bars are likely to be lower-bound estimates.

The most common type of self-serve bar was a salad bar, including “side” salad bars, which usually contain a variety of vegetables and fruits and are offered as all or part of the fruit/vegetable component of a reimbursable meal, and more extensive “entree” salad bars where students can obtain all or most of the components of a reimbursable meal (Table 4.2). Twenty-three percent of schools offered some type of salad bar at least once per week, and 17 percent offered one every day. Side salad bars were more common than entree salad bars. Thirteen percent of schools offered a side salad bar every day, but only three percent of schools offered an entree salad bar every day. High schools were almost twice as likely as middle schools to offer an entree salad bar at least once per week (14 versus 8 percent) and almost five times more likely to do so than elementary schools (14 versus less than 3 percent).

Other types of food bars were notably less common than salad bars and were offered almost exclusively in secondary (middle and high) schools. These included sandwich or deli bars, baked potato bars, nacho or taco bars, and Italian/pasta bars. These bars were rarely offered on a daily basis.

3. Types and Frequency of Foods Offered in NSLP Lunches

To obtain more in-depth information about the specific types of foods offered in NSLP lunches, we used a detailed food grouping system to categorize the foods reported in daily lunch menus (see Appendix Table C.1). We assigned all foods reported in daily menus to one of nine major food groups—milk, fruits, vegetables, combination entrees, meat/meat alternates, grains/breads, desserts, other menu items (for example, snack chips and juice drinks)⁵, and accompaniments (condiments, toppings and spreads). These major food groups were further subdivided into minor food groups that classified foods based on characteristics that affect nutrient content, including ingredients and preparation methods.⁶

Table 4.3 presents information on the foods/food groups that were offered in at least five percent of daily lunch menus, overall, or for one or more school types. In the sections that follow, we discuss key findings within each major food group.

a. Milk

Milk was offered in essentially all daily lunch menus (Table 4.3). Nearly all daily lunch menus included both unflavored milk and flavored milk (99 and 96 percent, respectively). A variety of fat contents were offered for both unflavored and flavored milks. In both cases, 1% milk was the most common, followed by skim or nonfat milk, and 2% milk. Whole milk was offered rarely (in less than five percent of all daily lunch menus, overall, and for all three types of schools), and therefore does not appear in Table 4.3. The types of milk offered and their relative frequency was generally consistent across school types. However, daily lunch menus in middle schools included unflavored skim or nonfat milk more often than daily lunch menus in high schools (52 versus 43 percent), and daily lunch menus in elementary school included flavored milks somewhat less frequently than daily menus in middle or high schools (94 versus 98 percent).

⁵ Juice drinks are sweetened, fruit-flavored drinks that may or may not contain real fruit juice.

⁶ For information regarding the use of brand-name and chain restaurant products, see Chapter 2, Table 2.12.

Table 4.3. Foods Offered in National School Lunch Program Lunches

	Percentage of Daily Lunch Menus			
	Elementary Schools	Middle Schools	High Schools	All Schools
Milk	>97 ^a	>97	>97	>97
Unflavored	99	>97	99	99
1% fat	74	74	70	73
Skim or nonfat	47	52 ^β	43	47
2% fat	28	34	34	30
Flavored	94 ^α	98	98 ^γ	96
1% fat	63	65	63	63
Skim or nonfat	39	39	40	39
2% fat	2	4	5	3
Vegetables	95	96	93	95
Vegetables, cooked	74 ^α	81	78	76
Starchy vegetables	45 ^α	57	61 ^γ	50
French fries/similar potato products ^b	18 ^α	31 ^β	39 ^γ	25
Corn	15	16	18 ^γ	16
White potatoes	12 ^α	17	17 ^γ	14
Green peas	5	6	6	5
Other vegetables	24	26	27	25
String beans	14	14	15	14
Mixtures and blends	8	10	10	9
Legumes ^c	9	11	10	10
Dark green vegetables (mainly broccoli)	8	9	10	9
Orange vegetables (mainly carrots)	6	7	5	6
Vegetables, raw	57	62	65 ^γ	59
Other vegetables	46 ^α	53	57 ^γ	50
Side salads	23 ^α	30	35 ^γ	27
Side salad bars	14	16	19	15
Mixtures	5	7	7	6
Celery	5	6 ^β	3	5
Orange vegetables (carrots)	20	20	17	19
Fruits and 100% Fruit Juices	86 ^α	91	92 ^γ	88
Any fruit ^d	83	87	90 ^γ	85
Canned fruit ^e	57	62	64 ^γ	60
Peaches	18 ^α	24	24 ^γ	20
Applesauce	18	20	18	18
Unsweetened	14	15	13	14
Sweetened	4	5	5	4
Pears	13 ^α	18	17	15
Fruit cocktail	15	15	18	15
Pineapple	11	12	14	12
Mandarin oranges	5	4	4	4
Fresh fruit	56 ^α	63	66 ^γ	59
Apple	33 ^α	44 ^β	53 ^γ	39
Orange	24 ^α	33 ^β	41 ^γ	29
Banana	14	17	22 ^γ	16
Pear	6	9	11	8
100% Fruit juice	26	32	26	27
Non-citrus juice	20	23	21	20
Apple juice	17	18	17	17
Grape juice	4	6	5	4
Fruit juice blend	4	5	5	4
Citrus juice (mainly orange)	19	22 ^β	15	18
Frozen fruit ^f	4	5	3	4

Table 4.3 (continued)

	Percentage of Daily Lunch Menus			
	Elementary Schools	Middle Schools	High Schools	All Schools
Combination Entrees	92 ^a	95	96 ^y	94
Sandwiches with plain meat or poultry	25 ^a	34 ^b	42 ^y	30
Entree salads (chef's salads)	25 ^a	36	41 ^y	30
Pizza	20 ^a	45	51 ^y	30
Pizza without meat	14 ^a	32	36 ^y	21
Pizza with meat	11 ^a	34	36 ^y	20
Peanut butter sandwiches	30	24	26	28
Sandwiches with breaded/fried meat, poultry, or fish	10 ^a	32 ^b	42 ^y	21
Mexican-style entrees (burritos, tacos, nachos)	17 ^a	26	27 ^y	21
Hamburgers, similar beef/pork sandwiches	11 ^a	27	27 ^y	17
Cheeseburgers, similar beef/pork sandwiches	9 ^a	28 ^b	35 ^y	17
Mixtures with meat, grain and/or vegetables (spaghetti, lasagna, macaroni and cheese)	14	18	17	15
Hot dog, corn dog, similar sausage sandwiches	12 ^a	19 ^b	14	14
Self-serve salad bars and other food bars	4 ^a	17	21 ^y	10
Sandwiches with cheese only	10	7	9	9
Bag lunches and pre-plated meals	9	8	6	9
Pizza pocket, pizza sticks, calzone (with or without meat)	5 ^a	9	11 ^y	7
Sandwiches with mayonnaise-based poultry or tuna salads	4	6 ^b	12 ^y	6
Other mixtures with meat, and/or vegetables (chili, chicken parmesan, stir-fry without rice)	4 ^a	7	9 ^y	6
Separate Grains/Breads^g	59 ^a	69	67 ^y	63
Breads, rolls, bagels, and other plain breads	27 ^a	37	36 ^y	31
Crackers and pretzels	21	26	22	22
Rice	9 ^a	12	16 ^y	11
Pasta	5	7	8	6
Corn/tortilla chips	4	5	6	4
Biscuits, cornbread	4	5	6	4
Meats/Meat Alternates^h	42	46	44	43
Breaded/fried chicken nuggets, patties, similar products	15 ^a	23	24 ^y	19
Meat (plain or breaded/fried beef, pork)	8	9	11	9
Yogurt	10 ^a	4	5 ^y	8
Low fat or fat-free	8 ^a	4	4 ^y	7
Other meat alternates ⁱ	7	6	7	7
Plain (not breaded or fried) chicken and turkey	4	5	4	4
Other Menu Items	30 ^a	36	36 ^y	32
Cookies, cakes, brownies	11	11	13	12
Dessert items that contain fruit or juice (fruit juice bars, fruited gelatin)	7	8	6	7
Snack foods (popcorn, potato chips, trail mix)	4 ^a	9	8 ^y	5
Dairy-based desserts (ice cream, pudding)	4	4	5	4
Number of Daily Menus	1,529	1,370	1,331	4,230
Number of Schools	318	287	279	884

Table 4.3 (continued)

Source: School Nutrition Dietary Assessment Study-IV, Menu Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Notes: Table is limited to food groups offered in at least five percent of menus, overall, or for one or more school types. The table does not account for individual food items offered as part of food bars, bag lunches, or pre-plated meals.

^aOne elementary school offered a pre-plated meal every day. The meal included fluid milk, but the milk was not coded separately.

^bIncludes both oven-baked and deep-fried products.

^cLegumes were coded as vegetables or meat alternates, depending on how they were used in the menu. Most legumes were offered as vegetables.

^dIncludes canned, fresh, frozen, and dried fruit.

^eWith the exception of applesauce, the majority of canned fruit was sweetened.

^fIncludes frozen strawberries, blueberries, and peaches.

^gGrains and breads not included in combination entrees or served solely with a specific menu item.

^hMeats and meat alternates not included in combination entrees.

ⁱIncludes cheese, peanut butter, nuts, eggs, hummus, legumes, and meat substitutes.

^aDifference between elementary and middle schools is significantly different from zero at the .05 level.

^bDifference between middle and high schools is significantly different from zero at the .05 level.

^cDifference between elementary and high schools is significantly different from zero at the .05 level.

>97 = Point estimate is considered less precise than estimates that are not flagged because the sample size is small or the coefficient of variation is large. The rules used in flagging estimates are described in Chapter 1. When these rules are applied, percentages close to 0 or 100 are often flagged. In this table, flagged percentages between 97 and 100 percent are displayed as >97.

b. Vegetables

Nearly all daily lunch menus (95 percent) included one or more vegetable as a discrete item (that is, not counting vegetables that were part of entree salad bars, other entree food bars, or combination entrees) (Table 4.3). More than three-quarters (76 percent) of all daily lunch menus included cooked vegetables, and about three out of five (59 percent) included raw vegetables. Starchy vegetables, including french fries, corn, white potatoes, and green peas were the most commonly offered cooked vegetables, and were included in half (50 percent) of all daily lunch menus. Side salads⁷ were the single most commonly offered vegetable (appearing in 27 percent of all daily lunch menus), followed by french fries and similar potato products (for example, potato puffs and triangles), raw carrots, corn, white potatoes and string beans (cooked). Dark green vegetables and orange vegetables were not commonly offered in cooked form (9 and 6 percent of all daily lunch menus, respectively). However, raw carrots were offered in about one in five (19 percent) daily lunch menus.

There were a number of significant differences in the types and frequency of vegetables offered in different types of schools, although the magnitude of several of the differences was small. Most notably, daily lunch menus in elementary schools offered both french fries and similar potato products and side salads less frequently than daily lunch menus in either middle or high schools (18

⁷ Side salads typically include lettuce with some combination of tomatoes, carrots, and/or other vegetables (such as radish, cucumber, celery, and onion). Side salads may include a small amount of cheese, but do not include enough cheese or other meat alternate to be considered an entree salad.

versus 31 and 39 percent, respectively, for french fries and 23 versus 30 and 35 percent, respectively, for side salads).⁸

c. Fruit and 100% Fruit Juice

Fruit or 100% fruit juice was offered in almost nine of every ten daily lunch menus (88 percent) (Table 4.3). The vast majority (85 percent) of daily lunch menus offered some type of canned, fresh, frozen, or dried fruit. Fruit juice was offered less frequently than fruit, appearing in only about one-quarter (27 percent) of all daily lunch menus. Overall, fresh fruit and canned fruit were offered with the same frequency (59 to 60 percent of all daily lunch menus). The single most commonly offered fruit was fresh apples, followed by fresh oranges, canned peaches and canned applesauce. The most commonly offered fruit juice was 100% citrus juice (mainly orange juice) followed by apple juice. Daily lunch menus in elementary schools offered fruit and 100% juice less frequently than daily menus in either middle or high schools. The difference was most pronounced for fresh fruit, which was offered in 56 percent of daily lunch menus in elementary schools, compared with 63 and 66 percent of daily lunch menus in middle and high schools, respectively.

d. Combination Entrees

Combination entrees were offered in almost all (94 percent) daily lunch menus (Table 4.3). The most common combination entrees varied by school type:

- In elementary schools, the most commonly offered combination entree was peanut butter sandwiches (30 percent of daily lunch menus), followed by sandwiches with plain meat or poultry, such as ham or turkey sandwiches (25 percent); entree salads, such as chef's salad and taco salad (25 percent); pizza (20 percent); and Mexican-style entrees, such as burritos, tacos, and nachos (17 percent).⁹
- In middle schools, the most commonly offered combination entree was pizza (45 percent of daily lunch menus), followed by entree salads (36 percent); sandwiches with plain meat or poultry (34 percent); sandwiches with breaded/fried meat, poultry or fish (32 percent); and cheeseburgers or similar beef/pork sandwiches with cheese (28 percent).
- In high schools, the leading entree was pizza (51 percent of daily lunch menus), followed by sandwiches with plain meat or poultry and sandwiches with breaded/fried meat, poultry, or fish (42 percent each); entree salads (41 percent); and cheeseburgers or similar beef/pork sandwiches with cheese (35 percent).

Many of the differences between elementary schools and high schools in the relative frequency of specific combination entrees were statistically significant. With the exception of peanut butter sandwiches; cheese sandwiches; bag lunches and pre-plated meals; sandwiches with mayonnaise-base salads (such as tuna or chicken salad); and mixtures with meat, grain and/or vegetables (such as spaghetti, lasagna, and macaroni and cheese), all of the combination entrees listed in Table 4.3 were offered less frequently in elementary school lunch menus than in middle school and/or high school

⁸ For french fries, the difference between middle and high schools was also statistically significant.

⁹ Some schools offered both meat and meatless pizza on the same day.

lunch menus. This is partially attributable to the larger number of entrees offered in middle and high schools on a daily basis, as shown in Table 4.1. There were fewer significant differences between middle schools and high schools. However, middle school lunch menus offered several types of sandwiches less frequently than high school lunch menus. Hot dogs, corn dogs, and similar sausage sandwiches were an exception.

e. Separate Grains/Breads

Nearly two-thirds (63 percent) of all daily lunch menus included grains or breads that were available to all students, regardless of their entree choice (Table 4.3). As noted previously, separate grains/breads were offered less frequently in elementary school menus than high school menus (Table 4.1). Bread, rolls, bagels and other plain breads were the items offered most frequently (31 percent of all daily lunch menus), followed by crackers and pretzels (22 percent) and rice (11 percent). Pasta, corn/tortilla chips, and biscuits/cornbread were offered in less than 10 percent of all daily lunch menus.

f. Meats and Meat Alternates

Meats or meat alternates that were offered separately (not part of a combination entree) were offered in 43 percent of all daily lunch menus (Table 4.3). The leading item in this group was breaded chicken products, including chicken nuggets and patties (but not chicken pieces, like thighs and drumsticks). Breaded chicken products were offered less frequently in elementary schools than in middle or high schools (15 percent of daily lunch menus versus 23 and 24 percent, respectively). This difference is at least partially attributable to the larger number of daily entree choices in middle and high schools. Yogurt was offered in eight percent of all daily lunch menus, and was offered more frequently in elementary schools than middle or high schools (10 percent of daily lunch menus, versus 4 and 5 percent, respectively). The majority of the yogurt offered was low-fat or fat-free.

g. Other Menu Items

About one-third (32 percent) of all daily lunch menus included one or more items that would be considered an extra under the traditional food-based menu-planning system (Table 4.3). Such items were offered less frequently in elementary school menus than in middle and high school menus (30 versus 36 percent), and were mainly desserts. Snack foods, such as potato chips, popcorn and trail mix, were offered in only 5 percent of daily lunch menus overall, but were twice as likely to be offered in middle and high school menus than in elementary school menus (9 and 8 percent, respectively, versus 4 percent).

4. Availability of Fresh Fruits and Vegetables in NSLP Lunches

USDA has worked to promote an increase in fruits and vegetables in the school meal programs (USDA, FNS 2002b). Technical assistance materials have been developed to provide guidance to school foodservice personnel on purchasing, preparing, and promoting fruits and vegetables in the school meal programs. In addition, USDA has greatly increased the amount and variety of fresh

fruits and vegetables available to schools by using the Department of Defense's purchasing and distribution system for fresh fruits and vegetables.¹⁰

Virtually all schools offered some type of fresh fruit and/or vegetable at least once per week (Table 4.4). About two thirds (68 percent) of schools offered some type of fresh fruit and/or vegetable every day. Fresh vegetables (served raw or in cooked form) were offered more frequently than fresh fruits—67 percent of all schools offered some type of fresh vegetable five days per week, but only 38 percent of schools offered fresh fruit five days per week. Fresh vegetables were offered in both raw and cooked forms; however, more schools offered raw vegetables than cooked fresh vegetables every day (49 versus 28 percent).

Elementary schools were significantly less likely than either middle or high schools to offer fresh fruits and/or vegetables on a daily basis (62 versus 77 and 79 percent, respectively). This was true for fresh vegetables (both raw and cooked forms) as well as fresh fruit. In addition, middle schools were significantly less likely than high schools to offer cooked fresh vegetables on a daily basis (44 versus 55 percent).

¹⁰ USDA also administers the Fresh Fruit and Vegetable Program (FFVP), which provides all children in participating schools with free fresh fruits and vegetables during the school day (outside of school meals).

Table 4.4. Availability of Fresh Fruits and Vegetables in National School Lunch Program Lunches

	Percentage of Schools			
	Elementary Schools	Middle Schools	High Schools	All Schools
Number of Days Any Fresh Fruits or Vegetables Were Offered				
None	<3	<3	<3	<3
1 to 2	10 ^α	4~	5 ^γ	8
3 to 4	28 ^α	18	16 ^γ	24
5	62 ^α	77	79 ^γ	68
<i>Average number of days offered</i>	4	5	5	4
<i>Median number of days offered</i>	4	4	4	4
Number of Days Any Fresh Vegetables (Served Raw or in Cooked Form) Were Offered^a				
None	<3	<3	<3	<3
1 to 2	11 ^α	4~	<3 ^γ	8
3 to 4	27	23	15 ^γ	24
5	61 ^α	73	82 ^γ	67
<i>Average number of days offered</i>	4	5	5	4
<i>Median number of days offered</i>	4	4	4	4
Number of Days Any Raw Fresh Vegetables Were Offered^a				
None	3~	3~	3~	3
1 to 2	28	21 ^β	13 ^γ	24
3 to 4	25	21	23	24
5	44 ^α	55	61 ^γ	49
<i>Average number of days offered</i>	4	4	4	4
<i>Median number of days offered</i>	4	4	4	4
Number of Days Any Cooked Fresh Vegetables Were Offered^a				
None	4~	<3	4~	3
1 to 2	38 ^α	17	14 ^γ	30
3 to 4	43	37 ^β	27 ^γ	39
5	16 ^α	44 ^β	55 ^γ	28
<i>Average number of days offered</i>	3	4	4	3
<i>Median number of days offered</i>	2	4	4	3
Number of Days Any Fresh Fruits Were Offered^b				
None	14	16	12	14
1 to 2	33	25	21 ^γ	30
3 to 4	21 ^α	12	17	19
5	32 ^α	47	50 ^γ	38
<i>Average number of days offered</i>	3	3	3	3
<i>Median number of days offered</i>	2	4	4	3
Number of Schools	257	224	215	696

Source: School Nutrition Dietary Assessment Study-IV, Menu Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Note: Includes only schools that provided menu information for five days.

^aExcludes canned and frozen vegetables.

^bExcludes canned, frozen, and dried fruits and fruit juices.

^αDifference between elementary and middle schools is significantly different from zero at the .05 level.

^βDifference between middle and high schools is significantly different from zero at the .05 level.

^γDifference between elementary and high schools is significantly different from zero at the .05 level.

Table 4.4 (continued)

~ Point estimate is considered less precise than estimates that are not flagged because the sample size is small or the coefficient of variation is large. The rules used in flagging estimates are described in Chapter 1. When these rules are applied, percentages close to 0 or 100 are often flagged. In this table, flagged percentages between 0 and 3 percent are displayed as <3.

Note: Differences in medians were not tested for statistical significance.

C. Foods Offered in National School Lunch Program Lunches, by Menu-Planning System

1. Amount of Choice and Variety Offered in NSLP Lunches, by Menu-Planning System

Table 4.5 presents data on the amount of choice and variety offered in daily lunch menus in schools using different menu-planning systems (traditional food-based, enhanced food-based, and nutrient-based). In general, there were few significant differences in the level of choice and variety offered in schools that used the two food-based menu-planning systems. However, the pattern was markedly different for separate grain/bread items. Daily lunch menus in schools that used the enhanced food-based system were significantly more likely than those in schools that used the traditional food-based system to include a separate grain/bread item (59 versus 43 percent). This pattern is consistent with the fact that the enhanced food-based system requires more servings of grain/bread over the course of a week.

There were more significant differences in the level of choice and variety offered in schools that used nutrient-based menu planning, compared with schools that used the two food-based menu-planning systems. Compared with schools that used food-based menu planning, daily lunch menus in schools that used nutrient-based menu planning tended to offer fewer milk choices, more entree choices, and were more likely to include a dessert. In addition, daily lunch menus in schools that used nutrient-based menu planning were significantly less likely to include a separate grain/bread item than lunch menus in schools that used the enhanced food-based menu-planning system.

Nearly all daily lunch menus (95 percent) in schools that used nutrient-based menu planning offered more than one type of “side” at lunch. More than one-third (39 percent) of daily lunch menus in these schools included two to four sides, 21 percent included five to six side items, and 35 percent included seven or more sides. The median number of sides offered per day was five, and the median number of different side items offered over the course of a five-day school week was 16.

Table 4.5. Choice and Variety in National School Lunch Program Lunches, by Menu-Planning System

	Percentage of Daily Lunch Menus				
	Traditional Food-Based	Enhanced Food-Based	All Food-Based	Nutrient-Based	All Schools
Number of Types of Milk Offered per Day					
No more than 1	2	3	2	1	2
2	26	26 ^β	26	41 ^γ	30
3	39	39	39	42	40
4 or more	32	33 ^β	33	16 ^γ	28
<i>Median number different items/day</i>	3	3	3	2	2
<i>Median number different items/week^a</i>	3	3	3	2	3
Number of Fruits/Vegetables/100% Juices Offered per Day^b					
No more than 2	29	34	31	27	30
3 to 4	36	30	35	27 ^γ	33
5 to 7	22	22	22	28	24
8 or more	12	14	13	18	14
<i>Median number different items/day</i>	3	3	3	4	3
<i>Median number different items/week^a</i>	11	10	11	12	11
Number of Entrees Offered per Day^c					
1	26	24 ^β	26	12 ^γ	22
2 to 3	36	40	37	42	39
4 to 5	20 ^α	13 ^β	18	21	19
6 or more	17	23	19	25 ^γ	20
<i>Median number different items/day</i>	2	2	2	3	2
<i>Median number different items/week^a</i>	9	9	9	12	10
Number of Separate Grains/Breads Offered per Day^d					
None	57 ^α	41 ^β	53	61	55
1	33 ^α	41 ^β	35	31	34
2 or more	10 ^α	18 ^β	12	8	11
<i>Median number different items/day</i>	0	0	0	0	0
<i>Median number different items/week^a</i>	1	2	1	1	1
Number of Desserts Offered per Day^e					
None	85	81 ^β	84	72 ^γ	80
1	14	16 ^β	15	26 ^γ	18
2 or more	1	3	2	2	2
<i>Median number different items/day</i>	0	0	0	0	0
<i>Median number different items/week^a</i>	0	0	0	0	0
Number of Side Items Offered per Day					
No more than 1	n.a.	n.a.	n.a.	4	n.a.
2 to 4	n.a.	n.a.	n.a.	39	n.a.
5 to 6	n.a.	n.a.	n.a.	21	n.a.
7 or more	n.a.	n.a.	n.a.	35	n.a.
<i>Median number different items/day</i>	n.a.	n.a.	n.a.	5	n.a.
<i>Median number different items/week^a</i>	n.a.	n.a.	n.a.	16	n.a.
Number of Daily Menus	2,175	813	2,988	1,242	4,230
Number of Schools	454	171	625	259	884

Source: School Nutrition Dietary Assessment Study-IV, Menu Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Note: Differences in medians were not tested for statistical significance.

Table 4.5 (*continued*)

^aIncludes only schools that provided menu information for five days.

^bFruits and vegetables not included in combination entrees.

^cIncludes meats and meat alternates as well as combination entrees.

^dGrains and breads not included in combination entrees or served solely with a specific menu item.

^eUnder enhanced food-based menu planning, grain-based desserts may count toward the grains/breads requirement.

^fDifference between traditional and enhanced is significantly different from zero at the .05 level.

^gDifference between enhanced and nutrient-based is significantly different from zero at the .05 level.

^hDifference between traditional and nutrient-based is significantly different from zero at the .05 level.

n.a. = not applicable.

2. Availability of Self-Serve Food Bars in NSLP Lunches, by Menu-Planning System

Appendix Table C.2 presents data on the availability of self-serve food bars in schools that used different menu-planning systems. Schools that used traditional food-based menu planning were significantly less likely than schools that used either enhanced food-based menu planning or nutrient-based menu planning to offer any type of self-serve bar. In addition, schools that used traditional food-based menu planning were significantly less likely than schools that used nutrient-based menu planning to offer any type of salad bar at least once per week and to offer side salad bars (at least once per week or daily).

3. Types and Frequency of Foods Offered in NSLP Lunches, by Menu-Planning System

Appendix Table C.3 presents information on the foods/food groups offered in schools that used different menu-planning systems. There were relatively few meaningful differences in the types and frequency of foods offered in schools that used the two food-based menu-planning systems. Relative to daily lunch menus in schools that used traditional food-based menu planning, menus in schools that used enhanced food-based menu planning were significantly more likely to offer side salad bars, separate grains/breads, and yogurt, and were significantly less likely to offer bag lunches and pre-plated meals.

Not surprisingly, perhaps, there were many more meaningful differences in the types and frequency of foods offered in schools that used nutrient-based menu planning, compared with schools that used the two food-based menu-planning systems. Key differences include the following:

- Lunch menus in schools that used nutrient-based menu planning were significantly less likely than lunch menus in schools that used either of the food-based menu-planning systems to include 2% unflavored milk.
- Lunch menus in schools that used nutrient-based menu planning were significantly more likely than lunch menus in schools that used either of the food-based menu-planning systems to include fresh oranges, Mexican-style entrees, cheeseburgers and similar beef/pork sandwiches with cheese, mixtures with meat, grain and/or vegetables (such as lasagna or macaroni and cheese), breaded/fried chicken products, and other menu items, including cookies, cakes, brownies, and snack foods such as popcorn and potato chips.
- Relative to schools that used the traditional food-based menu-planning system, lunch menus in schools that used nutrient-based menu planning were significantly more likely to include raw vegetables of any type; side salad bars; raw carrots; pizza; and sandwiches with breaded/fried meat, poultry or fish.

- Relative to schools that used the enhanced food-based menu-planning system, lunch menus in schools that used nutrient-based menu planning were significantly less likely to include separate grain/bread items.

4. Availability of Fresh Fruits and Vegetables in NSLP Lunches, by Menu-Planning System

Appendix Table C.4 presents information on the availability of fresh fruits and vegetables by menu-planning system. Schools that used the traditional food-based menu-planning system were significantly more likely than schools that used the enhanced food-based menu-planning system to offer no raw vegetables during the week. However, for both menu-planning systems, the proportion of schools in this group was very low (5 versus less than 3 percent, respectively).

Schools that used nutrient-based menu planning were significantly more likely than schools that used traditional food-based menu planning to offer any type of fresh vegetable five days per week (77 versus 61 percent); to offer raw vegetables five days per week (62 versus 41 percent); and to offer cooked fresh vegetables three or four days per week (48 versus 34 percent). Schools that used nutrient-based menu planning were less likely than schools that used traditional food-based menu planning to offer fresh vegetables, raw vegetables, and fresh fruit only one or two days per week.

D. Foods Offered in School Breakfast Program Breakfasts

In SY 2009–2010, schools that offered the SBP had the option to use any of five different approaches to planning their breakfast menus (see Chapter 1 and Appendix A). Schools that used the traditional or enhanced food-based menu-planning systems were required to offer a minimum of four items: fluid milk (as a beverage); one serving of fruit, 100% juice, or vegetable; and either two grain/bread items, two meat/meat alternate items, or one of each (separately or as a combination entree). Schools that used nutrient-based menu planning were not required to offer specific meal components; however, breakfasts offered to students had to include fluid milk and at least two side items. Sides may include fruits, vegetables, juice, grains/breads, meat/meat alternates, or other items.

1. Amount of Choice and Variety Offered to Students in SBP Breakfasts

To assess the amount of choice and variety offered in SBP breakfasts, we examined food items within six food groups: milk; fruits, 100% fruit juice, and vegetables; grains/breads; meat/meat alternates; and combination entrees.¹¹ These food groups are based on the meal component groups used in the food-based menu-planning systems. Breakfasts offered in schools that used nutrient-based menu planning generally include the same basic food groups.

Table 4.6 presents data on the amount of choice and variety offered to students, overall, and in different types of schools. The table shows the proportion of *daily breakfast menus* that offered different numbers of choices within each food group, as well as the median number of choices offered per day and the median number of different items offered per week. In the sections that follow, we discuss key findings within each food group.

¹¹ We also looked at menu items that didn't fit into any of these food groups (the "other" items described in the analysis of NSLP lunches). However, such items were rarely offered in SBP breakfasts.

Table 4.6. Choice and Variety in School Breakfast Program Breakfasts

	Percentage of Daily Breakfast Menus			
	Elementary Schools	Middle Schools	High Schools	All Schools
Number of Types of Milk Offered per Day				
No more than 1	17 ^a	10	12	15
2	38	33	32	36
3	26	31	35 ^y	29
4 or more	19 ^a	26	21	21
<i>Median number of different items per day</i>	2	2	2	2
<i>Median number of different items per week^a</i>	2	3	2	2
Number of Fruits/Vegetables/100% Juices Offered per Day^b				
No more than 1	36 ^a	28	26 ^y	33
2	25	25	19	23
3	20	21	25	21
4	10	13	14	11
5 or more	9	13	15 ^y	11
<i>Median number of different items per day</i>	2	2	2	2
<i>Median number of different items per week^a</i>	3	4	4	4
Number of Separate Grains/Breads Offered per Day^c				
No more than 1	33 ^a	26	25 ^y	30
2	34 ^a	27	24 ^y	31
3	19	21	20	19
4	8	11	13 ^y	10
5 or more	6 ^a	15	18 ^y	10
<i>Median number of different items per day</i>	2	2	2	2
<i>Median number of different items per week^a</i>	4	5	5	5
Number of Separate Meats/Meat Alternates Offered per Day^d				
None	61	55	55	59
1	31	30	31	31
2 or more	8 ^a	15	14 ^y	11
<i>Median number of different items per day</i>	0	0	0	0
<i>Median number of different items per week^a</i>	1	1	1	1
Number of Combination Entrees Offered per Day				
None	66 ^a	49	47 ^y	59
1	29 ^a	34	33	31
2 or more	6 ^a	16	20 ^y	10
<i>Median number of different items per day</i>	0	1	0	0
<i>Median number of different items per week^a</i>	1	2	1	1
Number of Daily Menus	1,349	1,258	1,218	3,825
Number of Schools	282	264	257	803

Source: School Nutrition Dietary Assessment Study-III, Menu Survey, school year 2004–2005. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the NSLP.

Notes: None of the differences between middle and high schools are significantly different from zero. Differences in medians were not tested for statistical significance.

Table 4.6 (*continued*)

^aIncludes only schools that provided menu information for five days.

^bFruits and vegetables not included in combination entrees.

^cGrains and breads not included in combination entrees. All varieties of cold cereal were counted as one grain/bread choice.

^dMeats and meat alternates not included in combination entrees.

^eDifference between elementary and middle schools is at the .05 level.

^fDifference between elementary and high schools is significantly different from zero at the .05 level.

a. Milk

Fifteen percent of all daily breakfast menus included only one type of milk (by comparison, 98 to 99 percent of daily lunch menus included more than one type of milk) (Table 4.6). Twenty-one percent of daily breakfast menus offered four or more types of milk. The median number of milks offered each day was two and, typically, the same milk choices were offered every day of the week. Elementary schools were significantly more likely than middle schools to offer only one milk choice (17 percent of daily breakfast menus versus 10 percent), and were significantly less likely than middle or high schools to offer three or more types of milk.

b. Fruit and 100% Fruit Juice

One-third of all daily breakfast menus included only one type of fruit or 100% juice (Table 4.6). Elementary schools were significantly more likely than either middle or high schools to offer only one fruit or juice option (36 percent of daily breakfast menus versus 28 and 26 percent, respectively). The median number of fruit and juice choices per day was two for all types of schools. The median number of different types of fruit and 100% juice offered over the course of a week was three for elementary schools and four for middle and high schools.

c. Separate Grains/Breads

Thirty percent of all daily breakfast menus included only one grain/bread choice, and 31 percent include only two choices (Table 4.6). Twenty percent of all daily breakfast menus included four or more grain/bread choices. Elementary schools were significantly more likely than either middle or high schools to offer only one or two bread/grain choices (67 percent of daily breakfast menus versus 53 and 49 percent, respectively). Elementary schools were less likely than middle or high schools to offer five or more grain/bread choices (6 percent of daily breakfast menus versus 15 and 18 percent, respectively). The median number of grain/bread choices per day was two for all types of schools. The median number of different types of grain/bread items offered across all schools over the course of a week was four to five.

d. Combination Entrees and Meats and Meat Alternates

More than half (59 percent) of all daily breakfast menus did not include any separate meat/meat alternates or combination entrees (Table 4.6). These items are optional for SBP breakfasts. To meet the minimum requirements for reimbursement, breakfasts offered in schools that used food-based menu planning may include two grains/breads and no meat/meat alternate. Under nutrient-based menu planning, a breakfast must include two menu items other than milk, but neither item is required to be an entree or a meat/meat alternate. When schools did offer meat/meat alternates or combination entrees, they generally offered only one item. Only 10 to 11 percent of all daily breakfast menus included two or more combination entrees or two or more meat/meat alternates.

Elementary schools were significantly less likely than either middle or high schools to offer two or more meats/meat alternates (8 percent of daily breakfast menus versus 15 and 14 percent, respectively) and to offer any combination entrees (35 percent of daily breakfast menus versus 50 and 53 percent, respectively).

2. Types and Frequency of Foods Offered in SBP Breakfasts

We assessed the types and frequencies of foods offered in SBP breakfasts using the food grouping system described in the preceding discussion of NSLP lunch menus (see Appendix Table C.1).

Table 4.7 presents information on the foods/food groups that were offered in at least five percent of daily breakfast menus, overall, or for one or more school types. In the sections that follow, we discuss key findings within each major food group.

Table 4.7. Foods Offered in School Breakfast Program Breakfasts

	Percentage of Daily Breakfast Menus			
	Elementary Schools	Middle Schools	High Schools	All Schools
Milk	>97	>97	>97	>97
Unflavored	>97	>97	>97	>97
1% fat	73	72	69	72
Skim or nonfat	42	44	42	42
2% fat	29	34	35	31
Flavored	69 ^a	87	84 ^y	75
1% fat	48 ^a	58	53	50
Skim or nonfat	27 ^a	34	35 ^y	30
Fruits and 100% Juices	97	98	97	97
100% Fruit Juice	83 ^a	89	91 ^y	86
Citrus juice	61 ^a	68	73 ^y	65
Orange juice	60	65	71 ^y	63
Fruit juice blend	3	6	4	4
Non-citrus juice	63	65	69 ^y	64
Apple juice	53	54 ^b	61 ^y	55
Grape juice	24	29	26	25
Fruit juice blend	10	10	9	10
Any fruit ^a	49	55	56	51
Fresh fruit	35 ^a	44	48 ^y	39
Apple	19 ^a	30	34 ^y	24
Orange	13 ^a	21	22 ^y	17
Banana	12	14	17 ^y	14
Canned fruit ^b	20	18	14 ^y	19
Peaches and pears	10	11	8	10
Applesauce	5	5	4	5
Vegetables	2 ^a	6	5 ^y	3
Hash browns, potato puffs, french fries ^c	2 ^a	6	5 ^y	3
Separate Grains/Breads^d	93	94	93	93
Cold cereal	75	78	76	76
Sweetened	66	71	71	68
Unsweetened	36 ^a	29	28 ^y	33
Pastries	18 ^a	35	40 ^y	25
Cinnamon buns	7 ^a	14	18 ^y	11
Toaster pastries	5 ^a	16	18 ^y	10

Table 4.7 (continued)

	Percentage of Daily Breakfast Menus			
	Elementary Schools	Middle Schools	High Schools	All Schools
Donuts	4 ^a	12	13 ^y	8
Strudels, turnovers, Danishes	2 ^a	4	5 ^y	3
Breads, rolls, bagels, other plain breads	19 ^a	30	33 ^y	24
Muffins (excludes English muffins), sweet/quick breads	19	24	29 ^y	22
Pancakes, waffles, French toast	20	21	21	21
Buttered toast, bagels with cream cheese	17 ^a	24	21	19
Crackers (mainly graham)	19	15	13 ^y	17
Biscuits, cornbread	10 ^a	13	12	11
Grain and fruit cereal bars, granola bars	9	8	11	9
Hot cereal	7	6	7	6
Separate Meats/Meat Alternates^e	39	45	45	41
Yogurt	18	22	22	19
Low fat or fat-free	14	19	18	15
Sausage	11 ^a	15	14 ^y	12
Eggs	9	8	11	9
Cheese	6	6	6	6
Combination Entrees	34^a	51	53^y	41
Breakfast sandwiches ^f	10 ^a	21	23 ^y	15
Pizza (all types)	8 ^a	15	15 ^y	11
Sausage with pancake, corn dog, similar products	7	9	8	7
Breakfast burritos	5	6	9 ^y	6
Peanut butter sandwiches	2	5	8 ^y	4
Number of Daily Menus	1,367	1,227	1,231	3,825
Number of Schools	282	264	257	803

Source: School Nutrition Dietary Assessment Study-IV, Menu Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Notes: Table is limited to food groups offered in at least five percent of menus, overall, or for one or more school types. The table does not account for individual food items offered as part of food bars or bagged/pre-plated meals.

^aIncludes canned, fresh, frozen, and dried fruit.

^bWith the exception of applesauce, the majority of canned fruit was sweetened.

^cIncludes both oven-baked and deep-fried products.

^dGrains and breads not included in combination entrees or served solely with a specific menu item.

^eMeats and meat alternates not included in combination entrees.

^fIncludes sandwiches with egg, cheese, sausage, ham or other types of meat on a biscuit, English muffin, bagel, or croissant.

^aDifference between elementary and middle schools is significantly different from zero at the .05 level.

^bDifference between middle and high schools is significantly different from zero at the .05 level.

^yDifference between elementary and high schools is significantly different from zero at the .05 level.

>97 = Point estimate is considered less precise than estimates that are not flagged because the sample size is small or the coefficient of variation is large. The rules used in flagging estimates are described in Chapter 1. When these rules are applied, percentages close to 0 or 100 are often flagged. In this table, flagged percentages between 97 and 100 percent are displayed as >97.

a. Milk

Milk was offered in essentially all daily breakfast menus (Table 4.7). Nearly all daily breakfast menus included unflavored milk and three-quarters (75 percent) included flavored milk. Similar to the pattern observed for NSLP lunch menus, 1% milk was the most common type of milk, followed by skim or nonfat milk, and 2% milk. Whole milk was offered in fewer than five percent of all daily breakfast menus and, therefore, does not appear in Table 4.7. Elementary schools were significantly less likely than either middle or high schools to offer flavored milk at breakfast (69 percent of daily breakfast menus versus 87 and 84 percent, respectively).

b. Fruit and 100 % Fruit Juice

Fruit or 100% fruit juice was offered in almost every breakfast menu (97 percent) (Table 4.7). Fruit juice was offered much more frequently than any type of fruit (86 percent of all breakfast menus versus 51 percent). Fresh fruit (39 percent) was offered more frequently than canned fruit (19 percent) in daily breakfast menus. Citrus and non-citrus juices were offered with comparable frequency (approximately 65 percent of all breakfast menus). Daily breakfast menus in elementary schools offered 100% fruit juice and fresh fruit less frequently than daily menus in either middle or high schools. Canned fruit was offered more frequently in elementary schools than in high schools (for canned fruit, the difference between elementary and middle schools was not statistically significant).

c. Vegetables

Very few daily breakfast menus included vegetables (hash browns, potato puffs, and similar products) (Table 4.7). Elementary schools were significantly less likely than either middle or high schools to offer vegetables (2 percent of daily breakfast menus versus 6 and 5 percent, respectively).

d. Separate Grains/Breads

Almost all (93 percent) daily breakfast menus included grains or breads that were not part of a combination entrée (Table 4.7). As discussed above, this is not surprising, given that two grain/bread servings, coupled with fluid milk and a serving of fruit or 100% juice, meets the requirements for a reimbursable breakfast under both food-based menu-planning systems. Cold cereal was the specific grain/bread item offered most frequently—more than three-quarters (76 percent) of daily breakfast menus included one or more types of cold cereal. Sweetened cold cereals were offered more than twice as often as unsweetened cereals¹² (68 percent of daily breakfast menus versus 33 percent). Although offered much less frequently than cold cereal, the next most common grain/bread items were pastries (offered in 25 percent of all breakfast menus), plain breads and rolls (24 percent), muffins and quick breads (22 percent), and pancakes, waffles and French toast (21 percent).

Middle and high schools were roughly two times more likely to offer pastries than elementary schools (35 and 40 percent of daily breakfast menus, respectively, versus 18 percent). High schools

¹² A cereal was classified as sweetened if it contained 21.3 grams of sugar or more per 100 gram serving—the current criterion for cereals not allowed under the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC).

were also significantly more likely than elementary schools to offer muffins and quick breads (29 versus 19 percent), and were significantly less likely than elementary schools to offer crackers (generally graham crackers) (13 versus 19 percent).

e. Meat and Meat Alternates

As noted previously, meat and meat alternates and combination entrees were less commonly offered in SBP breakfast menus than other food groups (Table 4.7). Overall, about four in ten daily breakfast menus (41 percent) included one or more meats or meat alternates. Yogurt, most of which was low-fat or fat-free, was the most commonly offered meat/meat alternate (19 percent of all breakfast menus), followed by sausage (12 percent), eggs (9 percent), and cheese (6 percent).

f. Combination Entrees

Overall, combination entrees were offered about as frequently as meats/meat alternates. Forty-one percent of all daily breakfast menus included one or more combination entrees (Table 4.7). The most common type of combination entree was breakfast sandwiches (sandwiches that included egg, cheese, and/or sausage, ham or other types of meat on a biscuit, English muffin, or croissant). Breakfast sandwiches and all other combination entrees were offered more frequently in middle school and high school menus than in elementary school menus, and most of these differences were statistically significant.

E. Foods Offered in School Breakfast Program Breakfasts, by Menu-Planning System

1. Amount of Choice and Variety Offered in SBP Breakfasts, by Menu-Planning System

Appendix Table C.5 presents information on the amount of choice and variety offered in SBP breakfast menus in schools that used different menu-planning systems. Few significant differences were detected. Schools that used traditional food-based menu planning were significantly less likely than schools that used enhanced food-based menu planning to offer a choice (two or more) of combination entrees (8 percent of daily breakfast menus versus 14 percent). In addition, relative to schools that used nutrient-based menu planning, schools that used traditional food-based menu planning were significantly more likely to offer only one fruit or juice choice (39 percent of daily breakfast menus versus 25 percent), and were significantly less likely to (1) offer five or more fruit or juice choices (8 versus 16 percent) and (2) offer any combination entrees (37 versus 46 percent).

Nearly all daily breakfast menus (96 percent) in schools that used nutrient-based menu planning offered more than two or more “sides” at breakfast. This is consistent with the requirements for nutrient-based breakfast menus. One-quarter (25 percent) of daily breakfast menus in these schools included three or four sides, 26 percent included five to six sides, 23 percent included seven to eight sides, and 22 percent included nine or more sides. The median number of sides offered per day was six, and the median number of different side items offered over the course of a five-day school week was 13.

2. Types and Frequency of Foods Offered in SBP Breakfasts, by Menu-Planning System

Appendix Table C.6 presents information on the foods/food groups offered in schools that used different menu-planning systems. As noted for NSLP lunches, there were few meaningful differences in the types and frequency of foods offered in schools that used the two food-based

menu-planning systems. Relative to daily breakfast menus in schools that used traditional food-based menu planning, menus in schools that used enhanced food-based menu planning were significantly more likely to offer 100% citrus juice and yogurt.

There were many more meaningful differences in the types and frequency of foods offered in schools that used nutrient-based menu planning, compared with schools that used food-based menu-planning systems, especially the traditional food-based system. Key differences include the following:

- Breakfast menus in schools that used nutrient-based menu planning were significantly more likely than breakfast menus in schools that used either type of food-based menu planning to include fresh fruit, canned fruit, and vegetables and were significantly less likely to include 2% unflavored milk.
- Breakfast menus in schools that used nutrient-based menu planning were significantly more likely than breakfast menus in schools that used traditional food-based menu planning to include 1% unflavored milk, any type of fruit, cold cereal, cinnamon buns, and combination entrees.
- Breakfast menus in schools that used nutrient-based menu planning were significantly less likely than breakfast menus in schools that used enhanced food-based menu planning to include 100% fruit juice and yogurt.

CHAPTER 5

CALORIE AND NUTRIENT CONTENT OF AVERAGE NATIONAL SCHOOL LUNCH PROGRAM LUNCHES

The USDA regulates and monitors the NSLP to ensure that meals provided through the program make a positive contribution to the health and well-being of the nation's children. To be eligible for Federal reimbursement, NSLP meals must meet defined nutrition standards. The standards in place during SY 2009–2010 were implemented in 1995 as part of the SMI and are based on nutrient requirements defined in the 1989 RDAs (NRC 1989) and the 1995 *Dietary Guidelines for Americans* (USDA and HHS 1995). Nutrition standards for school meals were recently revised to reflect the current nutrition guidance provided by the *Dietary Guidelines* (USDA and HHS 2010), as well as updated information about nutrient requirements included in the DRIs (IOM 2006), which replaced the 1989 RDAs.¹

In this chapter, we describe the calorie and nutrient content of average NSLP lunches *offered* and *served* to students in public schools during SY 2009–2010. Reported statistics reflect the average calorie and nutrient content of NSLP lunches over one school week. In addition, we present information about the proportions of schools that *offered* and *served* average NSLP lunches that met or came close to meeting specific nutrition standards. *These analyses focus mainly on the SMI standards because these are the standards that were in effect during SY 2009–2010.* However, to provide some insight into how school meals compare to recent nutrition guidance, we also assess the proportion of schools that met standards based on the 2010 *Dietary Guidelines*.²

All the findings are based on analysis of data from the menu survey, which was completed by foodservice managers in 884 schools for five consecutive school days in the spring of SY 2009–2010 (January–June 2010).^{3,4} Data are presented separately by school type—defined by grade level (elementary, middle, and high schools)—and by menu-planning system.^{5,6} The statistical significance of differences between schools in these subgroups was tested using two-tailed *t*-tests.⁷ Table footnotes provide information about the specific comparisons that were made in these tests. Some findings are summarized in tables that present data for each school type/menu-planning system and

¹ The final rule on the revised meal requirements, issued in January 2012 (*Federal Register*, vol. 77, no. 17, January 26, 2012, Rules and Regulations) mandates that schools begin implementing the new requirements in SY 2012–2013.

² The potential contribution of NSLP lunches to recommended USDA Food Patterns, including contributions to recommended daily limits for calories from solid fats and added sugars, is explored in Chapter 8.

³ Because of holidays or other school closings, some schools provided data for only four days. A very small number of schools provided data for only three days.

⁴ A detailed description of the protocols used in collecting and processing menu survey data is provided in Volume II of this report.

⁵ See Chapter 1 for a description of menu-planning options that were available to schools in SY 2009–2010.

⁶ Tables that present data for additional subgroups of schools based on school size, urbanicity, and district child poverty rate are presented in Appendix E. These appendix tables are not discussed in the report.

⁷ Tests were conducted using SUDAAN statistical software, which adjusts standard errors for the study's complex sample design.

for all schools combined, and other findings are summarized in graphics that present data for each school type/menu-planning system. The detailed data that underlie the graphics, as well as findings for all schools combined, are presented in Appendix E.

A. Summary of Findings

We used two different approaches to assess the calorie and nutrient content of the average NSLP lunch. The first approach estimates the calorie and nutrient content of the average lunch *offered*. This analysis is based on a simple average of all foods offered to students. It assumes that lunches include one serving of each type of food (meal component) offered and gives equal weight to alternatives within a meal component group. For example, if three different types of milk are offered, the analysis includes the nutrient content of an average serving of milk.

The second approach estimates the calorie and nutrient content of the average lunch *served*. This analysis incorporates information about students' food selection patterns—that is, information about the number and types of foods included in the meals that were actually served to (or selected by) students. Rather than the simple average used in estimating the calorie and nutrient content of the average lunch *offered*, estimates of the average lunch *served* give greater weight to foods that students selected more frequently. Examination of the nutrient content of meals *served* was introduced as part of the SMI to provide a more accurate assessment of the potential contribution of school meals to children's dietary intakes.⁸

Below, we summarize key findings for both lunches *offered* and lunches *served*:

- With the exception of iron in middle and high school lunches, more than 80 percent of all schools *offered* NSLP lunches that, on average over a typical school week, met or exceeded standards for the nutrients targeted in the SMI—protein, vitamins A and C, calcium, and iron.
- With the exception of protein and calcium, fewer schools *served* average NSLP lunches that met the SMI standards for target nutrients. This is consistent with the fact that students do not necessarily take one serving of all foods offered to them. Still, for all schools combined, the average NSLP lunch *served* in more than three-quarters of all schools met or came within 10 percent of the SMI standards for all target nutrients. For both NSLP lunches *offered* and *served*, elementary schools were consistently more likely than either middle or high schools to meet or come within 10 percent of the SMI standards for target nutrients.
- Schools were less likely to *offer* and *serve* average NSLP lunches that met or came within 10 percent of the SMI standard for minimum calories. This was especially true for middle and high schools.
- On average, 32 to 33 percent of calories in the average NSLP lunch *offered* came from fat. This level exceeded the SMI standard of no more than 30 percent of calories, but was within the range recommended for school-aged children in the 2010 *Dietary*

⁸ The terms unweighted analysis and weighted analysis are often used to refer to estimates of the calorie and nutrient content of average lunches *offered* and *served*, respectively.

Guidelines (25 to 35 percent of calories). Consequently, only about one-third (35 percent) of schools *offered* average NSLP lunches that met the SMI standard for total fat, while 70 percent *offered* average lunches that satisfied the 2010 *Dietary Guidelines* recommendation for fat.

- On average, 10 percent of calories in the average NSLP lunch *offered* came from saturated fat, a level that is just above the SMI standard of less than 10 percent of calories from saturated fat. Half (51 percent) of all schools *offered* lunches that met the SMI standard for saturated fat. (The 2010 *Dietary Guidelines* recommendation for saturated fat is the same as the SMI standard.)
- Overall, 14 percent of schools *offered* NSLP lunches that, on average, satisfied all of the SMI standards. The percentage of schools that *served* average NSLP lunches that satisfied all of the SMI standards was 50 percent lower (7 percent).
- Essentially all schools *offered* and *served* average NSLP lunches that were consistent with the 2010 *Dietary Guidelines* recommendation for cholesterol, but very few schools *offered* or *served* average NSLP lunches that met 2010 *Dietary Guidelines* recommendations for sodium or dietary fiber.
- Schools that used nutrient-based menu planning were the most likely to *offer* and *serve* average NSLP lunches that met the SMI standards for total fat and saturated fat, and schools using enhanced food-based menu planning were the least likely to meet these standards. These trends were significant for total fat in the average lunch *offered* and saturated fat in the average lunch *served*.

B. Standards Used to Assess Nutrient Content

The standards we used to assess NSLP lunches are summarized in Table 5.1. The primary benchmarks were the SMI nutrition standards, which require that NSLP lunches provide one-third of students' daily needs for calories and target nutrients, based on the 1989 RDAs (NRC 1989), and be consistent with 1995 *Dietary Guidelines* recommendations for total fat and saturated fat (USDA and HHS 1995). We also compared NSLP lunches to 2010 *Dietary Guidelines* recommendations for total fat, cholesterol, sodium, and dietary fiber.⁹ For cholesterol and sodium, we used standards that represent one-third of the recommended daily limits (300 mg for cholesterol and 2,300 mg for sodium). For dietary fiber, the benchmark is based on the density standard of 14 g dietary fiber per 1,000 calories used in the DRIs (IOM 2006). To simplify the discussion, we generally use the term *standard* to refer to all the benchmarks used in assessing school meals. We note, however, that schools were not required to meet the 2010 *Dietary Guidelines* recommendations. Regulations in effect during SY 2009–2010 recommended that school foodservice programs strive to decrease levels of cholesterol and sodium and increase levels of dietary fiber in NSLP lunches, but they did not specify quantitative targets.

⁹ This is similar to the approach used in the SNDA-III study, but the sodium standard was updated to match the 2010 *Dietary Guidelines*, and the fiber standard was updated to reflect the DRIs.

Table 5.1. Standards Used to Evaluate Calorie and Nutrient Content of National School Lunch Program Lunches

Nutrient	Standard
SMI Standards	
Based on 1989 <i>Recommended Dietary Allowances</i>^a	
Calories	One-third of <i>Recommended Energy Allowance</i> (REA)
Protein, vitamin A, vitamin C, calcium, and iron	One-third of <i>Recommended Dietary Allowance</i> (RDA)
Based on 1995 <i>Dietary Guidelines for Americans</i>^b	
Total fat	No more than 30 percent of calories
Saturated fat	Less than 10 percent of calories
Standards Based on the 2010 <i>Dietary Guidelines for Americans</i>^c	
Total Fat	25 to 35 percent of calories
Cholesterol	Less than 100 mg ^d
Sodium	Less than 767 mg ^d
Dietary Fiber	14 g per 1,000 calories
Combinations of Standards	
All SMI Standards	• One-third of 1989 REA/RDAs for calories, protein, vitamin A, vitamin C, calcium, and iron • No more than 30 percent of calories from fat • Less than 10 percent of calories from saturated fat
SMI Standards for All Target Nutrients	• One-third of 1989 RDAs for protein, vitamin A, vitamin C, calcium, and iron
SMI Standards for All Target Nutrients and SMI Standard for Saturated Fat ^e	• One-third of 1989 RDAs for protein, vitamin A, vitamin C, calcium, and iron • Less than 10 percent of calories from saturated fat
SMI Standards for All Target Nutrients and SMI Standard for Saturated Fat ^e and 2010 <i>Dietary Guidelines</i> Standard for Total Fat	• One-third of 1989 RDAs for protein, vitamin A, vitamin C, calcium, and iron • Less than 10 percent of calories from saturated fat • 25 to 35 percent of calories from fat
Updated Standards for All SMI Target Nutrients and SMI Standard for Saturated Fat ^e and 2010 <i>Dietary Guidelines</i> Standard for Total Fat	• One-third of current RDAs for protein, vitamin A, vitamin C, calcium, and iron^f • Less than 10 percent of calories from saturated fat • 25 to 35 percent of calories from fat

^aNational Research Council (1989).

^bU.S. Department of Agriculture and U.S. Department of Health and Human Services (1995).

^cU.S. Department of Agriculture and U.S. Department of Health and Human Services (2010).

^dBenchmark is based on one-third of the recommended daily limit.

^eThe SMI standard for saturated fat is the same as the 2010 *Dietary Guidelines* recommendation.

^fInstitute of Medicine (2006 and 2010).

SMI = School Meals Initiative for Healthy Children.

We compared the average calorie and nutrient content of NSLP lunches *offered* and *served* nationally to the standards shown in Table 5.1. We also assessed the proportions of schools that *offered* and *served* average lunches that satisfied each of the individual nutrition standards shown in Table 5.1 and the proportions of schools that “came close” to meeting each standard (that is, schools that *offered* or *served* average lunches that were within 10 percent of the standard). Information on how close schools came to meeting the various standards is useful to program administrators in identifying potential areas for training and technical assistance to support school foodservice staff in planning meals that do meet the standards.

Finally, we looked at the proportions of schools that met all the SMI standards and that met various combinations of standards, as shown in Table 5.1. The combinations examined were developed in consultation with FNS staff, and some were designed to provide insight into how school meals *offered* and *served* in SY 2009–2010 compared to alternative nutrition standards under consideration at the time this report was prepared. For example, two of the combinations included the 2010 *Dietary Guidelines* recommendation for total fat, and one included updated RDA standards for protein, vitamin A, vitamin C, calcium, and iron, based on the DRIs.

C. Calorie and Nutrient Content of NSLP Lunches *Offered*

The calorie and nutrient content of the average NSLP lunch *offered* is based on a simple average of all foods offered to students. The estimate assumes that lunches include one serving of each type of food (meal component) offered and gives equal weight to alternatives within a meal component group (for example, three different types of milk). Thus, the average NSLP lunch *offered* in a school that used food-based menu planning includes one average serving of milk, two or more average servings of fruit and/or vegetables (depending on the school’s policy), one average serving of meat/meat alternate or entree, one average serving of grains/breads (if offered separately and available to all students), one average serving of dessert or other items not considered a required part of the NSLP meal (if offered), and one average serving of condiments not linked to specific menu items.

The same basic approach has been used to estimate the nutrient content of NSLP lunches *offered* in all the SNDA studies. However, the methodology has been updated over time to reflect changes in program regulations and local school foodservice practices. For SNDA-II, the basic assumptions were updated to reflect the greater emphasis on fruits, vegetables, and grains in the enhanced food-based menu-planning system. For SNDA-III, the methodology was modified to take into account differences in the required structure of menus planned under the nutrient-standard menu-planning system. For SNDA-IV, we updated the methodology to account more accurately for the number of fruits and vegetables schools allow students to include in their lunches.¹⁰ A detailed description of the methodology used in estimating the nutrient content of NSLP lunches *offered* is provided in Appendix D.

Schools use many commercially prepared (pre-prepared) foods that are formulated specifically for school foodservice, sometimes with more whole grains, less fat, more vitamins or minerals, or added protein. As a result, the nutrient content of pre-prepared foods reported on the menu surveys

¹⁰ This methodological difference had no material effect on the general pattern of results or overall conclusions. Appendix Tables E.33 to E.35 present results for NSLP lunches *offered* based on the methodology used in SNDA-III.

may not be equivalent to a similar product in the nutrient database used to code the data and estimate nutrient and food group content of school meals. To ensure that the nutrient content of pre-prepared foods used in school meals was accurately represented, coders tracked pre-prepared foods in a centralized database, categorizing each food into one of 70 food-type groups.¹¹ A list of the 200 most commonly reported pre-prepared foods, at least one for each of the 70 food-type groups, was sent to USDA's Agricultural Research Service (ARS), along with ingredient lists and Nutrition Facts labels (which coding staff obtained via the Internet or from manufacturers). ARS staff developed complete nutrient and food group profiles for each food, and these profiles were used in the analysis. A complete description of the procedures used to code and process the menu survey data is provided in Volume II.

1. Average Calorie and Nutrient Content

On average, NSLP lunches *offered* to students during a typical school week in SY 2009–2010 provided 761 calories, with 32 percent of calories from fat and 10 percent from saturated fat (Table 5.2).¹² In general, average amounts of calories, nutrients, and other dietary components increased from elementary to middle schools and from middle to high schools. This is consistent with menu-planning guidance that specifies larger portions of some foods (food-based menu planning) or higher calorie targets (nutrient-based menu planning) for students in higher grades to meet students' varying needs for calories and nutrients.

2. Average Calorie and Nutrient Content Relative to Nutrition Standards

a. Calories and Target Nutrients

On average, NSLP lunches *offered* in SY 2009–2010 met or exceeded the SMI standards (one-third of the 1989 RDA) for calories, protein, vitamins A and C, calcium, and iron (Figure 5.1). This was true for the average lunches *offered* in all three types of schools. Except for vitamin C, NSLP lunches *offered* in elementary schools provided a significantly larger share of children's daily calorie and nutrient needs (as defined in the 1989 RDAs) than lunches *offered* in middle and high schools. In addition, NSLP lunches *offered* in middle schools provided a significantly larger share of the 1989 RDA for protein, relative to high schools, and a significantly smaller share of the 1989 RDA for iron. The significant differences between elementary schools and middle and high schools, despite the fact that lunches *offered* in the latter schools were higher in calories and nutrients (as shown in Table 5.2), reflect differences in nutrient requirements of younger and older students. For example, the 1989 RDA for calcium is 800 mg for children aged 7 to 10 and 1,200 mg for children aged 11 to 14 and 15 to 18 (NRC 1989).

¹¹ Food-type groups were defined as foods that seemed essentially the same, based on their food descriptions. For example, four food-type groups were created to capture different types of thin-crust cheese pizza—cheese pizza; cheese pizza, reduced fat; cheese pizza, whole grain; and cheese pizza reduced-fat, whole grain.

¹² More detailed data on the calorie and nutrient content of NSLP lunches *offered*, including standard errors, percentile distributions, and concentrations of nutrients per 1,000 calories, are provided in Appendix Tables E.9 to E.12 and E.17 to E.20.

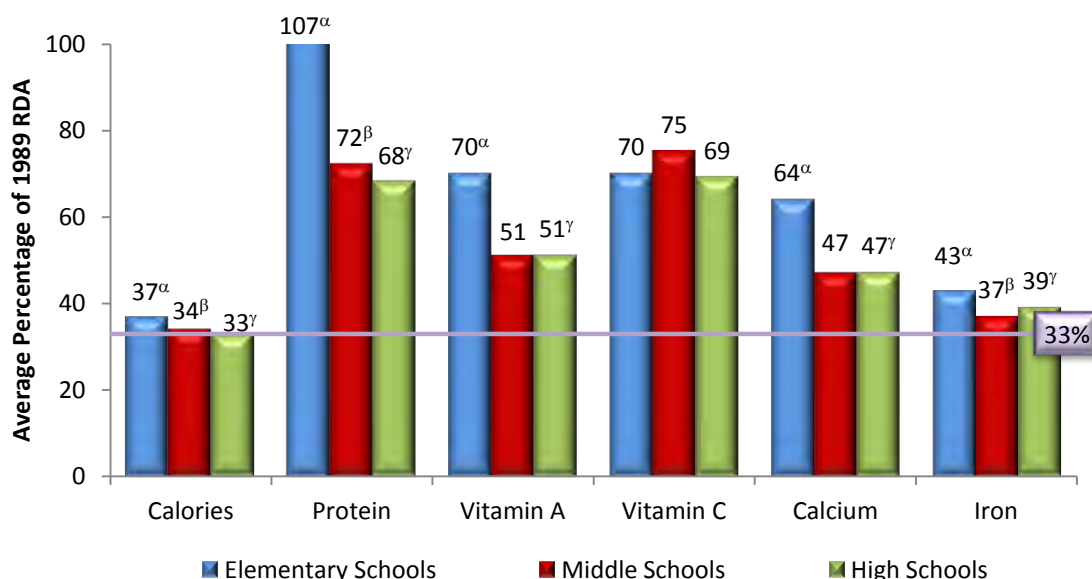
Table 5.2. Average Calorie and Nutrient Content of National School Lunch Program Lunches Offered

	Elementary Schools	Middle Schools	High Schools	All Schools
Average Amount				
Calories	726	785	843	761
Nutrients Included in SMI Standards				
Protein (g)	30	32	34	31
Vitamin A (mcg RE)	453	457	455	454
Vitamin C (mg)	32	37	40	34
Calcium (mg)	529	552	565	540
Iron (mg)	4.4	4.9	5.2	4.7
Other Dietary Components				
Cholesterol (mg)	56	62	66	59
Sodium (mg)	1,395	1,545	1,651	1,474
Dietary fiber (g/1,000 calories)	10	10	10	10
Average Percentage of Calories from:				
Total Fat	31.9	32.0	32.6	32.1
Saturated Fat	10.0	10.0	10.0	10.0
Number of Schools	318	287	279	884

Source: School Nutrition Dietary Assessment Study–IV, Menu Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

RE = Retinol equivalents; SMI = School Meals Initiative for Healthy Children.

Figure 5.1. Average Percentage of 1989 Recommended Energy/Dietary Allowances in National School Lunch Program Lunches Offered



Note: The SMI standards are one-third of the 1989 Recommended Energy/Dietary Allowances.

^αDifference between elementary and middle schools is significantly different from zero at the .05 level.

^βDifference between middle and high schools is significantly different from zero at the .05 level.

^γDifference between elementary and high schools is significantly different from zero at the .05 level.

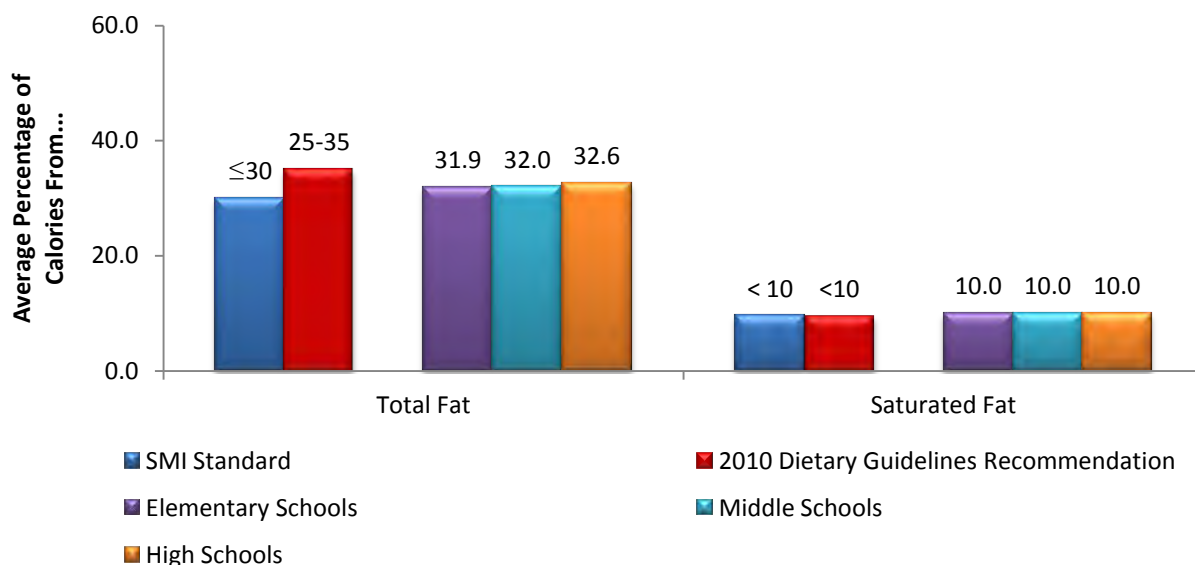
SMI = School Meals Initiative for Healthy Children.

b. Percentage of Calories from Total Fat and Saturated Fat

On average, NSLP lunches *offered* in SY 2009–2010 came close to, but did not meet, the SMI standard for total fat (Figure 5.2). The average fat content of lunches *offered* was similar for all three types of schools—32 to 33 percent of calories from fat. This level exceeded the SMI standard for fat (no more than 30 percent of calories from fat) but was consistent with the 2010 *Dietary Guidelines* recommendation, which specifies a range of 25 to 35 percent of calories from fat for school-aged children.

The average saturated fat content of NSLP lunches *offered* in all three types of schools was identical (10.0 percent of calories). This was just above the SMI standard (and the 2010 *Dietary Guidelines* recommendation) for saturated fat, which is less than 10 percent of calories.

Figure 5.2. Average Percentage of Calories from Total Fat and Saturated Fat in National School Lunch Program Lunches Offered



Notes: The average percentage of calories from total fat exceeds the SMI standard (no more than 30 percent of calories), but is consistent with the 2010 *Dietary Guidelines* recommendation for children 4 to 18 years of age (25 to 35 percent of calories).

The average percentage of calories from saturated fat slightly exceeds both the SMI standard and the 2010 *Dietary Guidelines* recommendation (less than 10 percent of calories).

None of the differences between school types are statistically significant.

SMI = School Meals Initiative for Healthy Children.

c. Cholesterol, Sodium, and Dietary Fiber

Cholesterol. On average, NSLP lunches *offered* in SY 2009–2010 met the 2010 *Dietary Guidelines* recommendation for cholesterol (Table 5.3). The average cholesterol content of lunches *offered* in all three types of schools was well below the benchmark of 100 mg, with a range of 56 mg (for elementary school lunches) to 66 mg (for high school lunches). The average cholesterol content of lunches *offered* increased from elementary schools through high schools, and all the differences between school types were statistically significant.

Table 5.3. Average Cholesterol, Sodium, and Dietary Fiber Content of National School Lunch Program Lunches Offered

	Standard	Elementary Schools	Middle Schools	High Schools	All Schools
Cholesterol (mg)	<100 mg ^{a,b}	56 ^α	62 ^β	66 ^γ	59
Sodium (mg)	<767 mg ^{a,b}	1,395 ^α	1,545 ^β	1,651 ^γ	1,474
Dietary Fiber (g/1,000 calories)	14 g ^a	10	10	10	10
Number of Schools		318	287	279	884

Source: School Nutrition Dietary Assessment Study–IV, Menu Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

^aBased on the 2010 *Dietary Guidelines for Americans*.

^bBenchmark is one-third of the recommended daily limit.

^αDifference between elementary and middle schools is significantly different from zero at the .05 level.

^βDifference between middle and high schools is significantly different from zero at the .05 level.

^γDifference between elementary and high schools is significantly different from zero at the .05 level.

Sodium. Average NSLP lunches *offered* in SY 2009–2010 were not consistent with the 2010 *Dietary Guidelines* recommendation for sodium (Table 5.3). The average sodium content of lunches *offered* in all three types of schools exceeded the benchmark of 767 mg (equivalent to one-third of the recommended daily limit of 2,300 mg) by a substantial margin.¹³ The average sodium content of lunches *offered* in elementary schools was more than 80 percent above the benchmark, at 1,395 mg, and the average sodium content of lunches *offered* in middle and high schools (1,545 mg and 1,651 mg, respectively) was more than twice the benchmark. All the differences between school types were statistically significant. The higher average levels of sodium in lunches *offered* in middle and high schools is partially attributable to the fact that these lunches include larger portions of some foods than elementary school lunches.

Dietary fiber. Average NSLP lunches *offered* in SY 2009–2010 did not meet the *Dietary Guidelines* recommendation for dietary fiber (Table 5.3), which is 14 g per 1,000 calories. On average, the concentration of dietary fiber in NSLP lunches *offered* in all three types of schools was more than 25 percent below this benchmark, at 10 g per 1,000 calories. Dietary fiber naturally occurs in plant-based foods; some of the best sources are legumes, vegetables, fruits (but not fruit juices), and whole grains (USDA and HHS 2010). Vegetables and fruits were frequently offered in NSLP lunches (95 and 85 percent of daily lunch menus, respectively); however, legumes were offered infrequently (10 percent of all daily lunch menus) (see Chapter 4, Table 4.3). In addition, NSLP lunches were low in whole grains (see Chapter 8).

¹³ It is possible that the nutrient analysis, which did not include entry of all individual school recipes (see Volume II), somewhat overestimated sodium content. However, given the magnitude of the disparity between estimated and recommended levels of sodium in the average lunch *offered*, it is unlikely that this overestimation, if present, affected the overall finding that average NSLP lunches *offered* were high in sodium, relative to the 2010 *Dietary Guidelines* recommendation. The SNDA-II study included entry of all school recipes (because the nutrient analysis system used in that study allowed it), and the general conclusion about the high levels of sodium in average NSLP lunches was similar (Fox et al. 2001).

3. Percentage of Schools Meeting Standards

The preceding sections described the average calorie and nutrient content of NSLP lunches *offered* nationally. In this section, we assess how well individual schools did in meeting the SMI and 2010 *Dietary Guidelines* standards. For each nutrition standard, we estimated the percentage of schools that *offered* NSLP lunches that, on average, were consistent with the standard. Among schools that did not meet the standard, we looked at the distribution of the calorie/nutrient content of average lunches *offered* (Appendix Table E.4) to determine the proportion of schools that came close to meeting the standard (within 10 percent).

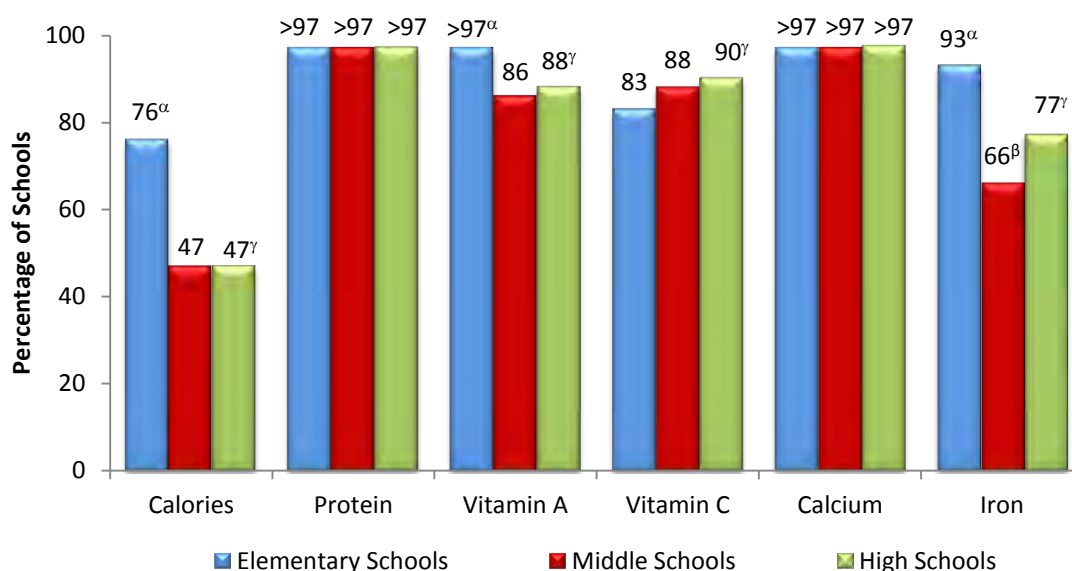
In interpreting findings for SMI standards for minimum calories and target nutrients, it is important to understand that these standards (for example, the minimum number of calories or minimum mg of iron) vary across schools—even within a particular school type or level (elementary, middle, and high)—based on the ages of the students enrolled. This is because children’s calorie and nutrient needs vary by age. SMI regulations and technical guidance provide separate standards for schools using different menu-planning systems and serving different age/grade groups (see Appendix A). Our analysis used a set of customized standards for each school, based on the age/grade span of the students served by the NSLP and SBP. The approach used in developing these customized standards is described in detail in Appendix D.

a. Calories and Target Nutrients

Calories. Just over three-quarters (76 percent) of elementary schools and fewer than half (47 percent) of middle and high schools *offered* lunches that, on average, met the SMI standard for calories (Figure 5.3). (The differences between elementary schools and both middle and high schools were statistically significant.) The SMI standards define minimum calorie levels for different types of schools based on the 1989 REA and the ages of students (see Appendix D). Thus, the average lunch *offered* in schools that did not meet the SMI standard was low in calories, relative to this standard. The SMI standards do not define maximum calorie levels.

Schools that did not meet the SMI standard for minimum calories varied in how close they came to meeting this target. Sixteen percent of elementary schools, 27 percent of middle schools, and 24 percent of high schools *offered* lunches with an average calorie content that was within 10 percent of the SMI standard (Figure 5.4).

Figure 5.3. Percentage of Schools *Offering* National School Lunch Program Lunches that, on Average, Satisfied SMI Standards for Minimum Levels of Calories and Target Nutrients



Note: The SMI standards are one-third of the 1989 *Recommended Energy/Dietary Allowances*.

^αDifference between elementary and middle schools is significantly different from zero at the .05 level.

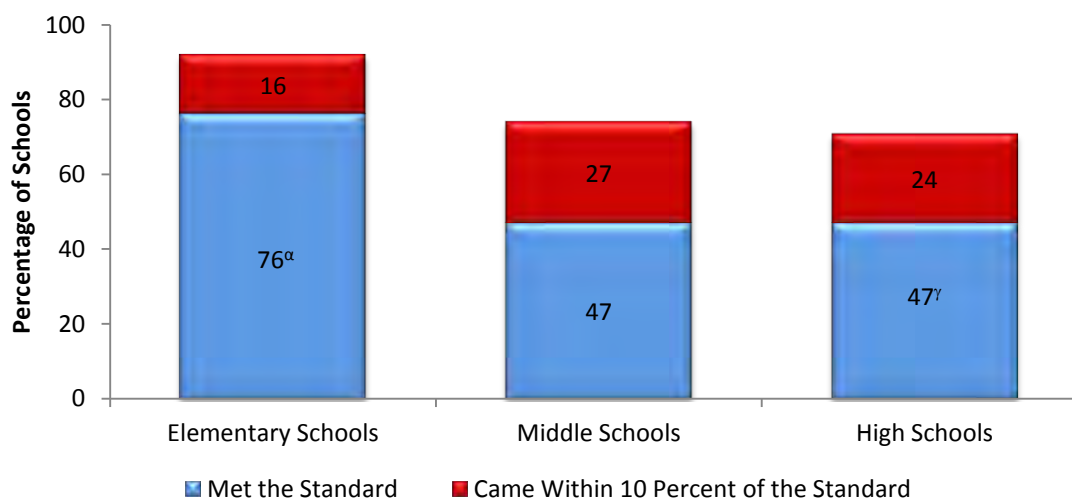
^βDifference between middle and high schools is significantly different from zero at the .05 level.

^γDifference between elementary and high schools is significantly different from zero at the .05 level.

>97 = Point estimate is between 97 and 100 but is considered less precise than other estimates because the sample size is small or the coefficient of variation is large. The rules used in flagging estimates are described in Chapter 1. When these rules are applied, percentages close to 0 or 100 are often flagged.

SMI = School Meals Initiative for Healthy Children.

Figure 5.4. Percentage of Schools *Offering* National School Lunch Program Lunches that, on Average, Satisfied or Came Within 10 Percent of the SMI Standard for Minimum Calories



Note: The SMI standard for calories is one-third of the 1989 *Recommended Energy Allowance*.

^αDifference between elementary and middle schools is significantly different from zero at the .05 level.

^γDifference between elementary and high schools is significantly different from zero at the .05 level.

SMI = School Meals Initiative for Healthy Children.

It is worth noting that the new requirements for NSLP meals, which will be implemented in SY 2012–2013, define both minimum and maximum calorie levels.¹⁴ Readers can gain some perspective on how NSLP lunches *offered* in SY 2009–2010 compared to these calorie ranges by examining the percentile distributions presented in Appendix Tables E.9 to E.11. For example, the new requirements specify a range of 750 to 850 calories, on average, for high school lunches. Appendix Table E.11 shows the distribution of calories in the average NSLP lunches *offered* in high schools in SY 2009–2010. These data indicate that the average calorie content of lunches *offered* in more than 25 percent of high schools fell below the minimum calorie level defined in the new requirements (the average calorie content at the 25th percentile of the distribution was 734), and that the average calorie content of lunches *offered* in somewhere between 25 and 50 percent of high schools exceeded the maximum calorie level. (The average calorie content at the 50th percentile was 820 [within the range], and the average calorie content at the 75th percentile was 932 [exceeded the range].)

Target nutrients. Virtually all schools *offered* NSLP lunches that met the SMI standards for protein and calcium, and more than 80 percent of all schools *offered* NSLP lunches that met the SMI standards for vitamins A and C (Figure 5.3). Elementary schools were significantly more likely than either middle or high schools to meet the SMI standard for vitamin A (about 97 versus 86 and 88 percent, respectively) and were significantly less likely than high schools to meet the SMI standard for vitamin C (83 versus 90 percent).

Almost all elementary schools (93 percent) *offered* NSLP lunches that met the SMI standard for iron. However, only 66 percent of middle schools and 77 percent of high schools met this standard (all the differences between types of schools were statistically significant). Most middle and high schools that did not meet the SMI standard for iron came close to meeting this target. Twenty-two percent of middle schools and 17 percent of high schools *offered* lunches with an average iron content that was within 10 percent of the SMI standard (Figure 5.5).

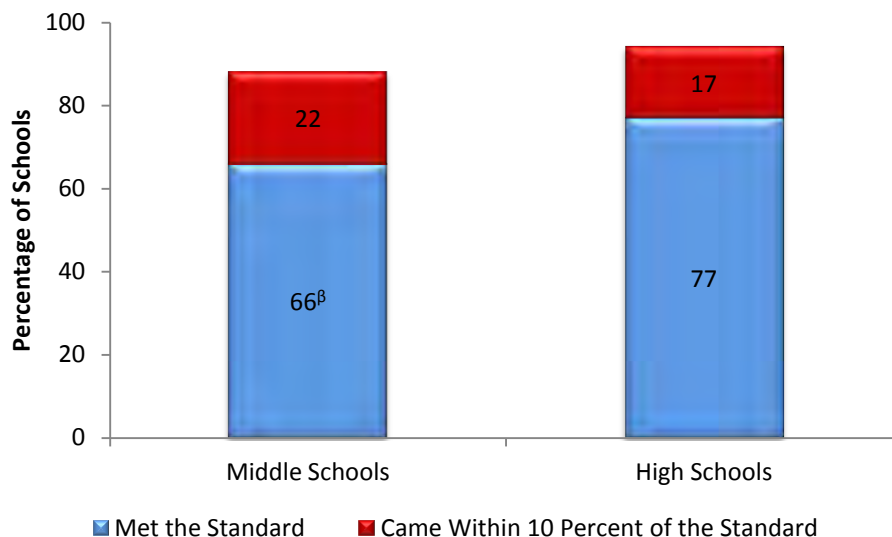
b. Percentage of Calories from Total Fat and Saturated Fat

Total fat. Roughly one-third (35 percent) of all schools *offered* average lunches that met the SMI standard for the percentage of calories from fat (no more than 30 percent) (Figure 5.6).¹⁵ There was quite a bit of variation in the percentage of calories from fat in average lunches *offered* in schools that did not meet the SMI standard for total fat. Roughly a quarter of schools *offered* NSLP lunches with average fat contents that came within 10 percent of the SMI standard (equivalent to 30.1 to 33.0 percent of calories from fat). However, 12 percent of schools *offered* NSLP lunches with a level of fat that was more than 25 percent above the SMI standard (equivalent to 37.6 percent or more of calories from fat) (Appendix Table E.4).

¹⁴ *Federal Register*, vol. 77, no. 17, January 26, 2012, Rules and Regulations.

¹⁵ Findings were consistent for the three types of schools (Appendix Tables E.3 and E.4).

Figure 5.5. Percentage of Middle and High Schools *Offering* National School Lunch Program Lunches that, on Average, Satisfied or Came Within 10 Percent of the SMI Standard for Iron

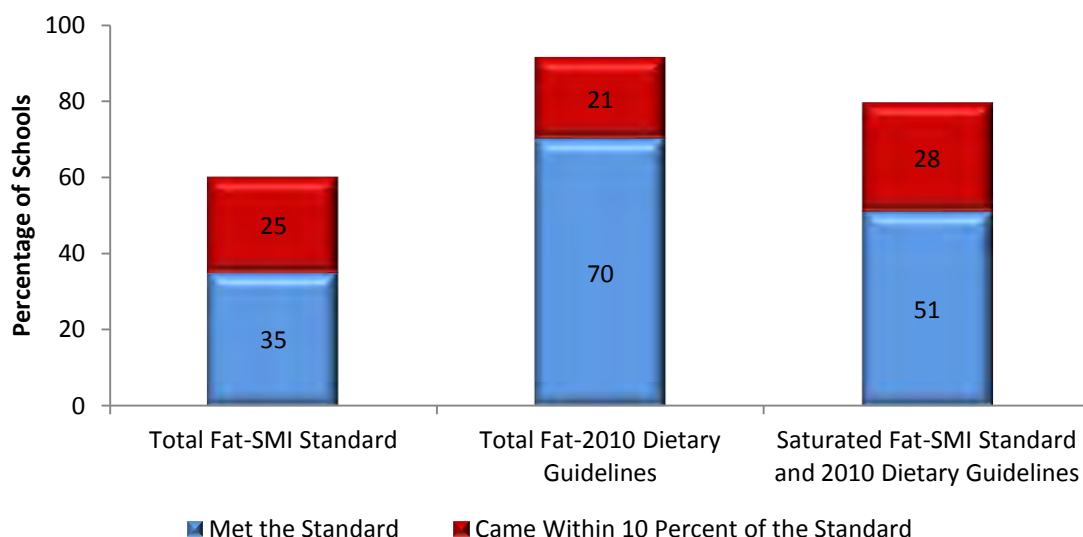


Note: The SMI standard for iron is one-third of the 1989 *Recommended Dietary Allowance*.

^bDifference between middle and high schools is significantly different from zero at the .05 level.

SMI = School Meal Initiative for Healthy Children.

Figure 5.6. Percentage of Schools *Offering* National School Lunch Program Lunches that, on Average, Satisfied or Came Within 10 Percent of the SMI and 2010 *Dietary Guidelines* Standards for Total Fat and Saturated Fat



Notes: The SMI standard for total fat is no more than 30 percent of calories.

The 2010 *Dietary Guidelines* recommendation for total fat for children 4 to 18 years of age is 25 to 35 percent of calories.

Both the SMI standard and the 2010 *Dietary Guidelines* recommendation for saturated fat are less than 10 percent of calories.

SMI = School Meals Initiative for Healthy Children.

Substantially more schools met the 2010 *Dietary Guidelines* recommendation for the percentage of calories from fat (25 to 35 percent) than met the SMI standard (Figure 5.6). Seventy percent of all schools *offered* NSLP lunches that were consistent with the 2010 *Dietary Guidelines* standard (double the proportion that met the SMI standard). An additional 21 percent of all schools *offered* NSLP lunches with an average fat content that came within 10 percent of the 2010 *Dietary Guidelines* recommendation. Most schools that did not meet the 2010 *Dietary Guidelines* recommendation exceeded the upper end of the range. Overall, 16 percent of schools *offered* NSLP lunches that came within 10 percent of this target (equivalent to 35.1 to 38.5 percent of calories from fat) (Appendix Table E.4). A small percentage of schools (5 percent overall) *offered* NSLP lunches that fell below the lower end of the range, providing, on average, fewer than 25 percent of calories from fat (Appendix Table E.4).

Saturated fat. About half (51 percent) of all schools *offered* lunches that, on average, met the SMI standard for saturated fat (which is the same as the 2010 *Dietary Guidelines* recommendation) (Figure 5.6). While there was some variation in the average saturated fat content of lunches *offered* in schools that did not meet the SMI standard, most of these schools came close to meeting the target (Appendix Table E.4). Overall, 28 percent of schools *offered* NSLP lunches with an average saturated fat content that was within 10 percent of the SMI standard (equivalent to 10.0 to 10.9 percent of calories from saturated fat).

c. Cholesterol, Sodium, and Dietary Fiber

Essentially all schools *offered* NSLP lunches that, on average, met the 2010 *Dietary Guidelines* recommendation for cholesterol (Appendix Table E.3). In contrast, no schools met the recommendation for sodium, and very few (4 percent overall) met the recommendation for dietary fiber (Appendix Table E.3). Not surprisingly, considering the average sodium content of NSLP lunches *offered* (Table 5.3), schools did not come close to meeting the sodium recommendation. The average sodium content of lunches *offered* in 81 percent of elementary schools and most middle and high schools (94 to 96 percent) exceeded the 2010 *Dietary Guidelines* recommendation by more than 50 percent (Appendix Table E.4). Excess sodium is not unique to school lunches; virtually all Americans consume more sodium than they need. Most sodium comes from processed foods and achieving recommended levels of sodium will require a deliberate reduction in the sodium content of foods available in the marketplace (IOM 2010).

There was more variability in how close schools came to meeting the 2010 *Dietary Guidelines* recommendation for dietary fiber. Overall, 8 percent of schools *offered* NSLP lunches with an average dietary fiber content within 10 percent of the benchmark of 14 g per 1,000 calories (equivalent to 12.6 to 13.9 g per 1,000 calories) (Appendix Table E.4). However, the average dietary fiber content of lunches *offered* in most schools (62 percent) was more than 25 percent below the recommended level (equivalent to 10.4 g or less per 1,000 calories) (Appendix Table E.4).

d. Combinations of Standards

To obtain a more complete picture of the nutritional quality of school meals, we looked at the percentage of schools that *offered* NSLP lunches that met all of the SMI nutrition standards. We also looked at the extent to which schools *offered* lunches that met a number of different combinations of SMI standards and 2010 *Dietary Guidelines* recommendations. Results are summarized in Table 5.4. Readers may find it useful to refer to Table 5.1 for information about the specific requirements included in each combination.

Table 5.4. Percentage of Schools *Offering* National School Lunch Program Lunches that, on Average, Met Different Combinations of Nutrition Standards

Combinations of Standards	Elementary Schools	Middle Schools	High Schools	All Schools
All SMI Standards	16.5	11.8	10.0 ^γ	14.3
SMI Standards for all Target Nutrients ^a	76.1 ^α	52.6 ^β	67.1 ^γ	70.1
SMI Standards for all Target Nutrients ^a and SMI Standard for Saturated Fat	38.8	31.8 ^β	41.5	38.1
SMI Standards for all Target Nutrients ^a and SMI Standard for Saturated Fat and 2010 <i>Dietary Guidelines</i> Standard for Total Fat	31.4	27.7	34.5	31.4
Updated Standards for all SMI Target Nutrients ^b and SMI Standard for Saturated Fat and 2010 <i>Dietary</i> <i>Guidelines</i> Standard for Total Fat	32.9	37.4 ^β	21.8 ^γ	31.4
Number of Schools	318	287	279	884

Source: School Nutrition Dietary Assessment Study–IV, Menu Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

^aIncludes protein, vitamin A, vitamin C, calcium and iron.

^bUpdated to reflect RDA values included in the *Dietary Reference Intakes*.

^αDifference between elementary and middle schools is significantly different from zero at the .05 level.

^βDifference between middle and high schools is significantly different from zero at the .05 level.

^γDifference between elementary and high schools is significantly different from zero at the .05 level.

RDA = *Recommended Dietary Allowances*; SMI = School Meals Initiative for Healthy Children.

Overall, 14 percent of schools *offered* NSLP lunches that met all of the SMI standards (Table 5.4). Elementary schools were significantly more likely than high schools to *offer* average NSLP lunches that met all of the SMI standards (17 versus 10 percent). As discussed above and shown in Figures 5.3 and 5.4, the SMI standards that were most challenging for schools to meet were the SMI standards for calories (defined as a minimum), total fat, and saturated fat. Indeed, as shown in the second row of Table 5.4, 70 percent of all schools *offered* NSLP lunches that met all of the other SMI standards (that is, all of the standards for target nutrients [protein, vitamin A, vitamin C, calcium, and iron] based on the 1989 RDAs). Elementary schools were significantly more likely than middle or high schools to *offer* such lunches (76 versus 53 and 67 percent, respectively), and middle schools were significantly less likely to *offer* such lunches than high schools. As discussed previously and shown in Figures 5.3 and 5.5, the target nutrient standard that middle and high schools were least likely to meet was the standard for iron.

When the SMI standard for saturated fat (which is the same as the 2010 *Dietary Guidelines* recommendation) is added to the SMI standards for target nutrients, the percentage of schools meeting all of the standards falls from 70 percent to 38 percent (third row in Table 5.4). Thus, 32 percent of schools met all of the SMI standards for target nutrients, but not the SMI standard for saturated fat. Results were only slightly different when the combination was expanded to include the 2010 *Dietary Guidelines* recommendation for total fat (fourth row in Table 5.4). Less than one-third (31 percent) of all schools *offered* NSLP lunches that met all of these standards.

Overall, there was no change in the proportion of schools meeting all the standards when the above combination (SMI standards for all target nutrients, plus the SMI standard for saturated fat, plus the 2010 *Dietary Guidelines* recommendation for total fat) was updated to reflect current RDAs (that is, those specified in the DRIs) for the SMI target nutrients (Table 5.4). However, the effect of the updated RDAs varied for different types of schools. While there was little change in the proportion of elementary schools that met all of the standards, the proportion of middle schools that met all of the standards increased (from 28 to 37 percent) and the proportion of high schools that met all the standards decreased (from 35 to 22 percent). Moreover, when updated RDA standards were used for the SMI target nutrients, elementary and middle schools were significantly more likely to meet all of the standards than high schools (33 and 37 percent, respectively, versus 22 percent). The increase in the proportion of middle schools meeting all the standards is consistent with the fact that the current RDA for iron is lower than the 1989 RDA for the age groups of children typically attending middle schools. Similarly, the decrease in the proportion of high schools is consistent with the fact that the current RDAs for vitamin C and calcium are higher than the 1989 RDAs for the age groups of children typically attending high schools.

D. Calorie and Nutrient Content of NSLP Lunches *Served*

Estimates of the calorie and nutrient content of the average NSLP lunch *served* incorporate information about students' food selection patterns—that is, information about the number and types of foods included in the meals that are actually *served* to students. Rather than the simple average used in estimating the calorie and nutrient content of meals *offered*, estimates of meals *served* give greater weight to foods that students select more frequently. Examination of meals *served* was introduced as part of SMI to provide a more accurate assessment of the potential contribution of school meals to children's dietary intakes.^{16,17} The nutrition standards used to assess NSLP lunches *served* are the same as those used to assess lunches *offered* (see Table 5.1).

1. Average Calorie and Nutrient Content

On average, NSLP lunches *served* to students during a typical school week in SY 2009–2010 provided 679 calories, with 32.1 percent of calories from fat and 10 percent from saturated fat (Table 5.5).^{18,19} Average amounts of calories and nutrients in NSLP lunches *served* were uniformly lower than the averages reported for lunches *offered* (Table 5.2). These differences are influenced largely by the fact that students do not necessarily take all the foods offered to them. Under the OVS policy, which is mandatory for high schools and was used in 82 percent of middle schools and 78 percent of elementary schools in SY 2009–2010 (see Chapter 2, Table 2.18), students in schools that use food-based menu planning may refuse up to two of the five meal components offered to

¹⁶ The terms unweighted analysis and weighted analysis are often used to refer to estimates of the calorie and nutrient content of meals *offered* and meals *served*, respectively.

¹⁷ Chapter 11 summarizes trends in the calorie and nutrient content of average NSLP lunches *served* since the SMI was implemented.

¹⁸ Four schools did not provide the detailed information on students' food selections needed to estimate the calorie and nutrient content of NSLP lunches *served*. Thus, the maximum sample for this analysis is 880 schools.

them. Students in schools that use nutrient-based menu planning must take at least two menu items and can never refuse more than two menu items (USDA, FNS 2004).

Table 5.5. Average Calorie and Nutrient Content of National School Lunch Program Lunches Served

	Elementary Schools	Middle Schools	High Schools	All Schools
Average Amount				
Calories	661	683	730	679
Nutrients Included in SMI Standards				
Protein (g)	28	29	30	29
Vitamin A (mcg RE)	351	309	336	340
Vitamin C (mg)	23	23	25	23
Calcium (mg)	481	470	489	481
Iron (mg)	4.2	4.4	4.7	4.3
Other Dietary Components				
Cholesterol (mg)	54	54	58	55
Sodium (mg)	1,324	1,392	1,515	1,375
Dietary fiber (g/1,000 calories)	9	9	9	9
Average Percentage of Calories from:				
Total Fat	31.5	32.4	33.5	32.1
Saturated Fat	10.1	10.2	10.3	10.1
Number of Schools	317	285	278	880

Source: School Nutrition Dietary Assessment Study–IV, Menu Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

RE = Retinol equivalents; SMI = School Meals Initiative for Healthy Children.

2. Average Calorie and Nutrient Content Relative to Nutrition Standards

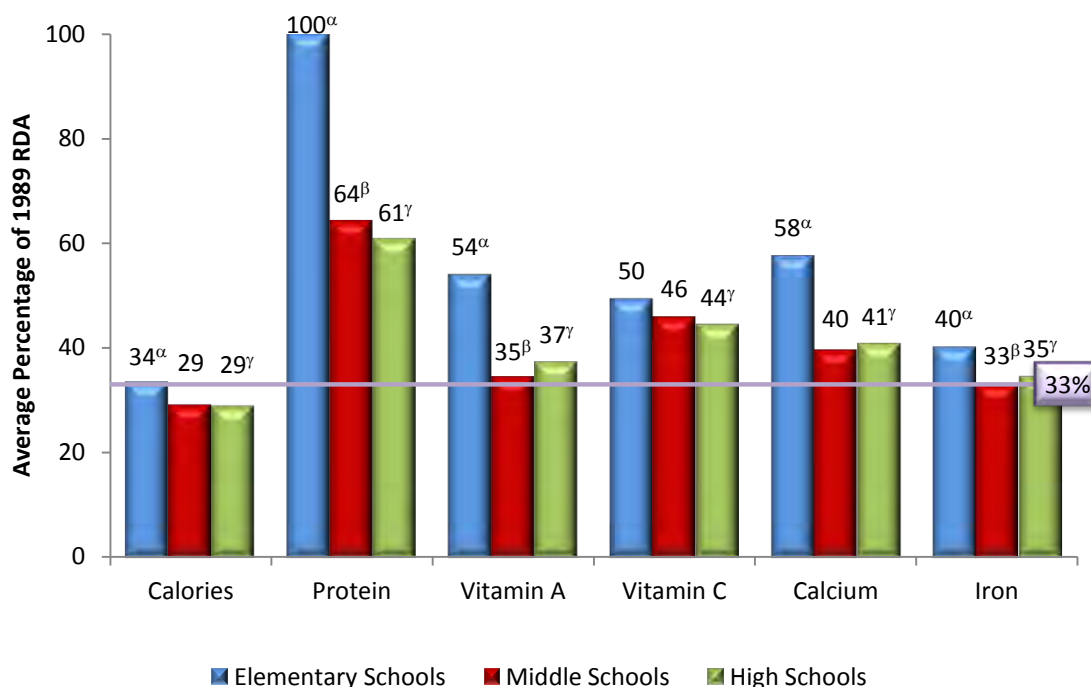
a. Calories and Target Nutrients

On average, NSLP lunches *served* in all three types of schools in SY 2009–2010, like NSLP lunches *offered*, met or exceeded the SMI standards (at least one-third of the 1989 RDA) for protein, vitamin A, vitamin C, calcium, and iron (Figure 5.7). On average, NSLP lunches *served* in elementary schools also met the SMI standard for minimum calories, as did the average NSLP lunch *offered* in these schools. However, the average calorie content of lunches *served* in middle and high schools fell short of the SMI standard for minimum calories, providing 29 percent of students' daily calorie needs (as defined in the 1989 RDAs). (In contrast, the average lunches *offered* in middle and high schools satisfied the SMI standard for minimum calories.)

(continued)

¹⁹ More detailed data on the calorie and nutrient content of NSLP lunches *served*, including standard errors, percentile distributions, and concentrations of nutrients per 1,000 calories, are provided in Appendix Tables E.13 to E.16 and E.21 to E.24.

Figure 5.7. Average Percentage of 1989 Recommended Energy/Dietary Allowances in National School Lunch Program Lunches Served



Note: The SMI standards are one-third of the 1989 *Recommended Energy/Dietary Allowances*.

^αDifference between elementary and middle schools is significantly different from zero at the .05 level.

^βDifference between middle and high schools is significantly different from zero at the .05 level.

^γDifference between elementary and high schools is significantly different from zero at the .05 level.

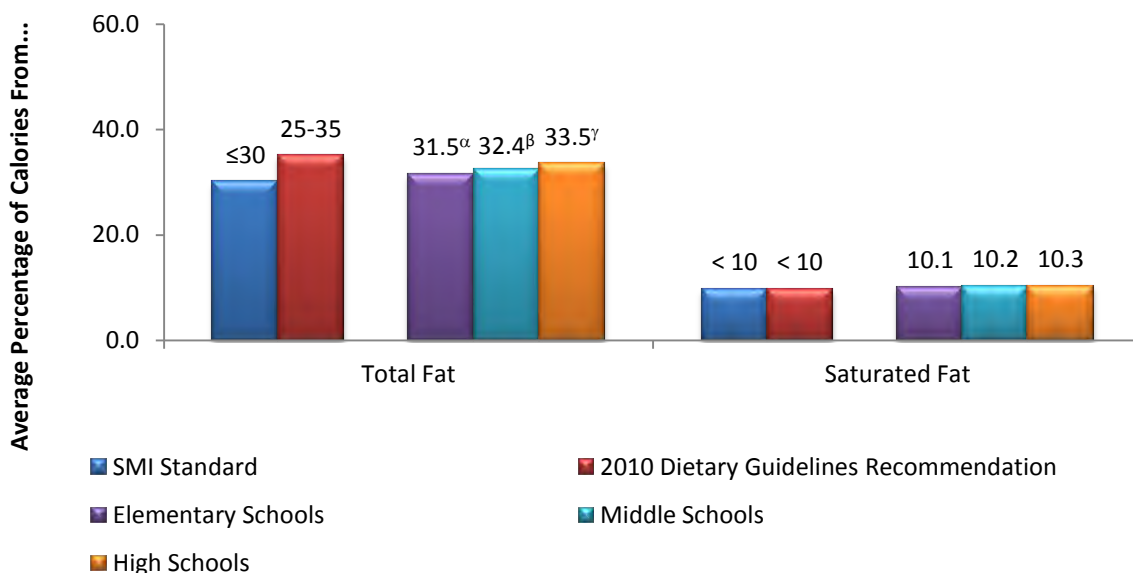
SMI = School Meals Initiative for Healthy Children.

On average, NSLP lunches *served* in elementary schools provided a significantly larger share of students' daily calorie and nutrient needs (as defined in the 1989 RDAs) than lunches *served* in middle or high schools. With the exception of vitamin C for middle schools, all the differences in average nutrient content of lunches *served* in elementary schools and those *served* in middle and high schools were statistically significant. In addition, NSLP lunches *served* in middle schools provided a significantly larger share of the 1989 RDA for protein, relative to high schools, and a significantly smaller share of the 1989 RDAs for vitamin A and iron. As noted previously, these differences are attributable at least partially to differences in the nutrient requirements of older and younger students. For lunches *served*, differences between elementary schools and middle and high schools may also have been influenced by older students having greater freedom to refuse components of the NSLP lunch and greater access to competitive foods.

b. Percentage of Calories from Total Fat and Saturated Fat

On average, NSLP lunches *served* in SY 2009–2010 came close to, but did not meet, the SMI standard for total fat (Figure 5.8). The average percentage of calories from fat in NSLP lunches *served* ranged from 32 percent to 34 percent across school types. These levels exceeded the SMI standard for total fat (no more than 30 percent of calories), but were consistent with the 2010 *Dietary Guidelines* recommendation for total fat (25 to 35 percent of calories).

Figure 5.8. Average Percentage of Calories from Total Fat and Saturated Fat in National School Lunch Program Lunches Served



Notes: The average percentage of calories from total fat exceeds the SMI standard (no more than 30 percent of calories), but is consistent with the 2010 *Dietary Guidelines* recommendation for children 4 to 18 years of age (25 to 35 percent of calories).

The average percentage of calories from saturated fat slightly exceeds both the SMI standard and the 2010 *Dietary Guidelines* recommendation (less than 10 percent of calories).

^aDifference between elementary and middle schools is significantly different from zero at the .05 level.

^bDifference between middle and high schools is significantly different from zero at the .05 level.

^cDifference between elementary and high schools is significantly different from zero at the .05 level.

SMI = School Meals Initiative for Healthy Children.

The average percentages of calories from fat in NSLP lunches *served* were generally consistent with those observed in lunches *offered*. However, while there were no statistically significant differences between types of schools in the relative fat content of lunches *offered*, all the between-school comparisons for lunches *served* were significant. Specifically, the average NSLP lunch *served* in elementary schools provided significantly fewer calories from fat than the average lunch *served* in middle or high schools (31.5 versus 32.4 and 33.5 percent, respectively), and the average lunch *served* in middle schools provided significantly fewer calories from fat than the average lunch *served* in high schools. The average saturated fat content of NSLP lunches *served* in all types of schools was just above the SMI standard (and 2010 *Dietary Guidelines* recommendation) of less than 10 percent of calories.

c. Cholesterol, Sodium, and Dietary Fiber

Cholesterol. Like NSLP lunches *offered*, NSLP lunches *served* in SY 2009–2010 met the 2010 *Dietary Guidelines* recommendation for cholesterol (Table 5.6). Average cholesterol content in all three types of schools was well below the benchmark of 100 mg and ranged from 54 mg to 58 mg. The average cholesterol content of lunches *served* was slightly lower in elementary schools and middle schools than in high schools (54 mg versus 58 mg), and these differences were statistically significant.

Table 5.6. Average Cholesterol, Sodium, and Dietary Fiber Content of National School Lunch Program Lunches Served

	Standard	Elementary Schools	Middle Schools	High Schools	All Schools
Cholesterol (mg)	<100 mg ^{a,b}	54	54 ^β	58 ^γ	55
Sodium (mg)	<767 mg ^{a,b}	1,324 ^α	1,392 ^β	1,515 ^γ	1,375
Dietary Fiber (g/1,000 calories)	14 g ^a	9 ^α	9	9 ^γ	9
Number of Schools		317	285	278	880

Source: School Nutrition Dietary Assessment Study–IV, Menu Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

^aBased on the 2010 *Dietary Guidelines for Americans*.

^bBenchmark is one-third of the recommended daily limit.

^αDifference between elementary and middle schools is significantly different from zero at the .05 level.

^βDifference between middle and high schools is significantly different from zero at the .05 level.

^γDifference between elementary and high schools is significantly different from zero at the .05 level.

Sodium. In keeping with the findings reported for NSLP lunches *offered*, NSLP lunches *served* in SY 2009–2010 did not meet the 2010 *Dietary Guidelines* recommendation for sodium (Table 5.6). Although the average sodium content of lunches *served* in all three types of schools was consistently lower than the sodium content of lunches *offered*, NSLP lunches *served* exceeded the benchmark of 767 mg by a substantial margin. The average sodium content of elementary and middle school lunches was more than 70 percent above the benchmark, at 1,324 mg and 1,392 mg, respectively, and the average sodium content of high school lunches (1,515 mg) was almost twice the benchmark. All the differences between school types were statistically significant.²⁰

Dietary fiber. NSLP lunches *served* in SY 2009–2010 did not meet the *Dietary Guidelines* recommendation for dietary fiber (Table 5.6). On average, NSLP lunches *served* in all types of schools provided 9 g of dietary fiber per 1,000 calories, compared to the *Dietary Guidelines* recommendation of 14 g per 1,000 calories. Modest differences in the average concentration of dietary fiber in NSLP lunches *served* in different types of schools (average dietary fiber content per 1,000 calories rounded to 9 g for all three types of schools) were statistically significant

3. Percentage of Schools Meeting Standards

The preceding sections described the average calorie and nutrient content of NSLP lunches *served* nationally. In this section, we assess how well individual schools did in meeting the SMI and 2010 *Dietary Guidelines* standards. For each nutrition standard, we estimated the percentage of schools that *served* NSLP lunches that, on average, were consistent with the standard. Among schools that did not meet the standard, we looked at the distribution of the calorie/nutrient content

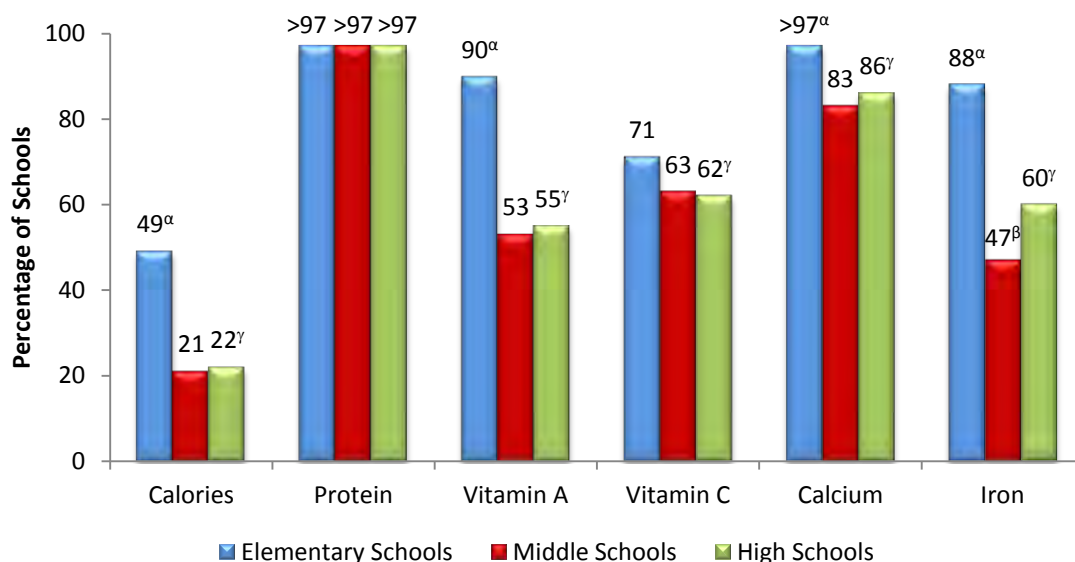
²⁰ As noted in the preceding analysis of lunches *offered*, sodium content may be somewhat overestimated because the nutrient analysis protocol did not include entry of individual recipes for all schools. However, it is unlikely that this overestimation, if present, affected the overall finding that average NSLP lunches *served* were high in sodium relative to the 2010 *Dietary Guidelines* recommendation. See footnote 13.

of average lunches *served* (Appendix Table E.8), to determine the proportion of schools that came close (within 10 percent) to meeting the standard.

a. Calories and Target Nutrients

Calories. As noted in the discussion of average lunches *offered*, the SMI standard for calories was the most challenging for all three types of schools. Just under half (49 percent) of elementary schools *served* lunches that met the SMI standard for calories, on average, and less than a quarter of middle schools and high schools (21 and 22 percent, respectively) *served* lunches that met this standard (Figure 5.9). (Differences between elementary schools and middle and high schools were statistically significant.) The SMI standard for calories is a minimum. Thus, lunches *served* in schools that did not meet this standard were low in calories, on average, relative to the standard.

Figure 5.9. Percentage of Schools *Serving* National School Lunch Program Lunches that, on Average, Satisfied SMI Standards for Minimum Levels of Calories and Target Nutrients



Note: The SMI standards are one-third of the 1989 *Recommended Energy/Dietary Allowances*.

^αDifference between elementary and middle schools is significantly different from zero at the .05 level.

^βDifference between middle and high schools is significantly different from zero at the .05 level.

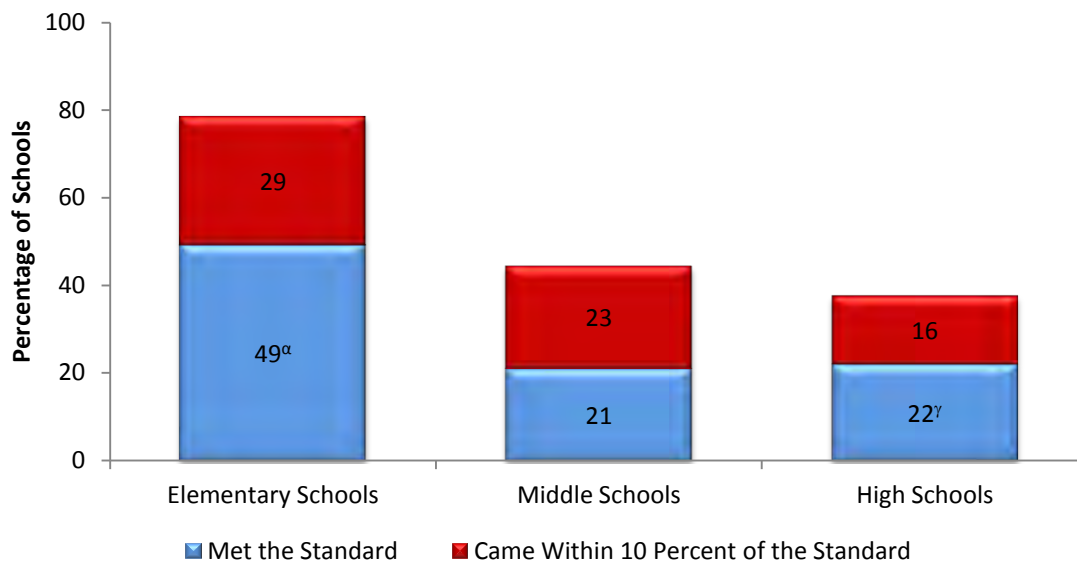
^γDifference between elementary and high schools is significantly different from zero at the .05 level.

>97 = Point estimate is between 97 and 100 but is considered less precise than other estimates because the sample size is small or the coefficient of variation is large. The rules used in flagging estimates are described in Chapter 1. When these rules are applied, percentages close to 0 or 100 are often flagged.

SMI = School Meals Initiative for Healthy Children.

Schools that did not meet the SMI standard for minimum calories varied in how close they came to meeting this target. Twenty-nine percent of elementary schools, 23 percent of middle schools, and 16 percent of high schools *served* lunches with an average calorie content within 10 percent of the SMI standard for minimum calories (Figure 5.10). However, the average calorie content of NSLP lunches *served* in 4 percent of elementary schools, 16 percent of middle schools, and 20 percent of high schools was 25 percent or more below the SMI standard (Appendix Table E.8).

Figure 5.10. Percentage of Schools *Serving* National School Lunch Program Lunches that, on Average, Satisfied or Came Within 10 Percent of the SMI Standard for Minimum Calories



Note: The SMI standard for calories is one-third of the 1989 *Recommended Energy Allowance*.

^aDifference between elementary and middle schools is significantly different from zero at the .05 level.

^bDifference between middle and high schools is significantly different from zero at the .05 level.

SMI = School Meals Initiative for Healthy Children.

The SMI standards define a minimum of 825 calories for grades 7 through 12.²¹ The average calorie content of NSLP lunches *served* in middle and high schools was 683 and 730, respectively (Table 5.5). *Offering* and *serving* average NSLP lunches that are low in calories, relative to the SMI standard, is not necessarily a negative outcome. Children obtain calories from other meals and snacks consumed both within and outside of school.

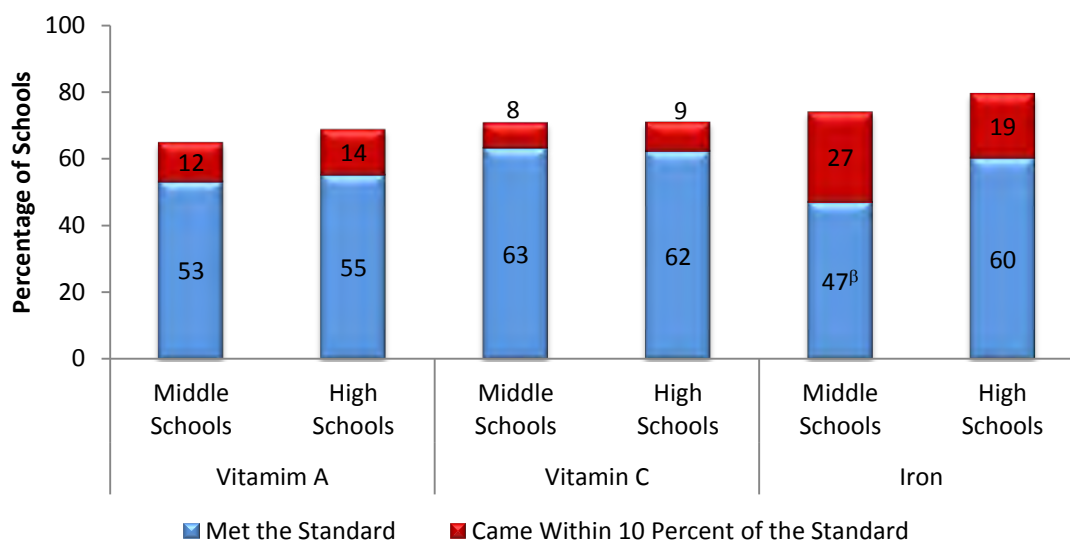
Target nutrients. Relative to the proportions of schools that met SMI standards for target nutrients in lunches *offered* (66 percent of schools to virtually all schools; Figure 5.3), fewer schools *served* lunches that met these standards, on average. This was especially true for middle and high schools. Except for protein and vitamin C, elementary schools were significantly more likely to meet SMI standards than either middle or high schools (Figure 5.9). Elementary schools were significantly more likely than high schools (but not middle schools) to meet the SMI standard for vitamin C (71 versus 62 percent). In addition, middle schools were significantly less likely than high schools to meet the SMI standard for iron (47 versus 60 percent).

There was substantial variation across middle schools and high schools in how close schools that did not *serve* lunches that met the SMI standards came to meeting these targets. Twenty-seven percent of middle schools and 19 percent of high schools *served* lunches that came within 10 percent of the SMI standard for iron, on average (Figure 5.11). However, substantially fewer schools came within 10 percent of the SMI standards for vitamins A and C (8 to 14 percent). NSLP lunches *served*

²¹ The standard used for individual schools in our analysis may have been somewhat higher or lower, depending on the age of the students enrolled in the school (see Appendix D).

in 16 percent of middle schools and 14 percent of high schools had an average vitamin A content that was 25 percent or more below the SMI standard. For vitamin C, the average lunch *served* in 17 percent of middle schools and 19 percent of high schools was 25 percent or more below the SMI standard.

Figure 5.11. Percentage of Middle and High Schools *Serving* National School Lunch Program Lunches that, on Average, Satisfied or Came Within 10 Percent of the SMI Standards for Vitamins A and C and Iron



Note: The SMI standards are one-third of the 1989 *Recommended Dietary Allowances*.

^BDifference between middle and high schools is significantly different from zero at the .05 level.

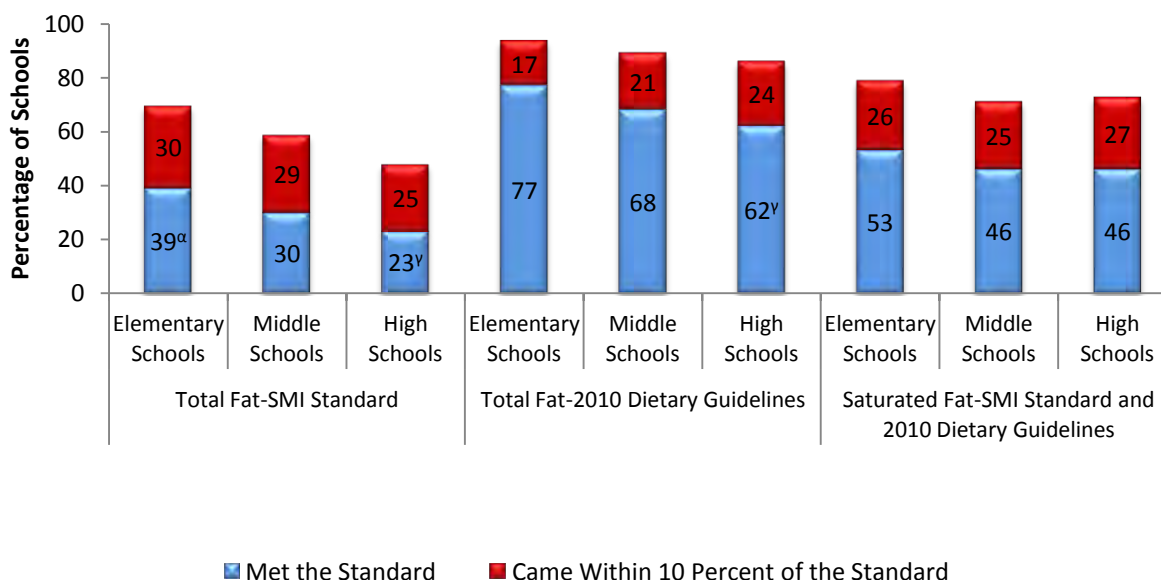
SMI = School Meals Initiative for Healthy Children.

b. Percentage of Calories from Total Fat and Saturated Fat

Total fat. The average lunch *served* in about 4 in 10 elementary schools (39 percent) met the SMI standard for the percentage of calories from total fat (no more than 30 percent) (Figure 5.12). The proportions of middle and high schools that *served* average lunches that met the SMI standard for fat were significantly lower (30 and 23 percent, respectively). Compared to lunches *offered*, the proportion of schools meeting the SMI standard for total fat was higher for elementary schools (39 versus 35 percent) and lower for middle and high schools (30 versus 36 percent and 23 versus 33 percent, respectively) (Appendix Table E.4).

There was considerable variation across school types in the average percentage of calories from fat in lunches *served* in schools that did not meet the SMI standard for fat. Twenty-five to 30 percent of schools *served* NSLP lunches that came within 10 percent of the SMI standard (equivalent to 30.1 to 33.0 percent of calories from fat) (Figure 5.12). However, 10 percent of elementary schools, 13 percent of middle schools, and 19 percent of high schools *served* NSLP lunches with an average level of fat that was more than 25 percent above the SMI standard (equivalent to 37.6 percent or more of calories from fat) (Appendix Table E.8).

Figure 5.12. Percentage of Schools *Serving* National School Lunch Program Lunches that, on Average, Satisfied or Came Within 10 Percent of the SMI and 2010 *Dietary Guidelines* Standards for Total Fat and Saturated Fat



Notes: The SMI standard for total fat is no more than 30 percent of calories.

The 2010 *Dietary Guidelines* recommendation for total fat for children 4 to 18 years of age is 25–35 percent of calories.

Both the SMI standard and the 2010 *Dietary Guidelines* recommendation for saturated fat are less than 10 percent of calories.

^aDifference between elementary and middle schools is significantly different from zero at the .05 level.

^yDifference between elementary and high schools is significantly different from zero at the .05 level.

SMI = School Meals Initiative for Healthy Children.

The proportions of schools that met the less restrictive 2010 *Dietary Guidelines* recommendation for calories from fat (25 to 35 percent of calories) were substantially higher than the proportions that met the SMI standard. More than three-quarters (77 percent) of elementary schools, 68 percent of middle schools, and 62 percent of high schools served NSLP lunches that were consistent with the 2010 *Dietary Guidelines* (Figure 5.12). The difference between elementary and high schools was statistically significant. For elementary and middle schools, the proportions that met the 2010 *Dietary Guidelines* recommendation for fat were roughly double the proportions that met the SMI standard. For high schools, the proportion that met the 2010 *Dietary Guidelines* recommendation was almost three times higher than the proportion that met the SMI standard.

Most schools that did not serve average lunches that were consistent with the 2010 *Dietary Guidelines* recommendation for the percentage of calories from fat came close to meeting this benchmark. Overall, 17 percent of elementary schools, 21 percent of middle schools, and 24 percent of high schools served NSLP lunches that came within 10 percent of this target (Figure 5.12). Most of these schools exceeded the upper end of the range (Appendix Table E.8). Lunches that were within 10 percent of the upper end of the recommended range provided 35.1 to 38.5 percent of calories from fat, on average. A small percentage of schools (5 percent overall) served NSLP lunches that fell below the lower end of the recommended range, providing, on average, fewer than 25 percent of calories from fat (Appendix Table E.8).

Saturated fat. More than half (53 percent) of elementary schools and just under half (46 percent) of middle and high schools *served* NSLP lunches with average levels of saturated fat that were consistent with the SMI (and 2010 *Dietary Guidelines*) standard (Figure 5.12). About a quarter (25 to 27 percent) of schools *served* lunches that came within 10 percent of this benchmark (equivalent to 10.0 to 10.9 percent of calories from saturated fat).

c. Cholesterol, Sodium, and Dietary Fiber

Essentially all schools *served* NSLP lunches that met the 2010 *Dietary Guidelines* recommendation for cholesterol, but very few *served* lunches that met the recommendations for sodium and dietary fiber (Appendix Table E.7). Moreover, few schools *served* lunches that came within 10 percent of the recommendations for sodium or dietary fiber. Overall, the average sodium content of NSLP lunches *served* in 78 percent of schools exceeded the 2010 *Dietary Guidelines* recommendation by more than 50 percent (Appendix Table E.8). Similarly, the average dietary fiber content of lunches *served* in 80 percent of schools was more than 25 percent below the recommended level (equivalent to 10.4 g per 1,000 calories or less) (Appendix Table E.8).

d. Combinations of Standards

Table 5.7 presents data on the proportions of schools that met different combinations of the nutrition standards used to evaluate NSLP lunches. Key findings are summarized below. Readers may want to refer to Table 5.1 and the preceding discussion of results for NSLP lunches *offered* for background on the combinations examined.

- Overall, 7 percent of schools *served* average NSLP lunches that met all of the SMI standards. This is half of the proportion that met all of the SMI standards for lunches *offered*. Elementary schools were significantly more likely than either middle or high schools to *serve* lunches that met all of the SMI standards (9 versus 4 and 3 percent, respectively).
- Fewer than half (45 percent) of all schools *served* NSLP lunches that met all the SMI standards for target nutrients (compared to 70 percent of all schools for average NSLP lunches *offered*). Elementary schools were significantly more likely to *serve* such lunches than middle or high schools (59 versus 18 and 29 percent, respectively), and middle schools were significantly less likely to *offer* such lunches than high schools.
- When the SMI standard for saturated fat (which is the same as the 2010 *Dietary Guidelines* recommendation) is added to the SMI standards for target nutrients, the percentage of schools meeting all of the standards falls from 45 percent to 23 percent. This indicates that 22 percent of schools *served* NSLP lunches that met all of the SMI standards for target nutrients, but not the SMI standard for saturated fat. Elementary schools were significantly more likely to *serve* NSLP lunches that met the SMI standards for all target nutrients and the SMI standard for saturated fat than either middle or high schools (30 versus 10 and 14 percent, respectively).

Table 5.7. Percentage of Schools *Serving* National School Lunch Program Lunches that, on Average, Met Different Combinations of Nutrition Standards

Combinations of Standards	Elementary Schools	Middle Schools	High Schools	All Schools
All SMI Standards	8.7 ^α	3.6	2.6 ^γ	6.5
SMI Standards for all Target Nutrients ^a	58.5 ^α	17.6 ^β	29.3 ^γ	45.2
SMI Standards for all Target Nutrients ^a and SMI Standard for Saturated Fat	29.9 ^α	9.6	14.4 ^γ	23.1
SMI Standards for all Target Nutrients ^a and SMI Standard for Saturated Fat and 2010 <i>Dietary Guidelines</i> Standard for Total Fat	24.3 ^α	7.4	9.6 ^γ	18.3
Updated Standards for all Target Nutrients ^b and SMI Standard for Saturated Fat and 2010 <i>Dietary</i> <i>Guidelines</i> Standard for Total Fat	23.2 ^α	12.3 ^β	3.9 ^γ	17.3
Number of Schools	317	285	278	880

Source: School Nutrition Dietary Assessment Study–IV, Menu Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research, Inc. are weighted to be representative of all public schools offering the National School Lunch Program.

^aIncludes protein, vitamin A, vitamin C, calcium and iron.

^bUpdated to reflect RDA values included in the *Dietary Reference Intakes*.

^αDifference between elementary and middle schools is significantly different from zero at the .05 level.

^βDifference between middle and high schools is significantly different from zero at the .05 level.

^γDifference between elementary and high schools is significantly different from zero at the .05 level.

RDA = *Recommended Dietary Allowances*; SMI = School Meals Initiative for Healthy Children.

- Results were only slightly different when the combination was expanded to include the 2010 *Dietary Guidelines* recommendation for total fat—overall 18 percent of all schools *served* NSLP lunches that met all of these standards. Again, elementary schools were significantly more likely than either middle or high schools to *serve* NSLP lunches that met this combination of standards (24 versus 7 and 10 percent, respectively).
- Overall, there was little change in the proportion of schools meeting all of the standards when the above combination (SMI standards for all target nutrients, plus the SMI standard for saturated fat, plus the 2010 *Dietary Guidelines* recommendation for total fat) was updated to reflect current RDAs for the SMI target nutrients. However, the effect of the updated RDAs varied for different types of schools. There was little change in the proportion of elementary schools that met all of the standards. In contrast, the proportion of middle schools that met all of the standards increased (from 7 to 12 percent) and the proportion of high schools that met all the standards decreased (from 10 to 4 percent). As noted in the preceding discussion of average NSLP lunches *offered*, these shifts are consistent with differences between current RDAs and the 1989 RDAs for the age groups of children that typically attend middle and high schools.

E. Calorie and Nutrient Content of NSLP Lunches *Offered* and *Served*, by Menu-Planning System

In SY 2009–2010, SFAs participating in the NSLP had five options for planning menus to meet the SMI nutrition standards. Two of the systems were food-based and included requirements for food groups (meal components) to be included in each meal as well as minimum acceptable serving sizes for children in different grades. Under traditional food-based menu planning, an NSLP lunch must include milk (as a beverage), a serving of meat or meat alternate, a serving of bread or other grain product, and two servings of fruit and/or vegetables. Enhanced food-based menu planning has similar specifications but requires more servings of bread or grain products over the course of a week and larger servings of fruit and vegetables.

SFAs also had the option to use nutrient-based menu planning, referred to as nutrient standard menu planning or NSMP. NSMP requires that SFAs use one of several USDA-approved computerized nutrient analysis systems to plan menus and imposes few food-based menu requirements.²² A variant known as assisted nutrient standard menu planning (ANSMP) allows SFAs to arrange for external sources to assist with menu planning and/or nutrient analysis. Finally, SFAs could use any other reasonable approach to plan menus, as long as the menus met the nutrition standards.²³

1. Average Calorie and Nutrient Content Relative to Nutrition Standards

a. Calories and Target Nutrients

On average, NSLP lunches *offered* in schools that used each of the different menu-planning systems (traditional food-based, enhanced food-based, and nutrient-based) met the SMI standards (one-third of the 1989 REA/RDA) for calories and all target nutrients (Table 5.8).²⁴ There were small but statistically significant differences in the average percentage of the 1989 REA in lunches *offered* in schools that used the enhanced food-based menu-planning system, relative to schools that used the traditional food-based and nutrient-based systems (37 percent of the 1989 REA versus 35 and 36 percent, respectively).

²² For lunch, NSMP requires that milk be offered as a beverage and that at least one entree and one side dish be offered.

²³ Details about the specific requirements of each menu-planning approach are provided in Appendix A.

²⁴ Data on the average calorie and nutrient content of NSLP lunches *offered* and *served* in schools that use different menu-planning systems, including standard errors and percentile distributions, are presented in detail in Appendix E.

Table 5.8. Average Percentage of 1989 Recommended Energy/Dietary Allowances in National School Lunch Program Lunches Offered and Served, by Menu-Planning System

		Percentage of Schools			
	SMI Standard	Food-Based Menu Planning			Nutrient-Based Menu Planning ^a
		Traditional	Enhanced	All	
NSLP Lunches <i>Offered</i>					
Calories	33%	35.4 ^α	37.2 ^β	35.9	34.8
Protein	33%	92.6	94.2	93.1	91.7
Vitamin A	33%	61.2	63.8	61.9	64.8
Vitamin C	33%	68.5	70.7	69.1	74.0
Calcium	33%	56.5	58.5	57.1	57.4
Iron	33%	40.7	42.1	41.1	39.9
NSLP Lunches <i>Served</i>					
Calories	33%	31.3 ^α	33.4	31.9	31.8
Protein	33%	85.1	87.4	85.7	85.4
Vitamin A	33%	45.7	49.7	46.8	48.4
Vitamin C	33%	46.5	49.7	47.3	49.3
Calcium	33%	50.4 ^α	53.9 ^β	51.3	50.3
Iron	33%	37.4	38.6	37.7	38.2
Number of Schools		454	171	625	259

Source: School Nutrition Dietary Assessment Study-IV, Menu Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

^aIncludes both Nutrient Standard Menu Planning (NSMP) and Assisted Nutrient Standard Menu Planning (ANSMP).

^αDifference between traditional and enhanced is significantly different from zero at the .05 level.

^βDifference between enhanced and nutrient-based is significantly different from zero at the .05 level.

NSLP = National School Lunch Program; SMI = School Meals Initiative for Healthy Children.

As expected, the average percentages of the 1989 REA/RDAs in NSLP lunches *served* were consistently lower than in lunches *offered*. Schools that used each type of menu-planning system still met the SMI standards for all target nutrients (Table 5.8). On average, lunches *served* in schools that used the enhanced food-based menu-planning system provided a significantly larger share of the 1989 RDA for calcium than schools that used the traditional food-based or nutrient-based systems (54 versus 50 and 51 percent, respectively). Average lunches *served* in schools that used the enhanced food-based menu-planning system also satisfied the SMI standard for calories. However, the average calorie content of lunches *served* in schools using the other two menu-planning systems fell just below the SMI target of one-third of the 1989 REA. The difference in the average calorie content of lunches *served* in schools that used the two food-based menu-planning systems was statistically significant (33 percent [enhanced] versus 31 percent [traditional]).

b. Percentage of Calories from Total Fat and Saturated Fat

On average, the fat content of lunches *offered* in schools using each type of menu-planning system exceeded the SMI standard for total fat (no more than 30 percent of calories) (Table 5.9). Average fat content ranged from 31.7 percent to 33.0 percent, and none of the differences between menu-planning systems were statistically significant. The overall pattern was the same for lunches *served*; however, the average fat content of NSLP lunches *served* in schools that used enhanced food-

based menu planning was significantly higher than in schools that used nutrient-based menu planning (33.0 versus 31.6 percent). The average fat content of NSLP lunches *offered* and *served* in schools that used each type of menu-planning system was consistent with the 2010 *Dietary Guidelines* recommendation for fat (25 to 35 percent of calories).

Table 5.9. Average Total Fat and Saturated Fat Content of National School Lunch Program Lunches Offered and Served, Relative to SMI Nutrition Standards, by Menu-Planning System

	SMI Standard	Percentage of Schools			
		Food-Based Menu Planning			Nutrient-Based Menu Planning ^a
		Traditional	Enhanced	All	
NSLP Lunches <i>Offered</i>					
Total Fat	≤30% ^b	31.9	33.0	32.2	31.7
Saturated Fat	<10% ^c	10.0	10.3 ^β	10.1	9.8
NSLP Lunches <i>Served</i>					
Total Fat	≤30% ^b	32.0	33.0 ^β	32.2	31.6
Saturated Fat	<10% ^c	10.2	10.5 ^β	10.3	9.8 ^γ
Number of Schools		454	171	625	259

Source: School Nutrition Dietary Assessment Study–IV, Menu Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

^aIncludes both Nutrient Standard Menu Planning (NSMP) and Assisted Nutrient Standard Menu Planning (ANSMP).

^bThe 2010 *Dietary Guidelines* recommendation for total fat for children 5 to 18 years of age is 25 to 35 percent of calories.

^cThe 2010 *Dietary Guidelines* recommendation for saturated fat is the same as the SMI standard (less than 10 percent of calories).

^bDifference between enhanced and nutrient-based is significantly different from zero at the .05 level.

^yDifference between traditional and nutrient-based is significantly different from zero at the .05 level.

NSLP = National School Lunch Program; SMI = School Meals Initiative for Healthy Children.

The average saturated fat content of lunches *offered* and *served* in schools that used food-based menu-planning systems came close to, but did not meet, the SMI standard (and the 2010 *Dietary Guidelines* recommendation) of less than 10 percent of calories. On the other hand, the average saturated fat content of NSLP lunches *offered* and *served* in schools that used nutrient-based menu planning (9.8 percent of calories) was consistent with the SMI standard. For lunches *offered*, the average saturated fat content of lunches in schools that used enhanced food-based menu planning was significantly higher than the average for schools that used nutrient-based menu planning (10.3 percent of calories versus 9.8 percent). For lunches *served*, the average saturated fat content of lunches in schools that used both of types of food-based menu planning was significantly higher than the average for schools that used nutrient-based menu planning (10.2 percent of calories [traditional] and 10.5 percent [enhanced] versus 9.8 percent).

c. Cholesterol, Sodium, and Dietary Fiber

Cholesterol. NSLP lunches *offered* and *served* in schools that used each type of menu-planning system met the 2010 *Dietary Guidelines* recommendation for cholesterol (Table 5.10). Average cholesterol content in all types of schools was well below the benchmark of 100 mg and ranged from 53 g to 61 g.

Table 5.10. Average Cholesterol, Sodium, and Dietary Fiber Content of National School Lunch Program Lunches *Offered* and *Served*, Relative to 2010 *Dietary Guidelines* Recommendations, by Menu-Planning System

	2010 <i>Dietary Guidelines</i> Recommendation	Percentage of Schools			
		Food-Based Menu Planning			Nutrient-Based Menu Planning ^a
		Traditional	Enhanced	All	
NSLP Lunches <i>Offered</i>					
Cholesterol (mg)	<100 mg ^b	59	61	60	57
Sodium (mg)	<767 mg ^b	1,448 ^α	1,570 ^β	1,480	1,458
Dietary Fiber (g/1,000 calories)	14	10	10	10	10
NSLP Lunches <i>Served</i>					
Cholesterol (mg)	<100 mg ^b	55	57	55	53
Sodium (mg)	<767 mg ^b	1,348 ^α	1,479 ^β	1,383	1,355
Dietary Fiber (g/1,000 calories)	14	9	9	9	9
Number of Schools		454	171	625	259

Source: School Nutrition Dietary Assessment Study-IV, Menu Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

^aIncludes both Nutrient Standard Menu Planning (NSMP) and Assisted Nutrient Standard Menu Planning (ANSMP).

^bBenchmark is one-third of the recommended daily limit.

^αDifference between traditional and enhanced is significantly different from zero at the .05 level.

^βDifference between enhanced and nutrient-based is significantly different from zero at the .05 level.

NSLP = National School Lunch Program.

Sodium. The average sodium content of lunches *offered* and *served* in schools that used each type of menu-planning system exceeded by a substantial margin the benchmark of 767 mg (equivalent to one-third of the daily limit recommended in the *Dietary Guidelines* [2,300 mg]) (Table 5.10). The average sodium content of lunches *offered* and *served* in schools that used enhanced food-based menu planning was significantly higher than the averages in schools that used traditional food-based menu planning or nutrient-based menu planning.

Dietary fiber. On average, NSLP lunches *offered* and *served* in schools that used each type of menu-planning system did not meet the *Dietary Guidelines* recommendation for dietary fiber (Table 5.10). The average concentration of dietary fiber in NSLP lunches *offered* and *served* in all three types of schools was more than 25 percent below the benchmark of 14 g per 1,000 calories. None of the differences in the average fiber content of NSLP lunches *offered* and *served* in schools using different menu-planning systems were statistically significant.

2. Percentage of Schools Meeting Standards

a. Calories and Target Nutrients

Calories. For both *offered* and *served* lunches, schools in all menu-planning groups were less likely to meet the SMI standard for calories than the standards for nutrients. For the average lunch *offered*, schools that used enhanced food-based menu planning were significantly more likely than schools that used traditional food-based or nutrient-based menu planning to meet the SMI standard for calories (76 versus 64 and 57 percent, respectively) (Table 5.11). The same pattern was observed for the average lunch *served*; however, only the difference between schools that used the two food-based menu-planning systems was statistically significant (50 versus 35 percent).

Target nutrients. Across all three menu-planning systems, virtually all schools *offered* NSLP lunches that met the SMI standards for protein and calcium, and more than 90 percent of schools *offered* NSLP lunches that met the SMI standard for vitamin A (Table 5.11). In addition, more than 80 percent of schools in each menu-planning group met the SMI standard for vitamin C, and more than three-fourths met the standard for iron. Schools that used enhanced food-based menu planning were significantly more likely than those that used traditional food-based menu planning or nutrient-based menu planning to *offer* average lunches that met the SMI standard for iron (93 versus 85 and 79 percent, respectively).

The proportions of schools that *served* average NSLP lunches that met the SMI standards for target nutrients were smaller than for the average lunches *offered*, but were greater than 70 percent for all nutrients except vitamin C (which ranged from 66 to 70 percent) (Table 5.11). There were a few statistically significant differences by menu-planning system in the proportion of schools that met SMI standards for the average lunch *served*. Schools that used enhanced food-based menu planning were significantly more likely than schools that used traditional food-based menu planning to *serve* average lunches that met the SMI standard for vitamin A (83 versus 73 percent), and were significantly more likely than schools that used either traditional food-based menu planning or nutrient-based menu planning to *serve* average lunches that met the SMI standard for calcium (although more than 90 percent of schools in all three groups met the calcium standard).

Table 5.11. Percentage of Schools *Offering* and *Serving* National School Lunch Program Lunches that, on Average, Satisfied SMI Standards for Calories and Target Nutrients, by Menu-Planning System

	Percentage of Schools			
	Food-Based Menu Planning			Nutrient-Based Menu Planning ^a
	Traditional	Enhanced	All	
NSLP Lunches <i>Offered</i>				
Calories	64.1 ^α	76.1 ^β	67.3	56.9
Protein	>97	>97	>97	>97
Vitamin A	91.9	95.0~	92.7	95.4~
Vitamin C	83.3	89.2	84.9	86.2
Calcium	>97	>97	>97	>97
Iron	84.9 ^α	92.8 ^β ~	87.0	78.7
NSLP Lunches <i>Served</i>				
Calories	35.2 ^α	49.8	39.1	37.4
Protein	>97	>97	>97	>97
Vitamin A	73.3 ^α	83.4	76.0	75.5
Vitamin C	66.3	69.8	67.3	69.0
Calcium	93.6 ^α	>97 ^β	94.8	91.4
Iron	74.0	78.1	75.1	74.3
Number of Schools	454	171	625	259

Source: School Nutrition Dietary Assessment Study-IV, Menu Survey, school year 2009-2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Note: The SMI standards are one-third of the 1989 *Recommended Energy/Dietary Allowances*.

^aIncludes both Nutrient Standard Menu Planning (NSMP) and Assisted Nutrient Standard Menu Planning (ANSMP).

^αDifference between traditional and enhanced is significantly different from zero at the .05 level.

^βDifference between enhanced and nutrient-based is significantly different from zero at the .05 level.

~ Point estimate is considered less precise than estimates that are not flagged because the sample size is small or the coefficient of variation is large. The rules used in flagging estimates are described in Chapter 1. When these rules are applied, percentages close to 100 are often flagged. In this table, flagged percentages between 97 and 100 percent are displayed as >97.

NSLP = National School Lunch Program; SMI = School Meals Initiative for Healthy Children.

b. Total Fat and Saturated Fat

The percentage of schools that *offered* average lunches that met the SMI standard for fat (no more than 30 percent of calories) ranged from 26 to 40 percent (Table 5.12). As expected, the proportions of schools that *offered* average lunches that met the less stringent 2010 *Dietary Guidelines* recommendation for fat (25 to 35 percent of calories) were substantially higher, ranging from 69 to 71 percent.

Table 5.12. Percentage of Schools *Offering* and *Serving* National School Lunch Program Lunches that, on Average, Satisfied SMI and 2010 *Dietary Guidelines* Recommendations for Total Fat and Saturated Fat, by Menu-Planning System

	Percentage of Schools			
	Food-Based Menu Planning			Nutrient-Based Menu Planning ^a
	Traditional	Enhanced	All	
NSLP Lunches <i>Offered</i>				
SMI Standard for Total Fat ^b	35.7	25.6 ^β	33.0	39.8
2010 <i>Dietary Guidelines</i> Recommendation for Total Fat ^c	71.3	70.5	71.0	68.7
SMI Standard for Saturated Fat	49.2	49.0	49.2	57.3
NSLP Lunches <i>Served</i>				
SMI Standard for Total Fat ^b	34.7	26.7	32.5	38.3
2010 <i>Dietary Guidelines</i> Recommendation for Total Fat ^c	74.9	64.5	72.2	72.2
SMI Standard for Saturated Fat	48.4	37.9 ^β	45.6	62.9 ^γ
Number of Schools	454	171	625	259

Source: School Nutrition Dietary Assessment Study–IV, Menu Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

^aIncludes both Nutrient Standard Menu Planning (NSMP) and Assisted Nutrient Standard Menu Planning (ANSMP).

^bThe SMI standard for total fat is no more than 30 percent of calories.

^cThe 2010 *Dietary Guidelines* recommendation for total fat for children 4 to 18 years of age is 25 to 35 percent of calories.

^dBoth the SMI standard and the 2010 *Dietary Guidelines* recommendation for saturated fat are less than 10 percent of calories.

^βDifference between enhanced and nutrient-based is significantly different from zero at the .05 level.

^γDifference between traditional and nutrient-based is significantly different from zero at the .05 level.

NSLP = National School Lunch Program; SMI = School Meals Initiative for Healthy Children.

Schools that used enhanced food-based menu planning were significantly less likely than schools that used nutrient-based menu planning to *offer* average NSLP lunches that met the SMI standard for fat (26 versus 40 percent). However, there was no significant difference between these two groups in the proportion of schools that *offered* average NSLP lunches that met the 2010 *Dietary Guidelines* recommendation for fat. There were no significant differences between schools that used different menu-planning systems in the proportion of schools that *served* average lunches that met the SMI standard for fat or the 2010 *Dietary Guidelines* recommendation for fat.

The percentage of schools that *offered* average NSLP lunches that were consistent with the SMI standard for saturated fat ranged from 49 percent (among schools that used food-based menu planning) to 57 percent (among schools that used nutrient-based menu planning), but none of the differences between schools that used different menu-planning systems were statistically significant (Table 5.12). The proportions of schools that *served* average lunches that met the SMI standard for saturated fat were lower for schools that used food-based menu planning, relative to the average lunch *offered*. The opposite pattern was observed for schools that used nutrient-based menu planning. For the average lunch *served*, schools that used nutrient-based planning were significantly more likely than schools that used traditional or enhanced food-based menu planning to meet the SMI standard for saturated fat (63 versus 48 and 38 percent, respectively).

c. Cholesterol, Sodium, and Fiber

Virtually all schools *offered* and *served* NSLP lunches that met the 2010 *Dietary Guidelines* recommendation for cholesterol, on average, but few schools *offered* or *served* lunches that met the recommendations for sodium or dietary fiber (Table 5.13). There were no statistically significant differences in the proportions of schools that met recommendations for cholesterol, sodium, or dietary fiber by menu-planning system.

d. Combinations of Standards

Table 5.14 presents data on the proportions of schools that met different combinations of the nutrition standards used in evaluating NSLP lunches, by menu-planning system. The pattern of results is consistent with what we would expect based on the preceding analyses of lunches *offered* and *served* by school type.²⁵

Only one significant difference was observed for NSLP lunches *offered* in schools using different menu-planning systems. Schools that used enhanced food-based menu planning were significantly more likely than schools that used traditional food-based or nutrient-based menu planning to *offer* NSLP lunches that met all of the SMI standards for target nutrients (81 versus 69 and 65 percent, respectively). There were no significant differences between schools that used different menu-planning system for average NSLP lunches *served*.

²⁵ Readers may want to refer to Table 5.1 and the preceding discussion of results for NSLP lunches *offered* and *served* by school type for background on the combinations examined.

Table 5.13. Percentage of Schools *Offering* and *Serving* National School Lunch Program Lunches that, on Average, Met 2010 *Dietary Guidelines* Recommendations for Cholesterol, Sodium, and Fiber, by Menu-Planning System

	Percentage of Schools			
	Food-Based Menu Planning			Nutrient-Based Menu Planning ^a
	Traditional	Enhanced	All	
NSLP Lunches <i>Offered</i>				
Cholesterol	>97	96~	>97	>97
Sodium	<3	<3	<3	<3
Dietary Fiber	<3	4~	2	7
NSLP Lunches <i>Served</i>				
Cholesterol	>97	>97	>97	>97
Sodium	<3	<3	<3	<3
Dietary Fiber	<3	<3	<3	<3
Number of Schools	454	171	625	259

Source: School Nutrition Dietary Assessment Study-IV, Menu Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Notes: Benchmarks used in assessing sodium and cholesterol content are one-third of daily limits recommended in the 2010 *Dietary Guidelines* (<100 mg and <767 mg, respectively). The benchmark used for dietary fiber is 14 g per 1,000 calories.

None of the differences between schools using different menu-planning systems are statistically significant.

^aIncludes both Nutrient Standard Menu Planning (NSMP) and Assisted Nutrient Standard Menu Planning (ANSMP).

~ Point estimate is considered less precise than estimates that are not flagged because the sample size is small or the coefficient of variation is large. The rules used in flagging estimates are described in Chapter 1. When these rules are applied, percentages close to 0 or 100 are often flagged. In this table, flagged percentages between 0 and 3 percent are displayed as <3 and flagged percentages between 97 and 100 percent are displayed as >97.

NSLP = National School Lunch Program.

Table 5.14. Percentage of Schools *Offering* and *Serving* National School Lunch Program Lunches that, on Average, Met Different Combinations of Nutrition Standards, by Menu-Planning System

Combinations of Standards	Food-Based Menu Planning			Nutrient-Based Menu Planning ^a
	Traditional	Enhanced	All	
NSLP Lunches <i>Offered</i>				
All SMI Standards	14.1	14.5	14.2	14.6
SMI Standards for all Target Nutrients ^b	68.8 ^α	80.5 ^β	71.9	65.2
SMI Standards for all Target Nutrients ^b and SMI Standard for Saturated Fat	35.5	41.3	37.1	40.8
SMI Standards for all Target Nutrients ^b and SMI Standard for Saturated Fat and 2010 <i>Dietary Guidelines</i> Standard for Total Fat	29.3	37.4	31.5	31.2
Updated Standards for all Target Nutrients ^c and SMI Standard for Saturated Fat and 2010 <i>Dietary Guidelines</i> Standard for Total Fat	29.7	38.8	32.1	29.5
NSLP Lunches <i>Served</i>				
All SMI Standards	5.4	6.9	5.8	8.6
SMI Standards for all Target Nutrients ^b	43.8	48.8	45.1	45.6
SMI Standards for all Target Nutrients ^b and SMI Standard for Saturated Fat	20.6	21.3	20.8	29.5
SMI Standards for all Target Nutrients ^b and SMI Standard for Saturated Fat and 2010 <i>Dietary Guidelines</i> Standard for Total Fat	16.7	20.7	17.8	19.7
Updated Standards for all Target Nutrients ^c and SMI Standard for Saturated Fat and 2010 <i>Dietary Guidelines</i> Standard for Total Fat	14.8	25.0	17.5	16.8
Number of Schools	454	171	625	259

Source: School Nutrition Dietary Assessment Study-IV, Menu Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research, Inc. are weighted to be representative of all public schools offering the National School Lunch Program.

^aIncludes both Nutrient Standard Menu Planning (NSMP) and Assisted Nutrient Standard Menu Planning (ANSMP).

^bIncludes protein, vitamin A, vitamin C, calcium and iron.

^cUpdated to reflect RDA values included in the *Dietary Reference Intakes*.

^βDifference between enhanced and nutrient-based is significantly different from zero at the .05 level.

NSLP = National School Lunch Program; SMI = School Meals Initiative for Healthy Children.

CHAPTER 6

AVAILABILITY OF LUNCHES THAT MET STANDARDS FOR TOTAL FAT, SATURATED FAT, AND OTHER NUTRIENTS

The SNDA-I study found in school year 1991–1992 that levels of fat, saturated fat, and sodium in lunches *offered* to students through the NSLP were not consistent with the *Dietary Guidelines* (Burghardt et al. 1993). In response, USDA launched the SMI, with a particular emphasis on increasing students' access to lower-fat meals, especially lower-fat lunches. Data presented elsewhere in this report (Chapter 11) demonstrate that schools have made considerable progress in decreasing levels of total fat and saturated fat in school lunches over time. However, in SY 2009–2010, the average NSLP lunch *offered* in roughly one-half to two-thirds of all schools fell short of satisfying existing nutrition standards (the SMI nutrition standards) for saturated fat and total fat, respectively.¹

Even in schools in which the average NSLP lunch *offered* to students was not consistent with SMI standards for total fat and saturated fat, it is possible that individual students could have selected lunches that were consistent with these standards, providing that lower-fat menu choices were available. This chapter presents information on the proportions of schools *offering* students the opportunity to select lunches that met specific nutrition standards. This information provides policymakers and other stakeholders with useful insights about the relative challenges schools face in *offering* lunches that meet specific nutrition standards. We recognize that the availability of meals that meet specific nutrition standards does not guarantee that students will select these meals. For this to happen, students' current food selection patterns will need to change. However, to gain a full appreciation of the challenges involved in reaching SMI goals for meals as *served*, it is important to understand the extent to which students could have selected meals that met SMI and other nutrition standards if they were motivated to do so.

The analysis focuses on the nutrition standards identified as the most challenging in the analysis of the average NSLP lunches *offered* to students (see Chapter 5). These include the SMI standards for total fat, saturated fat, and iron, and the 2010 *Dietary Guidelines* recommendations for sodium and dietary fiber.² The analysis uses data from menu surveys completed by FSMs in 884 schools for one school week between January and June 2010.^{3,4} Assessment of the availability of meals that met each of the above standards is based on the average so-called “healthiest-choice” lunches *offered* in each

¹ See Chapter 5, Figure 5.6. The SMI standards are based on the 1995 *Dietary Guidelines*, which recommended no more than 30 percent of calories from fat. In SY 2009–2010, schools did a better job of satisfying the 2010 *Dietary Guidelines* recommendation for total fat, which specifies a range of 25 to 35 percent of calories from fat for school-age children.

² Satisfying the SMI standard for calories at lunch was also challenging, especially for middle schools and high schools. However, calories were not included in this analysis because, at the time the analyses were conducted, a substantial change to the calorie standard used in planning school meals was expected. New requirements for school meals, which were finalized after this analysis was complete, include both minimum and maximum targets for calories (the SMI standard included only a minimum target). The SMI calorie standard is included in analyses that assess the extent to which healthiest-choice lunches satisfied other nutrition standards.

³ Because of school holidays or other school closures, some schools provided data for only four days. A very small number of schools provided data for only three days.

⁴ Volume II of this report provides a detailed description of the protocols used in collecting and processing menu survey data.

school—for example, the lowest-fat items or the items highest in dietary fiber available in each meal component group. All findings are summarized in graphics. Supporting data, including information on the average calorie and nutrient content of each of the healthiest-choice lunches *offered*, are presented in Appendix F.

A. Summary of Findings

- The vast majority of schools *offered* students the opportunity to select a lunch that, on average, met the SMI standards for total fat and saturated fat (no more than 30 percent of calories and less than 10 percent of calories, respectively).
- The lowest-percent-fat lunch *offered* in about 3 of 10 schools had an average fat content that fell below the lower end of the 2010 *Dietary Guidelines* recommended range for school-age children (25 to 35 percent of calories).
- Students had the opportunity to select average lunches that met the 2010 *Dietary Guidelines* recommendations for sodium in more than a third (34 to 39 percent) of all schools.
- At least half of middle schools and high schools (50 to 55 percent) *offered* students the opportunity to select average lunches that met the 2010 *Dietary Guidelines* recommendation for dietary fiber.
- Essentially all schools *offered* menu options that allowed students to select average lunches that were consistent with the SMI standard for iron (one-third of the 1989 RDA).
- Relative to average NSLP lunches *offered* overall, the average healthiest-choice lunches generally did a better job of meeting the more challenging nutrition standards, especially the SMI standards for total fat and saturated fat and the 2010 *Dietary Guidelines* recommendation for dietary fiber.
- However, with the exception of the highest-dietary-fiber and highest-iron lunches, the average healthiest-choice lunch was less likely than the average NSLP lunch *offered* to meet the SMI standard for minimum calories. In addition, the average lowest-sodium lunch satisfied fewer SMI standards than the average NSLP lunch *offered* overall.

B. Availability of Healthiest-Choice Lunches that Met Nutrition Standards

The methodology used in this analysis is similar to the approach used to estimate the average calorie and nutrient content of NSLP lunches overall. (The methodology is described in detail in Appendix D.) However, estimates of the calorie and nutrient content of the healthiest-choice lunches included only the “healthiest” menu item offered in each meal component group. For example, the average lowest-percent-fat lunch for a school using food-based menu planning consisted of the lowest-percent-fat milk, the lowest-percent-fat entree or meat/meat alternate, the lowest-percent-fat grain/bread (if offered), and the lowest-percent-fat fruit and/or vegetables.^{5,6}

⁵ The number of servings of fruits and vegetables included in an average lunch varied for each school, depending on local policy. See Appendix D for more information.

Condiments not linked to specific menu items and desserts or other items not considered part of the reimbursable meal were excluded. The same basic approach was used to determine the average nutrient content of the lowest-percent-saturated-fat lunches *offered* and the lowest-sodium lunches *offered*. For the highest-dietary-fiber lunches and the highest-iron lunches, the healthiest-choice lunches included the menu items that were *highest* in dietary fiber and iron, respectively.

To assess the availability of lunches that, if selected by students, would meet specific nutrition standards, we compared the average calorie and nutrient content of each school's healthiest-choice lunches with the relevant standards (for example, the average lowest-percent-fat lunch was compared with the SMI standard for total fat) and determined the proportion of schools that satisfied the standard. We also compared the average healthiest-choice lunches to the other nutrition standards and benchmarks used to assess average NSLP lunches overall (Chapter 5). Data showing the mean calorie and nutrient content of the healthiest-choice lunches appear in Appendix Tables F.7 to F.11, but are not discussed in the text.

1. Availability of Lunch Options that Met SMI Standards for Total Fat and Saturated Fat

As shown in Figure 6.1, 88 percent of elementary schools, 92 percent of middle schools, and 90 percent of high schools provided students with the opportunity to choose lunches that, on average, were consistent with the SMI standard for total fat (no more than 30 percent of calories from fat). Similarly, students in more than 90 percent of all schools had the opportunity to select lunches that, on average, met the SMI standard for saturated fat (less than 10 percent of calories). These results contrast sharply with results for the average NSLP lunch *offered* overall. Only a third of schools *offered* average NSLP lunches that met the SMI standard for total fat and slightly more than half of all schools *offered* average NSLP lunches that met the SMI standard for saturated fat (Chapter 5, Figure 5.6). Thus, findings from the analysis of average healthiest-choice lunches indicate that low-fat and low-saturated-fat lunches were available in substantially more schools than suggested by findings for average NSLP lunches overall.

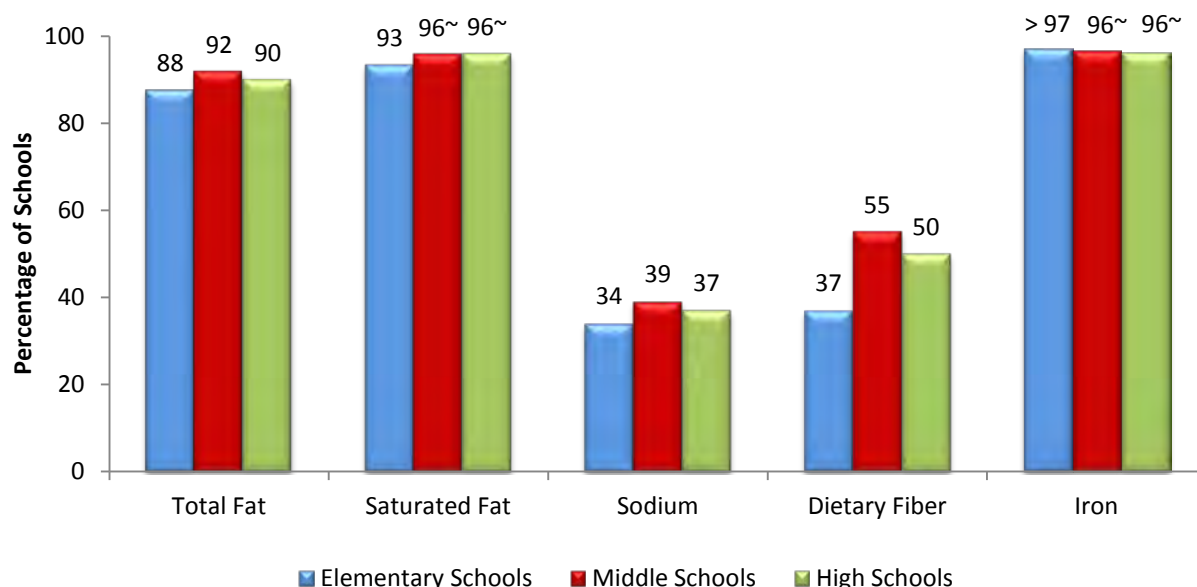
2. Availability of Lunch Options that Met Standards for Sodium, Dietary Fiber, and Iron

The analysis of average NSLP lunches found that no schools *offered* lunches that met the 2010 *Dietary Guidelines* recommendation for sodium, on average, and only 3 to 4 percent of schools *offered* lunches that met the *Dietary Guidelines* recommendation for dietary fiber (Appendix Table E.3). As shown in Figure 6.1, however, roughly a third of all schools *offered* students the opportunity to select lunches that, on average, were consistent with the *Dietary Guidelines* recommendation for sodium. The proportion of schools that *offered* students the opportunity to select average lunches that were consistent with the recommendation for dietary fiber was even greater (37 to 55 percent).

(continued)

⁶ The lunches constructed for this analysis also satisfied the minimum requirements for reimbursable lunches under the nutrient standard menu planning (NSMP) system—fluid milk, an entree, and at least one side item.

Figure 6.1. Percentage of Schools Offering Healthiest-Choice Lunches that, on Average, Satisfied Relevant SMI Standards and 2010 Dietary Guidelines Recommendations



Notes: The SMI standards for total fat and saturated fat are no more than 30 percent of calories and less than 10 percent of calories, respectively.

The SMI standard for iron is one-third of the 1989 *Recommended Dietary Allowance*.

The standards used to assess sodium and fiber content are based on the 2010 *Dietary Guidelines*—767 mg sodium (one-third of the suggested daily limit of 2,300 mg) and 14 g dietary fiber per 1,000 calories.

~ Point estimate is considered less precise than estimates that are not flagged because the sample size is small or the coefficient of variation is large. The rules used in flagging estimates are described in Chapter 1. When these rules are applied, percentages close to 100 are often flagged. In this figure, flagged percentages between 97 and 100 are displayed as >97.

SMI = School Meals Initiative for Healthy Children.

Although most elementary schools (93 percent) offered average NSLP lunches that met the SMI standard for iron, significantly fewer middle schools (66 percent) and high schools (77 percent) met this standard (Chapter 5, Figure 5.3). Our analysis of the highest-iron lunches showed that students in virtually all schools had the opportunity to select lunches that, on average, met the SMI standard for iron (Figure 6.1).

C. Nutrition Standards Met by Healthiest-Choice Lunches

In addition to assessing the extent to which the average healthiest-choice lunches satisfied their respective individual standards, it is useful to examine the additional nutritional benefits and trade-offs these meals may offer, relative to the average NSLP lunch. These comparisons are illustrated,

for all schools combined, in Figure 6.2.⁷ (Findings for elementary, middle, and high schools are presented separately in Appendix Tables F.1 to F.5).

In addition to the nutrients included in the preceding analysis, Figure 6.1 includes comparisons for the SMI standard for calories and the 2010 *Dietary Guidelines* recommendation for total fat.⁸ Each set of bars in Figure 6.2 shows the percentage of schools that met a specific nutrition standard for the average lunch *offered* overall (the top [dark-blue] bar) and for each of the average healthiest-choice lunches.

As shown, the average healthiest-choice lunches did a better job than the average NSLP lunch overall in satisfying most of the nutrition standards. The SMI standard for calories and the 2010 *Dietary Guidelines* standard for total fat were exceptions to this rule. Findings for each standard are discussed in the sections that follow.

1. SMI Standards for Total Fat and Saturated Fat

a. Total Fat

The proportion of schools meeting the SMI standard for total fat was greater for all of the average healthiest-choice lunches (range of 54 to 89 percent of schools) than for the average NSLP lunch (35 percent of schools) (Figure 6.2).⁹ Among the average healthiest-choice lunches, the lowest-percent-fat and lowest percentage-saturated-fat lunches did the best in meeting the SMI standard for total fat (89 and 81 percent of schools, respectively, versus 35 percent). On average, the lowest-sodium and the highest-dietary-fiber lunches also satisfied the SMI standard for total fat more often than the average lunch *offered* (63 and 54 percent of schools, respectively, versus 35 percent).

b. Saturated Fat

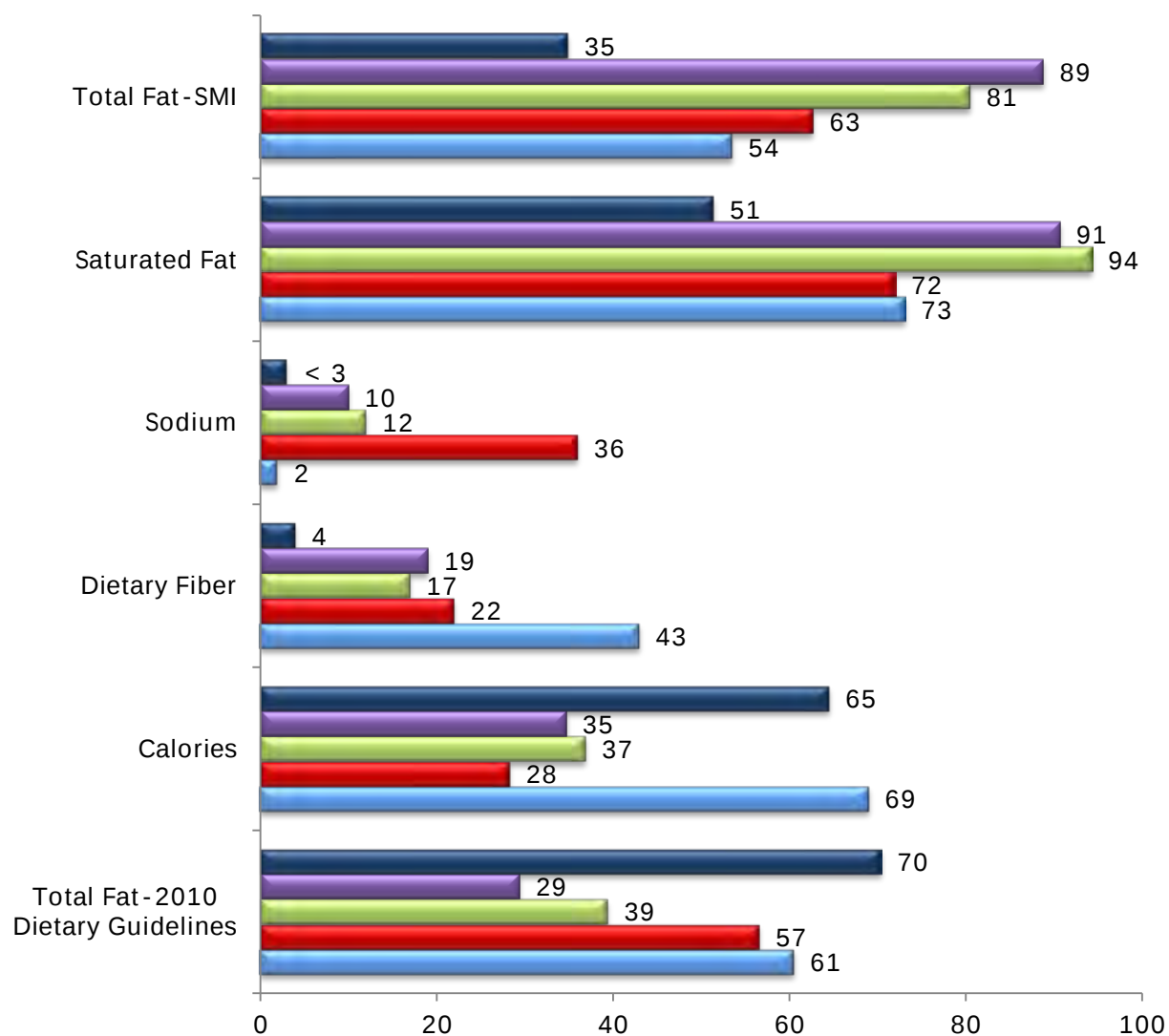
We observed a similar pattern when comparing the healthiest-choice lunches with the SMI standard for saturated fat. On average, the lowest-percent-fat and lowest-percent-saturated-fat lunches *offered* in more than 90 percent of schools met the SMI standard for saturated fat (Figure 6.2). This is almost double the percentage of schools that met the SMI standard for saturated fat for the average NSLP lunch *offered* (51 percent). For both the lowest-sodium lunches and highest-dietary fiber lunches, almost three-quarters of schools satisfied the SMI standard for saturated fat (roughly 1.5 times the proportion that met the SMI standard for saturated fat for the average NSLP lunch).

⁷ Findings for the highest-iron lunches are not included in Figure 6.2. These findings are discussed separately because findings for the average NSLP lunch varied by school type.

⁸ Appendix Tables F.1 to F.5 present data for all of the other nutrition standards assessed in the analysis of the average NSLP lunch *offered*, including combinations of standards.

⁹ For all references to Figure 6.2, see also Appendix Tables F.1 to F.5 and E.3.

Figure 6.2. Percentage of Schools Offering Lunches that Met Specific Nutrition Standards: Average NSLP Lunches Offered Overall Versus Average Healthiest-Choice Lunches



Notes: Data for average 2009–2010 NSLP lunches reflect average NSLP lunches *offered*.

The SMI standards for total fat and saturated fat are no more than 30 percent of calories and less than 10 percent of calories, respectively.

The standards used to assess sodium and fiber content are based on the 2010 *Dietary Guidelines*—767 mg sodium (one-third of the suggested daily limit of 2,300 mg) and 14 g dietary fiber per 1,000 calories.

The SMI standard for calories is one-third of the 1989 *Recommended Energy Allowance*.

The 2010 *Dietary Guidelines* recommendation for total fat is 25 to 35 percent of calories.

<3 = Point estimate is considered less precise than other estimates because the sample size is small or the coefficient of variation is large. The rules used in flagging estimates are described in Chapter 1. When these rules are applied, percentages close to 0 or 100 are often flagged. In this figure flagged percentages between 0 and 3 are displayed as <3.

SMI = School Meals Initiative for Healthy Children.

The higher proportions of schools *offering* healthiest-choice lunches that met the SMI standards for total fat and saturated fat can be explained in part by differences in the types of milk and entrees included in the lunches. By definition, the lowest-percent-fat and lowest-percent-saturated fat lunches included skim milk whenever it was offered as a milk choice and would never include 2% or whole milk unless these were the only options available (which almost never happened).¹⁰ In addition, as expected, we observed a lower frequency in the healthiest-choice lunches of many entree items that are high in fat and/or saturated fat, including pizza, sandwiches with breaded/fried poultry, chicken nuggets, entree salads (many of which include cheese, meat, and high-fat salad dressings), cheeseburgers and hamburgers (see Appendix Table F.6).

2. 2010 *Dietary Guidelines* Recommendations for Sodium and Dietary Fiber

a. Sodium

On average, both the lowest-percent-fat and lowest-percent-saturated-fat lunches met the 2010 *Dietary Guidelines* recommendation for sodium in about 10 percent of schools (Figure 6.2). Although this is a small proportion of schools, it represents an improvement, relative to the average NSLP lunch *offered*, for which no schools met the *Dietary Guidelines* recommendation for sodium. In contrast, the highest-dietary-fiber lunches were, on average, no more consistent with the sodium recommendation than the average NSLP lunch *offered*. This difference can be explained in part by the greater frequency of entree salads in the highest-dietary-fiber lunches compared with the other healthiest-choice lunches (11 percent of highest-dietary-fiber lunches versus 2 to 4 percent of other healthiest-choice lunches) (see Appendix Table F.6). Salads were usually accompanied by high-sodium salad dressing and, often, a roll or saltine crackers.

b. Dietary Fiber

On average, all of the healthiest-choice lunches satisfied the 2010 *Dietary Guidelines* benchmark for dietary fiber in a larger share of schools than NSLP lunches overall. The percentages of schools *offering* lowest-fat or lowest-sodium lunches that included an average of at least 14 g of dietary fiber per 1,000 calories ranged from 17 to 22 percent, compared with 4 percent for NSLP lunches overall. One possible explanation for the higher average dietary fiber content of the healthiest-choice lunches is a higher frequency of peanut butter sandwiches, a leading source of dietary fiber in average NSLP lunches overall (see Chapter 9). Peanut butter sandwiches were among the most commonly offered entrees in the lowest-percent-saturated-fat and lowest-sodium lunches and were also the top entree included in the highest-dietary-fiber lunches (see Appendix Table F.6).

3. SMI Standard for Calories and 2010 *Dietary Guidelines* Recommendation for Total Fat

a. Calories

Although the average healthiest-choice lunches did a better job of satisfying most of the more challenging nutrition standards than the average NSLP lunches, they tended (with the exception of the highest-dietary-fiber lunches) to be lower in calories and, therefore, less consistent with the SMI standard for calories. As shown in Figure 6.2, the proportion of schools in which the average lowest-

¹⁰ Based on ad hoc analysis of the frequency of minor food groups included in each healthiest-choice lunch and in NSLP lunches overall (see Appendix Table F.6).

percent-fat, lowest-percent-saturated-fat, and lowest-sodium lunches met the SMI standard for calories was about half the proportion that met this standard for the average NSLP lunch overall (28 to 37 percent versus 65 percent). We note, however, that this finding varied substantially by school type. For all three of these healthiest-choice lunches, the proportion of elementary schools that met the SMI standard for calories was more than double the proportion of middle schools and high schools (see Appendix Tables F.1, F.2, and F.3).

On average, the highest-dietary-fiber lunches did a slightly better job of satisfying the SMI standard for calories than NSLP lunches overall (69 versus 65 percent). This finding also varied by school type (Appendix Table F.4) and is at least partially attributable to the greater frequency of flavored milk, peanut butter sandwiches, and entrée salads (which include salad dressing) in the highest-dietary-fiber lunches, relative to other lunches (see Table F.6).

b. 2010 Dietary Guidelines Recommendation for Total Fat

The average NSLP lunch *offered* in all types of schools was more likely to meet the 2010 *Dietary Guidelines* recommendation for fat (25 to 35 percent of calories) than the more restrictive SMI standard for fat (no more than 30 percent of calories) (70 versus 35 percent). The opposite pattern was observed for all of the average healthiest-choice lunches except the highest-dietary-fiber lunches (Figure 6.2). The disparity was greatest for the lowest-percent-fat lunches (29 percent of schools met the 2010 *Dietary Guidelines* recommendation for fat compared with 89 percent for the SMI standard) and the lowest-percent-saturated-fat lunches (39 versus 81 percent). This difference is attributable to the fact that the average percentage of calories from total fat in the healthiest-choice lunches falls below the lower end of the range recommended by the 2010 *Dietary Guidelines* (less than 25 percent of calories from fat).

4. SMI Standard for Iron

As noted previously, significantly fewer middle and high schools *offered* average NSLP lunches that met the SMI standard for iron than elementary schools (66 and 77 percent, respectively, versus 93 percent; see Chapter 5, Figure 5.3). Because of the difference across school types for the average NSLP lunch, we examined the relative success of the average highest-iron lunches in meeting specific nutrition standards by type of school. In all three types of schools, the average highest-iron lunches did a better job than average NSLP lunches overall in satisfying all of the nutrition standards assessed in this analysis except the 2010 *Dietary Guidelines* recommendations for the percentage of calories from total fat and sodium (Appendix Tables E.3 and F.5).

CHAPTER 7

CALORIE AND NUTRIENT CONTENT OF AVERAGE SCHOOL BREAKFAST PROGRAM BREAKFASTS

In SY 2009–2010, approximately nine out of ten schools that participated in the NSLP also participated in the SBP.¹ Although the program is widely available, student participation rates are lower for the SBP than the NSLP (see Chapter 2, Table 2.2). In addition, relative to the NSLP, a larger share of the meals served in the SBP are served to low-income students who receive meals free or at a reduced price. In FY 2010, 84 percent of the meals served in the SBP were served free or at a reduced price, compared to 65 percent for the NSLP.²

As with the NSLP, SBP breakfasts must meet defined nutrition standards to be eligible for Federal reimbursement. The nutrition standards in place during SY 2009–2010 were implemented in 1995 as part of the SMI and are based on nutrient requirements defined in the 1989 RDAs (NRC 1989) and the 1995 *Dietary Guidelines for Americans* (USDA and HHS 1995). Nutrition standards for school meals were recently revised to reflect the most current nutrition guidance provided by the *Dietary Guidelines* (USDA and HHS 2010), as well as updated information about nutrient requirements included in the DRIs (IOM 2006), which replaced the 1989 RDAs.³

In this chapter, we describe the calorie and nutrient content of average SBP breakfasts *offered* and *served* to students in public schools during SY 2009–2010. Reported statistics reflect the average calorie and nutrient content of SBP breakfasts over one school week. In addition, we present information about the percentage of schools that *offered* and *served* average SBP breakfast that met or came close to meeting specific nutrition standards. *These analyses focus mainly on the SMI standards because these are the standards that were in effect during SY 2009–2010.* However, to provide some insight into how school meals compare to more recent nutrition guidance, we also assess the proportion of schools that met standards based on the 2010 *Dietary Guidelines*.⁴

All the findings are based on analysis of data from the menu survey, which was completed by foodservice managers in 803 schools that participated in the SBP for five consecutive school days in the spring of SY 2009–2010 (January–June 2010).^{5,6} Data are presented separately by school type—

¹ See Chapter 2, Table 2.1.

² FY 2010 statistics were obtained from national-level annual summary tables generated by FNS's Program Reports, Analysis and Monitoring Branch. These tables were accessed at <http://www.fns.usda.gov/pd/cnpmain.htm> on July 2, 2012. Data are subject to revision.

³ The final rule on the revised meal requirements was issued in January 2012 (*Federal Register*, vol. 77, no. 17, January 26, 2012, Rules and Regulations) and requires that schools begin implementing the new requirements for breakfast in SY 2013–2014.

⁴ The potential contribution of SBP breakfasts to recommended USDA Food Patterns, including contributions to recommended daily maximums for calories from solid fats and added sugars, is explored in Chapter 8.

⁵ Because of holidays or other school closings, some schools provided data for only four days. A very small number provided data for only three days.

⁶ A detailed description of the protocols used in collecting and processing menu survey data is provided in Volume II of this report.

defined by grade level (elementary, middle, and high schools)—and by menu-planning system.^{7,8} The statistical significance of differences between schools in these subgroups was tested using two-tailed *t*-tests.⁹ Table footnotes provide information about the specific comparisons that were made in these tests. Some findings are summarized in tables that present data for each school type/menu-planning system and for all schools combined, and other findings are summarized in graphics that present data for each school type/menu-planning system. The detailed data that underlie the graphics, as well as findings for all schools combined, are presented in Appendix G.

A. Summary of Findings

We assessed the calorie and nutrient content of average SBP breakfasts using two different approaches. The first approach estimates the calorie and nutrient content of the average breakfast *offered*. This analysis is based on a simple average of all foods offered to students. It assumes that breakfasts include one serving of each type of food (meal component) offered and gives equal weight to alternatives within a meal component group. For example, if three different types of milk are offered, the analysis includes the nutrient content of an average serving of milk.

The second approach estimates the calorie and nutrient content of the average breakfast *served*. This analysis incorporates information about students' food selection patterns—that is, information about the number and types of foods included in the meals that were actually served to (or selected by) students. Rather than the simple average used in estimating the calorie and nutrient content of the average breakfast *offered*, estimates of the average breakfast *served* give greater weight to foods that students selected more frequently. Examination of the nutrient content of meals *served* was introduced as part of the SMI to provide a more accurate assessment of the potential contribution of school meals to children's dietary intakes.¹⁰

Below, we summarize key findings for breakfasts *offered* and *served*:

- More than three-quarters of all schools *offered* and *served* SBP breakfasts that, on average, met the SMI standards (one-fourth of the 1989 RDA) for protein, vitamin C, calcium, and iron. The same is true for elementary schools for the vitamin A content of the average breakfast *served*; however, only about half of middle and high schools *served* average SBP breakfasts that met the SMI standard for vitamin A.
- Schools were more likely to meet SMI standards for minimum levels of target nutrients than the SMI standard for minimum calories. The average calorie content of breakfasts *offered* and *served* in all types of schools fell below the SMI standard for minimum calories. Elementary schools were significantly more likely than either middle or high

⁷ See Chapter 1 for a description of menu-planning options that were available to schools in SY 2009–2010.

⁸ Tables that present data for additional subgroups of schools based on school size, urbanicity, and district child poverty rate are presented in Appendix G. These appendix tables are not discussed in the report.

⁹ Tests were conducted using SUDAAN statistical software, which adjusts standard errors for the study's complex sample design.

¹⁰ The terms unweighted analysis and weighted analysis are often used to refer to estimates of the calorie and nutrient content of average breakfasts *offered* and *served*, respectively.

schools to *offer* average SBP breakfasts that met the SMI standard for calories (about 24 percent of elementary schools versus 12 to 16 percent of middle and high schools).

- The majority of schools *offered* and *served* average SBP breakfasts that met the SMI standards for total fat (no more than 30 percent of calories) and saturated fat (less than 10 percent of calories).
- Overall, 15 percent of schools *offered* SBP breakfasts that, on average, satisfied all of the SMI standards, and 11 percent of schools *served* SBP breakfasts that satisfied all the SMI standards. For both breakfasts *offered* and *served*, the SMI standard that schools had the most difficulty meeting was the standard for minimum calories.
- Relative to the percentage of schools that *offered* and *served* average SBP breakfasts that met the SMI standard for total fat, substantially fewer schools *offered* and *served* average SBP breakfasts that were consistent with the 2010 *Dietary Guidelines* recommendation for total fat. The difference was most dramatic for average SBP breakfasts *offered* (93 versus 29 percent).
- The fact that, on average, breakfasts *offered* in the SBP were somewhat low in fat relative to the 2010 *Dietary Guidelines* is not necessarily a negative finding. Fat is a concern because most Americans consume too much fat (USDA and HHS 2010). Moreover, the *Dietary Guidelines* reflect recommendations for total daily intake and are used only as a point of reference in evaluating the calorie and nutrient content of SBP meals. Breakfasts that are somewhat low in average calories from fat relative to the *Dietary Guidelines* recommendation may balance out other meals and snacks that are higher in relative fat content.
- Overall, 91 percent of schools *offered* and 87 percent of schools *served* average SBP breakfasts that met the 2010 *Dietary Guidelines* recommendation for cholesterol (less than 75 mg, or one-fourth of the recommended daily limit of 300 mg). Elementary schools were significantly more likely than middle or high schools to *serve* meals that met this standard (91 versus 82 and 79 percent, respectively).
- Overall, 62 percent of all schools *offered* average SBP breakfasts that were consistent with the 2010 *Dietary Guidelines* for sodium (575 mg, or one-fourth of the recommended daily limit of 2,300 mg). Elementary schools were significantly more likely than either middle or high schools to *offer* average breakfasts that met this target (70 versus 50 and 49 percent, respectively).
- Fewer schools (46 percent) met the sodium target for the average breakfast *served*. Elementary schools were significantly more likely than middle or high schools to *serve* average breakfasts that met the sodium target (53 versus 37 and 36 percent, respectively).
- Essentially no schools *offered* or *served* average SBP breakfasts that were consistent with the 2010 *Dietary Guidelines* recommendation for dietary fiber (14 g per 1,000 calories). The average fiber content of breakfasts *offered* and *served* in all types of schools was more than 50 percent below the recommended level (equivalent to 6.9 g per 1,000 calories or less).

B. Standards Used to Assess Nutrient Content

The standards we used to assess SBP breakfasts are summarized in Table 7.1. The primary benchmarks were the SMI standards, which require that SBP breakfasts provide one-fourth of students' daily needs for calories and target nutrients, based on the 1989 RDAs (NRC 1989), and be consistent with 1995 *Dietary Guidelines* recommendations for total fat and saturated fat (USDA and HHS 1995). We also compared SBP breakfasts to 2010 *Dietary Guidelines* recommendations for total fat, sodium, cholesterol, and dietary fiber. For cholesterol and sodium, we used standards that represent one-fourth of the recommended daily limit (300 mg for cholesterol and 2,300 mg for sodium). For dietary fiber, the benchmark is based on the density standard of 14 g dietary fiber per 1,000 calories used in the DRIs (IOM 2006). To simplify the discussion, we generally use the term standard to refer to all of the benchmarks used in assessing school breakfasts. We note, however, that schools were not required to meet the 2010 *Dietary Guidelines* recommendations. Regulations in effect during SY 2009–2010 recommended that school foodservice programs strive to decrease levels of cholesterol and sodium and increase levels of dietary fiber in SBP breakfasts, but they did not specify quantitative targets.

We compared the average calorie and nutrient content of SBP breakfasts *offered* and *served* nationally to the standards shown in Table 7.1. We also assessed the proportions of schools that *offered* and *served* breakfasts that, on average, satisfied each of the individual nutrition standards shown and the proportions of schools that “came close” to meeting each standard (that is, schools that *offered* or *served* average breakfasts that were within 10 percent of the standard). Information on how close schools came to meeting the various standards is useful to program administrators in identifying potential areas for training and technical assistance to support school foodservice staff in planning meals that do meet the standards.

Finally, we looked at the proportions of schools that met all the SMI standards and that met various combinations of standards, as shown in Table 7.1. The combinations examined were developed in consultation with FNS staff, and some were designed to provide insight into how school meals *offered* and *served* in SY 2009–2010 compared to alternative nutrition standards under consideration at the time this report was prepared. For example, two of the combinations included the 2010 *Dietary Guidelines* recommendation for total fat, and one included updated RDA standards for protein, vitamin A, vitamin C, calcium, and iron, based on the DRIs.

Table 7.1. Standards Used to Evaluate the Calorie and Nutrient Content of School Breakfast Program Breakfasts

Nutrient	Standard
SMI Standards	
Based on 1989 Recommended Dietary Allowances^a	
Calories	One-fourth of <i>Recommended Energy Allowance</i> (REA)
Protein, vitamin A, vitamin C, calcium, and iron	One-fourth of <i>Recommended Dietary Allowance</i> (RDA)
Based on 1995 Dietary Guidelines for Americans^b	
Total fat	No more than 30 percent of calories
Saturated fat	Less than 10 percent of calories
Standards Based on the 2010 Dietary Guidelines for Americans^c	
Total fat	25 to 35 percent of calories
Cholesterol	Less than 75 mg ^d
Sodium	Less than 575 mg ^d
Dietary fiber	14 g per 1,000 calories
Combinations of Standards	
All SMI standards	- One-fourth of 1989 REA/RDAs for calories, protein, vitamin A, vitamin C, calcium, and iron - No more than 30 percent of calories from fat - Less than 10 percent of calories from saturated fat
SMI standards for all Target Nutrients	One-fourth of 1989 RDAs for protein, vitamin A, vitamin C, calcium, and iron
SMI standards for all Target Nutrients and SMI standard for saturated fat ^e	- One-fourth of 1989 RDAs for protein, vitamin A, vitamin C, calcium, and iron - Less than 10 percent of calories from saturated fat
SMI standards for all Target Nutrients and SMI standard for saturated fat and 2010 <i>Dietary Guidelines</i> standard for total fat ^e	- One-fourth of 1989 RDAs for protein, vitamin A, vitamin C, calcium, and iron - Less than 10 percent of calories from saturated fat 25 to 35 percent of calories from fat
Updated standards for all SMI Target Nutrients and SMI standard for saturated fat and 2010 <i>Dietary Guidelines</i> standard for total fat ^e	- One-fourth of current RDAs for protein, vitamin A, vitamin C, calcium, and iron^f - Less than 10 percent of calories from saturated fat 25 to 35 percent of calories from fat

^a National Research Council (1989).

^b U.S. Department of Agriculture and U.S. Department of Health and Human Services (1995).

^c U.S. Department of Agriculture and U.S. Department of Health and Human Services (2010).

^d Benchmark is based on one-fourth of recommended daily limit.

^e The SMI standard for saturated fat is the same as the 2010 *Dietary Guidelines* recommendation.

^f Institute of Medicine (2006 and 2010).

SMI = School Meals Initiative for Healthy Children.

C. Calorie and Nutrient Content of SBP Breakfasts Offered

The calorie and nutrient content of the average SBP breakfast *offered* is based on a simple average of all foods *offered* to students. The estimate assumes that breakfasts include one serving of each type of food (meal component) offered and gives equal weight to alternatives within a meal component group (for example, three different types of milk). Thus, the average SBP breakfast *offered* in a school that used food-based menu planning includes one average serving of milk; one average serving of 100% juice, fruit, or vegetables; and, depending on the menu offerings, two average servings of meat/meat alternates, two average servings of bread/grains, or one average serving of each (meat/meat alternate and bread/grain); one average serving of other items not considered a required part of the SBP meal (if offered); and one average serving of condiments or spreads not linked to specific menu items.

Schools use many commercially prepared (pre-prepared) foods that are formulated specifically for school foodservice, sometimes with more whole grains, less fat, more vitamins or minerals, or added protein. As a result, the nutrient content of pre-prepared foods reported on the menu surveys may not be equivalent to a similar product in the nutrient database used to code the data and estimate nutrient and food group content of school meals. To ensure that the nutrient content of pre-prepared foods used in school meals was accurately represented, coders tracked pre-prepared foods in a centralized database, categorizing each food into one of 70 food-type groups.¹¹ A list of the 200 most commonly reported pre-prepared foods, at least one for each of the 70 food-type groups, was sent to USDA's Agricultural Research Service (ARS), along with ingredient lists and Nutrition Facts labels (which coding staff obtained via the Internet or from manufacturers). ARS staff developed complete nutrient and food group profiles for each food, and these profiles were used in the analysis. A complete description of the procedures used to code and process the menu survey data is provided in Volume II.

1. Average Calorie and Nutrient Content

On average, SBP breakfasts *offered* to students during a typical school week in SY 2009–2010 provided 480 calories, with 23 percent of calories from fat and 8.2 percent of calories from saturated fat (Table 7.2).¹² In general, average amounts of calories, nutrients, and other dietary components increased from elementary to middle schools and from middle to high schools. This is consistent with menu-planning guidance that specifies larger portions of some foods (food-based menu planning) or higher calorie targets (nutrient-based menu planning) for students in higher grades to meet students' varying calorie and nutrient needs.

¹¹ Food-type groups were defined as foods that seemed essentially the same, based on their food descriptions. For example, four food-type groups were created to capture different types of thin-crust cheese pizza—cheese pizza; cheese pizza, reduced fat; cheese pizza, whole grain; and cheese pizza reduced-fat, whole grain.

¹² Detailed data on the calorie and nutrient content of SBP breakfasts *offered*, including standard errors, percentile distributions, and concentrations of nutrients per 1,000 calories, are provided in Appendix Tables G.9 to G.12 and G.17 to G.20.

Table 7.2. Average Calorie and Nutrient Content of School Breakfast Program Breakfasts *Offered*

	Elementary Schools	Middle Schools	High Schools	All Schools
Average Amount				
Calories	458	509	520	480
Nutrients Included in SMI Standards				
Protein (g)	16	17	17	16
Vitamin A (mcg RE)	278	279	282	279
Vitamin C (mg)	32	35	36	34
Calcium (mg)	428	443	439	433
Iron (mg)	5.0	5.1	5.2	5.1
Other Dietary Components				
Cholesterol (mg)	40	45	46	42
Sodium (mg)	549	628	644	583
Dietary fiber (g/1,000 calories)	7	6	6	6
Average Percentage of Calories from:				
Total fat	22.2	23.0	23.6	22.6
Saturated fat	8.2	8.3	8.4	8.2
Number of Schools	282	264	257	803

Source: School Nutrition Dietary Assessment Study-IV, Menu Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

RE = Retinol equivalents; SMI = School Meals Initiative for Healthy Children.

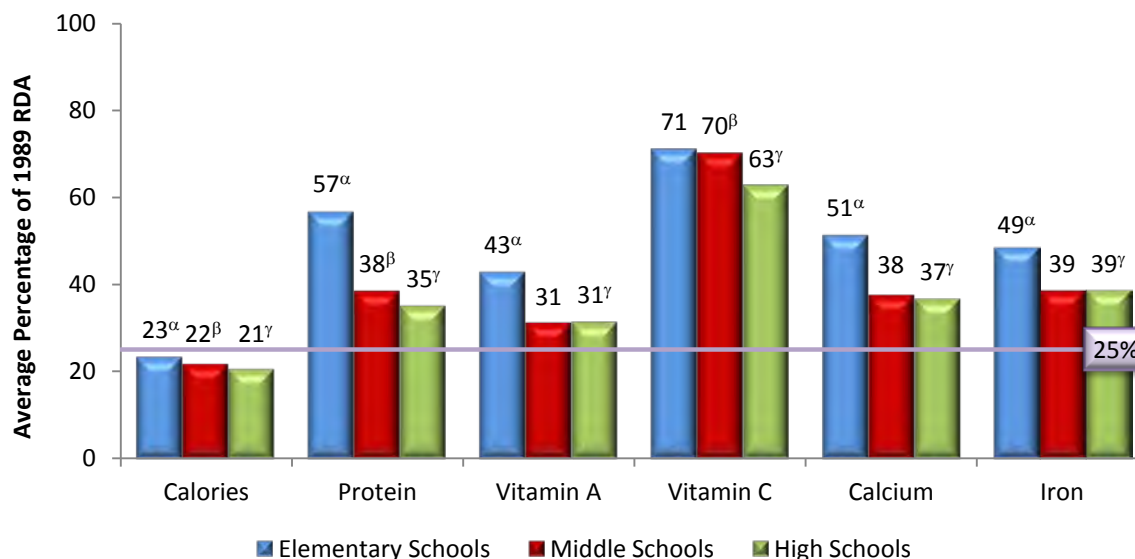
2. Average Calorie and Nutrient Content Relative to Nutrition Standards

a. Calories and Target Nutrients

The average calorie content of SBP breakfasts *offered* in SY 2009–2010 fell short of the SMI standard of one-fourth of the 1989 REA (Figure 7.1). The average percentage of the REA ranged from 21 percent for high schools to 23 percent for elementary schools, and all the differences between different types of schools were statistically significant.

On average, breakfasts *offered* in all three types of schools met the SMI standards for protein, vitamins A and C, calcium, and iron. With the exception of vitamin C, the average breakfast *offered* in elementary schools provided a significantly larger share of children’s daily calorie and nutrient needs (as defined in the 1989 RDAs) than the average breakfast *offered* in middle or high schools. (For vitamin C, the difference between elementary and high schools was significant, but the difference between elementary and middle schools was not.) In addition, the average SBP breakfast *offered* in middle schools provided a significantly larger share of the 1989 RDAs for protein and vitamin C than the average breakfast *offered* in high schools. The significant differences between elementary schools and middle and high schools, despite the fact that breakfasts *offered* in the latter schools were generally higher in calories and nutrients (as shown in Table 7.2), reflect differences in nutrient requirements of younger and older students. For example, the 1989 RDA for calcium is 800 mg for children ages 7 to 10 and 1,200 mg for children ages 11 to 18 (National Research Council 1989).

Figure 7.1. Average Percentage of 1989 Recommended Energy/Dietary Allowances in School Breakfast Program Breakfasts Offered



Note: The SMI standards are one-fourth of the 1989 *Recommended Energy/Dietary Allowances*.

^α Difference between elementary and middle schools is significantly different from zero at the .05 level.

^β Difference between middle and high schools is significantly different from zero at the .05 level.

^γ Difference between elementary and high schools is significantly different from zero at the .05 level.

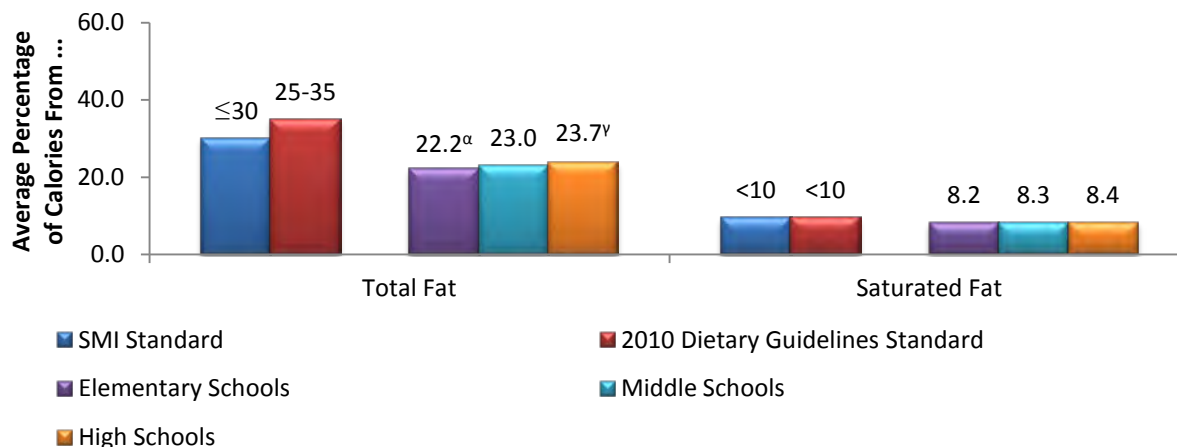
SMI = School Meals Initiative for Healthy Children.

b. Percentage of Calories from Total Fat and Saturated Fat

On average, SBP breakfasts *offered* in SY 2009–2010 provided 22 to 24 percent of calories from fat. This is consistent with the SMI standard of no more than 30 percent of calories from fat (Figure 7.2). In comparison to the 2010 *Dietary Guidelines* recommendation, however, the average fat content of SBP breakfasts *offered* in all three types of schools was somewhat low (below the lower bound of the recommended range of 25 to 35 percent of calories). The average breakfast *offered* in elementary schools was significantly lower in fat than the average breakfast *offered* in either middle or high schools (22 versus 23 and 24 percent, respectively).

The fact that, on average, breakfasts *offered* in the SBP were somewhat low in fat relative to the 2010 *Dietary Guidelines* is not necessarily a negative finding. Fat is a concern because most Americans consume *too much* fat (USDA and HHS 2010). Moreover, the *Dietary Guidelines* reflect recommendations for total daily intake and are used only as a point of reference in evaluating the calorie and nutrient content of SBP (and NSLP) meals. Thus, meals that exceed the *Dietary Guidelines* recommendation for total fat, on average, are a concern because they contribute to the potential for overconsumption. However, meals that are somewhat low in average calories from fat relative to the *Dietary Guidelines* recommendation are less of a concern because, in children’s overall diets, these meals may balance out other meals and snacks that are higher in relative fat content.

The average saturated fat content of SBP breakfasts *offered* in all three types of schools, as a percentage of calories, was about 8 percent (Figure 7.2). This is consistent with the SMI standard (and 2010 *Dietary Guidelines* recommendation) of less than 10 percent of calories.

Figure 7.2. Average Percentage of Calories from Total Fat and Saturated Fat in School Breakfast Program Breakfasts Offered

Notes: The average percentage of calories from total fat is consistent with the SMI standard (no more than 30 percent of calories), but falls below the lower end of the range of fat intake recommended in the 2010 *Dietary Guidelines* for children 4 to 18 years of age (25 to 35 percent of calories).

The average percentage of calories from saturated fat is consistent with both the SMI standard and the 2010 *Dietary Guidelines* recommendation (less than 10 percent of calories).

^a Difference between elementary and middle schools is significantly different from zero at the .05 level.

^y Difference between elementary and high schools is significantly different from zero at the .05 level.

SMI = School Meals Initiative for Healthy Children.

c. Cholesterol, Sodium, and Dietary Fiber

Cholesterol. The average cholesterol content of SBP breakfasts *offered* in all three types of schools was well below the recommended maximum of 75 mg (Table 7.3). Breakfasts *offered* in elementary schools provided slightly less cholesterol, on average, than those *offered* in either middle or high schools (40 mg versus 45 and 46 mg, respectively). Both of these differences were statistically significant.

Table 7.3. Average Cholesterol, Sodium, and Dietary Fiber Content of School Breakfast Program Breakfasts Offered

	Standard	Elementary Schools	Middle Schools	High Schools	All Schools
Cholesterol (mg)	<75 mg ^{a,b}	40 ^a	45	46 ^y	42
Sodium (mg)	<575 mg ^{a,b}	549 ^a	628	644 ^y	583
Dietary Fiber (g/1,000 calories)	14	7	6	6	6
Number of Schools		282	264	257	803

Source: School Nutrition Dietary Assessment Study-IV, Menu Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

^a Based on the 2010 *Dietary Guidelines for Americans*.

^b Benchmark is one-fourth of recommended daily limit.

^a Difference between elementary and middle schools is significantly different from zero at the .05 level.

^y Difference between elementary and high schools is significantly different from zero at the .05 level.

Sodium. On average, elementary schools *offered* SBP breakfasts that were consistent with the 2010 *Dietary Guidelines* recommendation for sodium (Table 7.3). The average sodium content (549 mg) was below the benchmark of 575 mg, which is equivalent to one-fourth of the recommended daily limit. Average breakfasts *offered* in middle and high schools were significantly higher in sodium than those *offered* in elementary schools and exceeded the 2010 *Dietary Guidelines* recommendation.¹³ However, the disparity between the average sodium content of SBP breakfasts *offered* and the *Dietary Guidelines* recommendation for sodium was much smaller than the disparity observed for NSLP lunches *offered* (see Chapter 5, Table 5.3).

The higher average levels of sodium in breakfasts *offered* in middle and high schools is attributable partially to the fact that these breakfasts include larger portions of some foods than elementary school breakfasts. Overall, however, the high average levels of sodium in SBP meals *offered* in these schools is influenced by a number of factors, including salt used in food preparation and the use of commercially prepared food items, which tend to be high in sodium.

Dietary fiber. On average, SBP breakfasts *offered* in SY 2009–2010 did not meet the *Dietary Guidelines* recommendation for dietary fiber, which is 14 g per 1,000 calories (Table 7.3). The average concentration of dietary fiber in SBP breakfasts *offered* in all three types of schools was almost 60 percent below this benchmark, at 6 g per 1,000 calories. Dietary fiber naturally occurs in plant-based foods; some of the best sources are legumes, vegetables, fruits (but not fruit juices), and whole grains (USDA and HHS 2010). Vegetables and legumes were offered infrequently in SBP breakfasts, and fruit juices were offered much more frequently than either canned or fresh fruit (86 percent of all daily breakfast menus versus 39 and 19 percent, respectively; Chapter 4, Table 4.7). In addition, SBP breakfasts were low in whole grains (see Chapter 8).

3. Percentage of Schools Meeting Standards

The preceding sections described the average calorie and nutrient content of SBP breakfasts *offered* nationally. In this section, we assess how well individual schools did in meeting the SMI standards and 2010 *Dietary Guidelines* recommendations. We estimated the percentage of schools that *offered* SBP breakfasts that, on average, satisfied each of the nutrition standards. In addition, we examined the distribution of the calorie/nutrient content of average breakfasts *offered* (see Appendix Table G.4) to determine the proportion of schools that came close (within 10 percent) to meeting the standard.

In interpreting findings for SMI standards for minimum calories and target nutrients, it is important to understand that these standards (for example, the minimum number of calories or minimum mg of iron required to meet the standard) vary across schools—even within a particular school type or level (elementary, middle, and high)—based on the ages of the students enrolled. This is because children’s calorie and nutrient needs vary by age. SMI regulations and technical guidance provide separate standards for schools using different menu-planning systems and serving different age/grade groups (see Appendix A). Our analysis used a set of customized standards for each

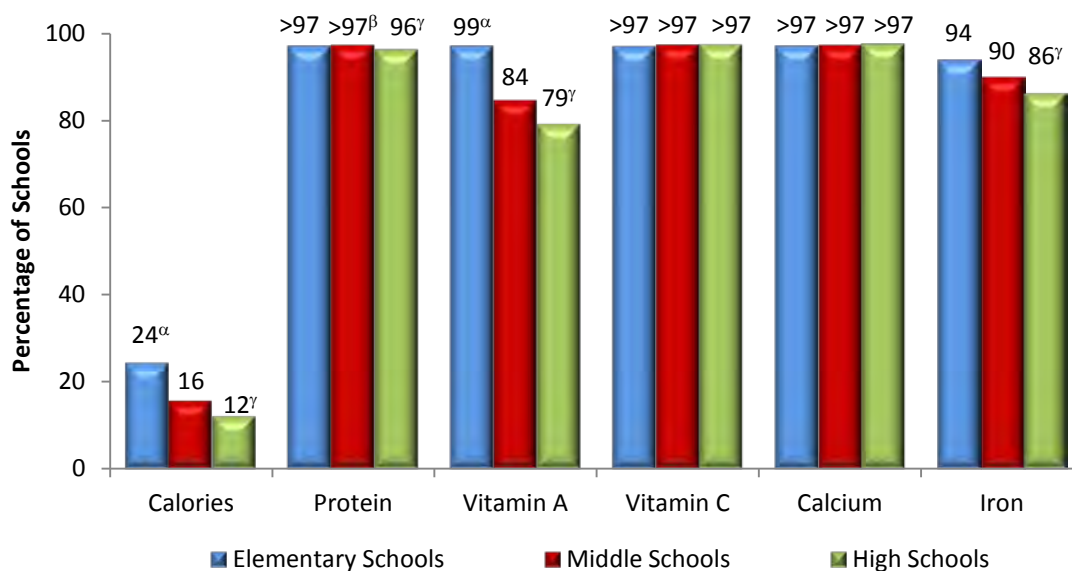
¹³ It is possible that the nutrient analysis, which did not include entry of individual recipes for all schools (see Volume II), somewhat overestimated sodium content.

school, based on the age/grade span of the students served by the NSLP and SBP. The approach used in developing these customized standards is described in detail in Appendix D.

a. Calories and Target Nutrients

Calories. Overall, only one in five schools *offered* average SBP breakfasts that met the SMI standard for calories (Appendix Table G.3). Elementary schools were significantly more likely than either middle or high schools to meet the SMI standard for calories (24 versus 16 and 12 percent, respectively) (Figure 7.3). The SMI standards define minimum calorie levels for different types of schools based on the 1989 REA and the ages of students (see Appendix D). The average breakfast *offered* in schools that did not meet the SMI standard was low in calories, relative to this standard. The SMI standards do not define maximum calorie levels.

Figure 7.3. Percentage of Schools Offering School Breakfast Program Breakfasts that, on Average, Satisfied SMI Standards for Minimum Levels of Calories and Target Nutrients



Note: The SMI standards are one-fourth of the 1989 *Recommended Energy/Dietary Allowances*.

^α Difference between elementary and middle schools is significantly different from zero at the .05 level.

^β Difference between middle and high schools is significantly different from zero at the .05 level.

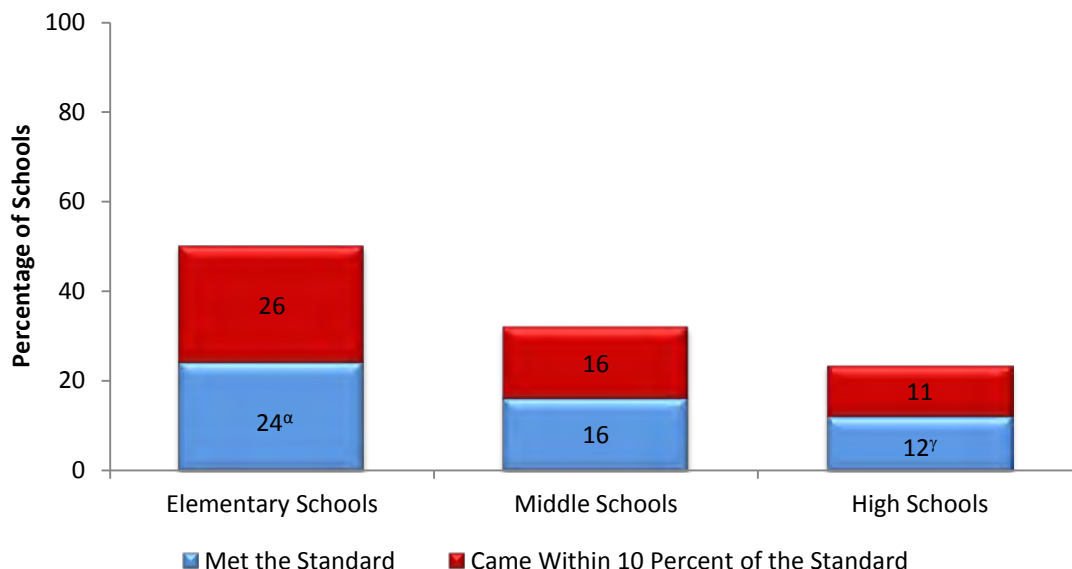
^γ Difference between elementary and high schools is significantly different from zero at the .05 level.

>97 = Point estimate is between 97 and 100 but is considered less precise than other estimates because the sample size is small or the coefficient of variation is large. The rules used in flagging estimates are described in Chapter 1. When these rules are applied, percentages close to 0 or 100 are often flagged.

SMI = School Meals Initiative for Healthy Children.

Schools that did not meet the SMI standard for minimum calories varied in how close they came to meeting this target. Twenty-six percent of elementary schools, 16 percent of middle schools, and 11 percent of high schools *offered* breakfasts that had an average calorie content that was within 10 percent of the SMI standard (Figure 7.4). At the same time, the average calorie content of breakfasts *offered* in 12 percent of elementary schools, 27 percent of middle schools, and 37 percent of high schools was more than 25 percent below the SMI standard (Appendix Table G.4).

Figure 7.4. Percentage of Schools Offering School Breakfast Program Breakfasts that, on Average, Satisfied or Came Within 10 Percent of the SMI Standard for Minimum Calories



Note: The SMI standard for calories is one-fourth of the 1989 *Recommended Energy Allowance*.

^a Difference between elementary and middle schools is significantly different from zero at the .05 level.

^y Difference between elementary and high schools is significantly different from zero at the .05 level.

SMI = School Meals Initiative for Healthy Children.

It is worth noting that the new requirements for SBP meals, which will begin to take effect in SY 2013–2014, define both minimum and maximum calorie levels.¹⁴ Readers can gain some perspective on how SBP breakfasts *offered* in SY 2009–2010 compared to these calorie ranges by examining the percentile distributions presented in Appendix Tables G.9 through G.12. For example, the new requirements specify a range of 350 to 500 calories, on average, for breakfasts in schools that serve students in kindergarten through grade 5 (elementary schools). Appendix Table G.9 shows the distribution of calories in the average SBP breakfasts *offered* in elementary schools in SY 2009–2010. These data indicate that the average calorie content of breakfasts *offered* in at least 5 percent of elementary schools fell below the minimum level of calories defined in the new requirements (the average calorie content at the 5th percentile of the distribution was 342), and that the average calorie content of breakfasts *offered* in somewhere between 10 and 25 percent of elementary schools exceeded the maximum level of calories defined in the new regulations (the average calorie content at the 75th percentile was 491 [within the range], and the average calorie content at the 90th percentile was 570 [exceeded the range]).

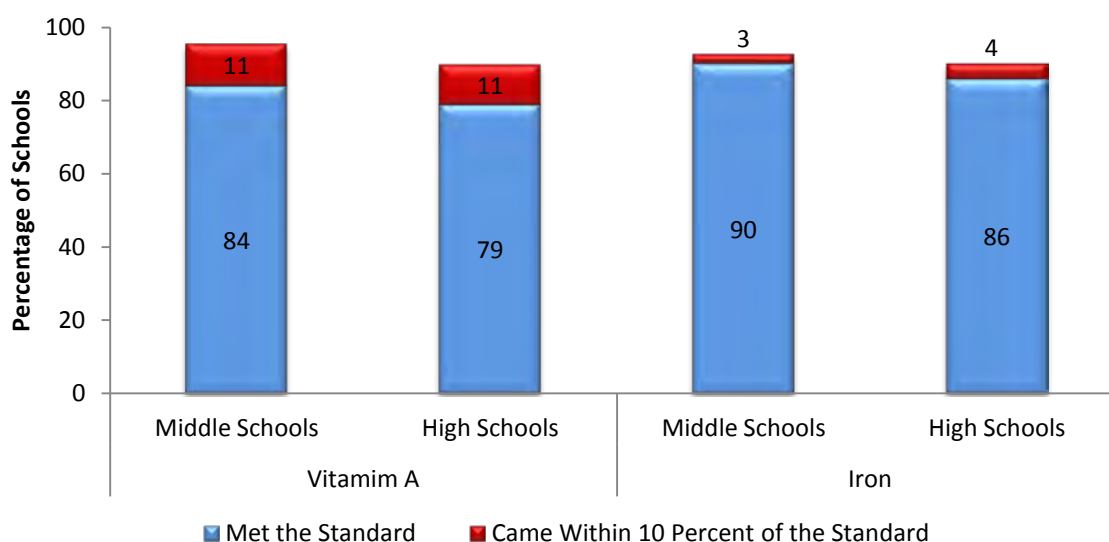
Target nutrients. Virtually all schools *offered* average SBP breakfasts that met the SMI standards for protein, calcium, and vitamin C (Figure 7.3). The majority of schools also met the SMI standards for vitamin A and iron. However, elementary schools were significantly more likely than both middle and high schools to *offer* average breakfasts that met the SMI standard for vitamin A (99

¹⁴ *Federal Register*, vol. 77, no. 17, January 26, 2012, Rules and Regulations.

percent versus 84 and 79 percent, respectively) and were significantly more likely than high schools to *offer* average breakfasts that met the SMI standard for iron (94 versus 86 percent) (Figure 7.3).

Most middle and high schools that did not meet the SMI standard for vitamin A came close to meeting this target. Eleven percent of both middle and high schools *offered* breakfasts with an average vitamin A content that was within 10 percent of the SMI standard (Figure 7.5). Similarly, the average iron content of breakfasts *offered* in 3 percent of middle schools and 4 percent of high schools were within 10 percent of the SMI standard (Figure 7.5). Thus, between 90 and 95 percent of all middle and high schools *offered* average SBP breakfasts that met the SMI standards for vitamin A and iron, or came within 10 percent of the standard.

Figure 7.5. Percentage of Middle and High Schools Offering School Breakfast Program Breakfasts that, on Average, Satisfied or Came Within 10 Percent of the SMI Standards for Vitamin A and Iron



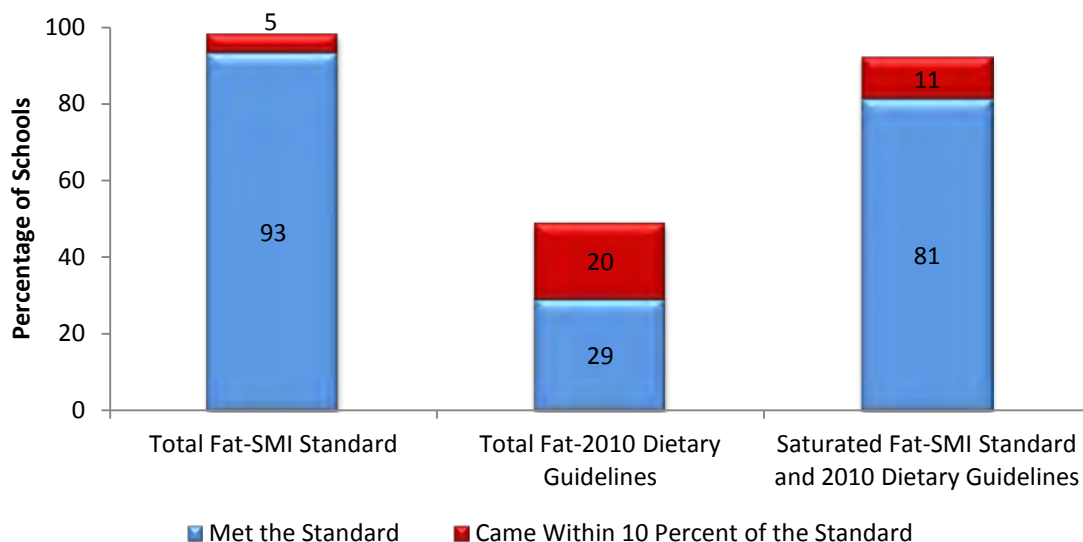
Note: The SMI standards one-fourth of the 1989 *Recommended Dietary Allowances*.

SMI = School Meals Initiative for Healthy Children.

b. Percentage of Calories from Total Fat and Saturated Fat

Total fat. The majority of schools (93 percent) *offered* average breakfasts that met the SMI standard for the percentage of calories from fat (no more than 30 percent) (Figure 7.6). The percentage of schools that *offered* average breakfasts that satisfied the 2010 *Dietary Guidelines* recommendation for fat (25 to 35 percent of calories) was substantially lower, at 29 percent. The average breakfasts *offered* in most of the schools that did not meet the 2010 *Dietary Guidelines* recommendation fell below the lower bound of the recommended range—that is, they provided an average of less than 25 percent of the calories from fat. As noted in the preceding discussion of the average percentage of calories in SBP breakfasts *offered*, the low fat content of SBP breakfasts is not necessarily a negative finding (see discussion in Section C.2.b).

Figure 7.6. Percentage of Schools Offering School Breakfast Program Breakfasts that, on Average, Satisfied or Came Within 10 Percent of SMI Standards and 2010 Dietary Guidelines Recommendations for Total Fat and Saturated Fat



Notes: The SMI standard for total fat is no more than 30 percent of calories.
 The 2010 *Dietary Guidelines* recommendation for total fat for children 4 to 18 years of age is 25 to 35 percent of calories.
 Both the SMI standard and the 2010 *Dietary Guidelines* recommendation for saturated fat are less than 10 percent of calories.

SMI = School Meals Initiative for Healthy Children.

There was some variation across school types in the extent to which average breakfasts *offered* satisfied the SMI standards for total fat and saturated fat and the 2010 *Dietary Guidelines* recommendations for total fat. Elementary and middle schools were significantly more likely than high schools to *offer* average breakfasts that met the SMI standard for total fat (95 and 94 percent, respectively, versus 89 percent) (Appendix Table G.3). In addition, elementary schools were significantly less likely than either middle or high schools to *offer* breakfasts that satisfied the 2010 *Dietary Guidelines* recommendation for total fat (25 versus 35 and 37 percent, respectively) (Appendix Table G.3).

Most schools that did not meet the SMI standard for total fat in breakfasts as *offered* came within 10 percent of this standard (Figure 7.6). Overall, 98 percent of schools *offered* breakfasts that met or came within 10 percent of the SMI standard for total fat. In contrast, there was considerable variation in how close schools came to meeting the 2010 *Dietary Guidelines* recommendation. Overall, 20 percent of schools *offered* breakfasts that were within 10 percent of the recommended range (Figure 7.6). Of this subgroup, the vast majority (95 percent) *offered* average breakfasts that came within 10 percent of the lower end of the recommended range (equivalent to 22.5 to 24.9 percent of calories from fat) (Appendix Table G.4). However, 21 percent of schools *offered* breakfasts with average fat content that was 25 percent or more below the recommended range (equivalent to less than 18.8 percent of calories from fat).

Saturated fat. Overall, 81 percent of schools *offered* breakfasts that were consistent with the SMI standard (and the *Dietary Guidelines* recommendation) for saturated fat (Figure 7.6). There were no significant differences across the three types of schools in the percentage that satisfied the

standard for saturated fat (Appendix Table G.3). Most schools that *offered* average breakfasts that did not satisfy the standard for saturated fat came close to meeting it. Overall, 11 percent of schools *offered* average SBP breakfasts that came within 10 percent of the SMI standard (equivalent to 10.0 to 10.9 percent of calories from saturated fat) (Appendix Table G.4).

c. Cholesterol, Sodium, and Dietary Fiber

About 90 percent of all schools *offered* average SBP breakfasts that met the 2010 *Dietary Guidelines* recommendation for cholesterol (Table 7.4). Substantially fewer—62 percent overall—*offered* breakfasts that satisfied the 2010 *Dietary Guidelines* recommendation for sodium. Elementary schools were significantly more likely than either middle or high schools to *offer* average breakfasts that were consistent with the 2010 *Dietary Guidelines* recommendation for sodium (70 versus 49 to 50 percent). Schools that did not meet the sodium recommendation varied in how close they came to meeting this target. Overall, 14 percent of schools *offered* breakfasts that came within 10 percent of the sodium target used in this analysis (equivalent to one-fourth of the recommended daily limit of 2,300 mg). However, the average sodium content of breakfasts *offered* in 10 percent of elementary schools, one in five (19 percent) middle schools, and one in four (24 percent) high schools exceeded the 2010 *Dietary Guidelines* recommendation by more than 25 percent (Appendix Table G.4).

Table 7.4. Proportion of Schools Offering School Breakfast Program Breakfasts that, on Average, Satisfied 2010 *Dietary Guidelines* Recommendations for Cholesterol, Sodium, and Dietary Fiber

	Elementary Schools	Middle Schools	High Schools	All Schools
Cholesterol	93	91	88	91
Sodium	70 ^a	50	49 ^y	62
Dietary Fiber	<3	<3	<3	<3
Number of Schools	282	264	257	803

Source: School Nutrition Dietary Assessment Study-IV, Menu Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Note: Benchmarks used in assessing sodium and cholesterol content are one-fourth of the daily limits recommended in the 2010 *Dietary Guidelines* (<75 mg and <575 mg, respectively). The benchmark used for dietary fiber is 14 g per 1,000 calories.

^a Difference between elementary and middle schools is significantly different from zero at the .05 level.

^y Difference between elementary and high schools is significantly different from zero at the .05 level.

<3 = Point estimate is between 0 and 3 but is considered less precise than other estimates because the sample size is small or the coefficient of variation is large. The rules used in flagging estimates are described in Chapter 1. When these rules are applied, percentages close to 0 or 100 are often flagged.

Essentially, no schools *offered* SBP breakfasts that were consistent with the 2010 *Dietary Guidelines* recommendation for dietary fiber (Table 7.4). The average breakfast *offered* in most schools fell considerably short of this target. The average dietary fiber content of breakfasts *offered* in most schools (65 percent) was more than 50 percent below the recommended level (equivalent to 6.9 g per 1,000 calories or less) (Appendix Table G.4).

d. Combinations of Standards

We looked at a number of different combinations of SMI standards and 2010 *Dietary Guidelines* recommendations. Results are summarized in Table 7.5. Readers may find it useful to refer to Table 7.1 for information about the specific requirements included in each combination.

Table 7.5. Percentage of Schools Offering School Breakfast Program Breakfasts that, on Average, Met Different Combinations of Nutrition Standards

Combinations of Standards	Elementary Schools	Middle Schools	High Schools	All Schools
All SMI Standards	19.0 ^α	10.7 ^β	5.5 ^γ	14.7
SMI Standards for all Target Nutrients ^a	90.6 ^α	78.0	72.6 ^γ	84.6
SMI Standards for all Target Nutrients ^a and SMI Standard for Saturated Fat	75.3	67.5	59.2 ^γ	70.6
SMI Standards for all Target Nutrients ^a and SMI Standard for Saturated Fat and 2010 <i>Dietary Guidelines</i> Standard for Total Fat	12.7	18.3	13.5	13.9
Updated Standards for all SMI Target Nutrients ^b and SMI Standard for Saturated Fat and 2010 <i>Dietary</i> <i>Guidelines</i> Standard for Total Fat	9.0	12.2 ^β	4.8	8.7
Number of Schools	282	264	257	803

Source: School Nutrition Dietary Assessment Study-IV, Menu Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research, Inc. are weighted to be representative of all public schools offering the National School Lunch Program.

^aIncludes protein, vitamin A, vitamin C, calcium and iron.

^bUpdated to reflect RDA values included in the *Dietary Reference Intakes*.

^αDifference between elementary and middle schools is significantly different from zero at the .05 level.

^βDifference between middle and high schools is significantly different from zero at the .05 level.

^γDifference between elementary and high schools is significantly different from zero at the .05 level.

RDA = *Recommended Dietary Allowances*; SMI = School Meals Initiative for Healthy Children.

Overall, 15 percent of schools *offered* SBP breakfasts that met all of the SMI standards (Table 7.5). Elementary schools were significantly more likely to meet all the SMI standards than either middle or high schools (19 versus 11 and 6 percent, respectively), and middle schools were significantly more likely to do so than high schools. As discussed in preceding sections and shown in Figures 7.3 and 7.4, the SMI standard that was the most challenging for schools was the standard for minimum calories. Indeed, as shown in the second row of Table 7.5, most schools (85 percent overall) *offered* breakfasts that met all of the SMI standards for target nutrients (protein, vitamin A, vitamin C, calcium, and iron). Again, elementary schools were significantly more likely to *offer* such breakfasts than middle or high schools (91 versus 78 and 73 percent, respectively). As discussed previously, the target nutrient standards that middle and high schools were least likely to meet were the standards for vitamin A and iron (see Figures 7.3 and 7.5).

Close to three-quarters of all schools (71 percent) met all of the SMI standards for target nutrients well as the SMI standard (and 2010 *Dietary Guidelines* recommendation) for saturated fat (Table 7.5). Elementary schools were significantly more likely than high schools to meet this

combination of standards (75 versus 59 percent). When the combination was expanded to include the 2010 *Dietary Guidelines* recommendation for total fat, there was a precipitous drop in the percentage of schools that met all the standards—from 71 percent to 14 percent overall. This is not surprising, given that, overall, less than one in three schools *offered* average SBP breakfasts that met the 2010 *Dietary Guidelines* recommendation for total fat (see Figure 7.6).

The proportion of schools meeting all the standards decreased (from 14 to 9 percent overall) when the above combination (SMI standards for all target nutrients, SMI standard for saturated fat, and 2010 *Dietary Guidelines* recommendation for total fat) was updated to reflect current RDAs (that is, those specified in the DRIs) for the SMI target nutrients (Table 7.5). When updated RDA standards were used for the SMI target nutrients, middle schools were significantly more likely to meet all of the standards than high schools. This is consistent with the fact that the current RDA for iron is lower than the 1989 RDA for the age groups of children typically attending middle schools.

D. Calorie and Nutrient Content of SBP Breakfasts *Served*

Estimates of the calorie and nutrient content of the average SBP breakfast *served* incorporate information about students' food selection patterns. Estimates of meals *served* give greater weight to foods that students select more frequently. Examination of meals *served* was introduced as part of SMI to provide a more accurate assessment of the potential contribution of school meals to children's dietary intakes.¹⁵ The nutrition standards used to assess breakfasts *served* are the same as those used to assess breakfasts *offered* (see Table 7.1). One school did not provide the detailed information on students' food selections needed to estimate the calorie and nutrient content of SBP breakfasts *served*. Thus, the maximum sample for this analysis is 802 schools.

1. Average Calorie and Nutrient Content

On average, SBP breakfasts *served* to students during a typical school week in SY 2009–2010 provided 461 calories, with 24.8 percent of calories from fat and 8.7 percent from saturated fat (Table 7.6).¹⁶ In contrast to the pattern observed for NSLP meals (see Chapter 5), average amounts of calories and nutrients in SBP breakfasts *served* were not uniformly lower than the averages observed for SBP breakfasts *offered*. In fact, average amounts of cholesterol and sodium were slightly higher in breakfasts *served* than in breakfasts *offered* (Table 7.2). Differences in the patterns observed for NSLP and SBP meals likely reflect the fact that, under OVS, students can refuse fewer of the foods offered to them at breakfast than at lunch. Students in schools that implement OVS can refuse only one of four meal components at breakfast, compared to up to two of five components at lunch.

¹⁵ The terms unweighted analysis and weighted analysis are often used to refer to estimates of the calorie and nutrient content of meals *offered* and meals *served*, respectively.

¹⁶ Detailed data on the calorie and nutrient content of SBP breakfasts *served*, including standard errors, percentile distributions, and concentrations of nutrients per 1,000 calories, are provided in Appendix Tables G.13 to G.16 and G.21 to G.24.

Table 7.6. Average Calorie and Nutrient Content of School Breakfast Program Breakfasts Served

	Elementary Schools	Middle Schools	High Schools	All Schools
Average Amount				
Calories	434	503	504	461
Nutrients Included in SMI Standards				
Protein (g)	15	17	17	16
Vitamin A (mcg RE)	245	241	234	242
Vitamin C (mg)	28	32	33	30
Calcium (mg)	382	390	373	382
Iron (mg)	4.5	4.5	4.6	4.5
Other Dietary Components				
Cholesterol (mg)	44	54	56	48
Sodium (mg)	569	687	703	618
Dietary fiber (g/1,000 calories)	6	6	6	6
Average Percentage of Calories from:				
Total fat	23.8	26.0	26.6	24.8
Saturated fat	8.6	8.9	9.1	8.7
Number of Schools	282	263	257	802

Source: School Nutrition Dietary Assessment Study-IV, Menu Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

RE = Retinol equivalents; SMI = School Meals Initiative for Healthy Children.

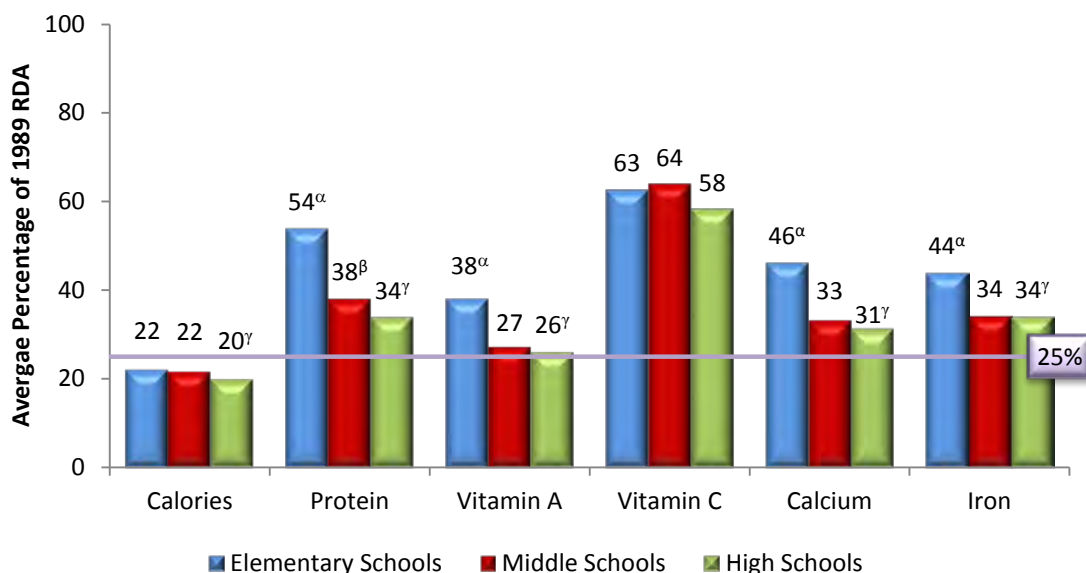
2. Average Calorie and Nutrient Content Relative to Nutrition Standards

a. Calories and Target Nutrients

On average, SBP breakfasts *served* in all three types of schools in SY 2009–2010, like SBP breakfasts *offered*, met or exceeded the SMI standards (at least one-fourth of the 1989 RDA) for protein, vitamins A and C, calcium, and iron (Figure 7.7). Except for vitamin C, breakfasts *served* in elementary schools provided a significantly greater share of the 1989 RDAs for target nutrients than breakfasts *served* in middle schools or high schools. In addition, breakfasts *served* in middle schools provided a significantly larger share of the 1989 RDA for protein than breakfasts *served* in high schools. As noted previously, these differences are attributable at least partially to differences in the nutrient requirements of older and younger students.

The average calorie content of breakfasts *served* in all three types of schools fell short of the SMI standard for calories (one-fourth of the 1989 REA for calories) (Figure 7.7). Elementary school breakfasts provided a significantly greater share of children’s calorie needs, as defined by the 1989 RDAs, than high schools, although the magnitude of the difference was small (22 versus 20 percent).

Figure 7.7. Average Percentage of 1989 Recommended Energy/Dietary Allowances in School Breakfast Program Breakfasts Served



Note: The SMI standards are one-fourth of the 1989 *Recommended Energy/Dietary Allowances*.

^α Difference between elementary and middle schools is significantly different from zero at the .05 level.

^β Difference between middle and high schools is significantly different from zero at the .05 level.

^γ Difference between elementary and high schools is significantly different from zero at the .05 level.

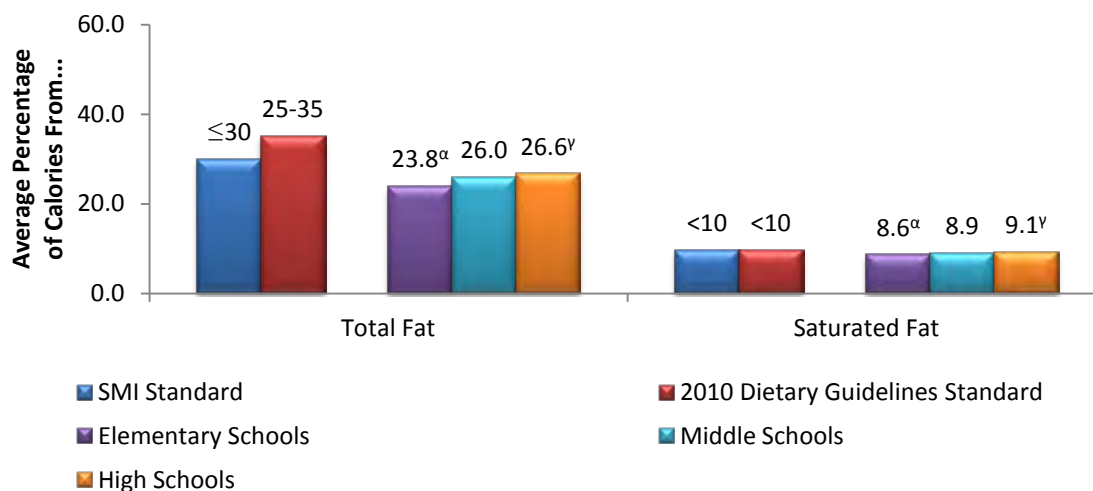
SMI = School Meals Initiative for Healthy Children.

b. Percentage of Calories from Total Fat and Saturated Fat

On average, SBP breakfasts *served* in SY 2009–2010 in all three types of schools met the SMI standard for fat (no more than 30 percent of calories) (Figure 7.8). In addition, average breakfasts *served* in middle and high schools met the 2010 *Dietary Guidelines* recommendation for fat (25 to 35 percent of calories), and average breakfasts *served* in elementary schools came close to meeting this target. Breakfasts *served* in elementary schools provided a significantly lower percentage of calories from fat, on average, than breakfasts *served* in middle or high schools (23.8 versus 26.0 and 26.6 percent, respectively). The average percentage of calories from fat was consistently higher in breakfasts *served* than breakfasts *offered* (see Figure 7.2). This suggests that students tended to select items with higher fat content more often than those with lower fat content.¹⁷

The average saturated fat content of SBP breakfasts *served* in all schools was consistent with the SMI standard (and 2010 *Dietary Guidelines* recommendation) of less than 10 percent of calories (Figure 7.8). On average, the saturated fat content of breakfasts *served* in elementary schools was significantly lower than the average of breakfasts *served* in high schools (8.6 versus 9.1 percent).

¹⁷ Appendix Tables G.1 and G.5 show that breakfasts *served* were 1 to 2 g higher in fat than breakfasts *offered*, on average, despite being 1 to 5 percent lower in calories.

Figure 7.8. Average Percentage of Calories from Total Fat and Saturated Fat in School Breakfast Program Breakfasts Served

Notes: The average percentage of calories from total fat is consistent with the SMI standard (no more than 30 percent of calories) and, for middle and high schools, with the range of fat intake recommended in the 2010 *Dietary Guidelines* for children 4 to 18 years of age (25 to 35 percent of calories). The average percentage of fat in elementary school breakfasts served falls below the lower end of the 2010 *Dietary Guidelines* range.

The average percentage of calories from saturated fat is consistent with both the SMI standard and the 2010 *Dietary Guidelines* recommendation (less than 10 percent of calories).

^α Difference between elementary and middle schools is significantly different from zero at the .05 level.

^γ Difference between elementary and high schools is significantly different from zero at the .05 level.

SMI = School Meals Initiative for Healthy Children.

c. Cholesterol, Sodium, and Dietary Fiber

Cholesterol. Like SBP breakfasts *offered*, SBP breakfasts *served* in SY 2009–2010 met the 2010 *Dietary Guidelines* recommendation for cholesterol (Table 7.7). Average cholesterol content in all three types of schools was well below the benchmark of 75 mg and ranged from 44 mg to 56 mg. The average cholesterol content of breakfasts *served* in elementary schools was significantly lower than that of breakfasts *served* in middle and high schools (44 mg versus 54 and 56 mg, respectively).

Table 7.7. Average Cholesterol, Sodium, and Dietary Fiber Content of School Breakfast Program Breakfasts Served

	Standard	Elementary Schools	Middle Schools	High Schools	All Schools
Cholesterol (mg)	<75 mg ^{a,b}	44 ^α	54	56 ^γ	48
Sodium (mg)	<575 mg ^{a,b}	569 ^α	687	703 ^γ	618
Dietary Fiber (g/1,000 calories)	14 ^a	6 ^α	6	6 ^γ	6
Number of Schools		282	263	257	802

Source: School Nutrition Dietary Assessment Study-IV, Menu Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

^aBased on the 2010 *Dietary Guidelines for Americans*.

^bBenchmark is one-fourth of recommended daily limit.

^α Difference between elementary and middle schools is significantly different from zero at the .05 level.

^γ Difference between elementary and high schools is significantly different from zero at the .05 level.

Sodium. In keeping with the findings reported for SBP breakfasts *offered*, elementary schools *served* breakfasts that were consistent with the 2010 *Dietary Guidelines* recommendation for sodium, but middle and high schools did not (Table 7.7). The average sodium content of elementary school breakfasts (569 mg) was below the benchmark of 575 mg, which is equivalent to one-fourth of the recommended daily limit for sodium. Average breakfasts *offered* in middle and high schools were significantly higher in sodium than the average breakfast *offered* in elementary schools (687 and 703 mg versus 569 mg).¹⁸

Dietary fiber. SBP breakfasts *served* in SY 2009–2010 did not meet the *Dietary Guidelines* recommendation for dietary fiber (Table 7.7). On average, SBP breakfasts *served* in all types of schools provided 6 g of dietary fiber per 1,000 calories, compared to the *Dietary Guidelines* recommendation of 14 g per 1,000 calories. Modest but substantively unimportant differences in the average concentration of dietary fiber in SBP breakfasts *served* in elementary schools and high schools were statistically significant (average dietary fiber content per 1,000 calories rounded to 6 g for breakfasts *served* in all three types of schools).

3. Percentage of Schools Meeting Standards

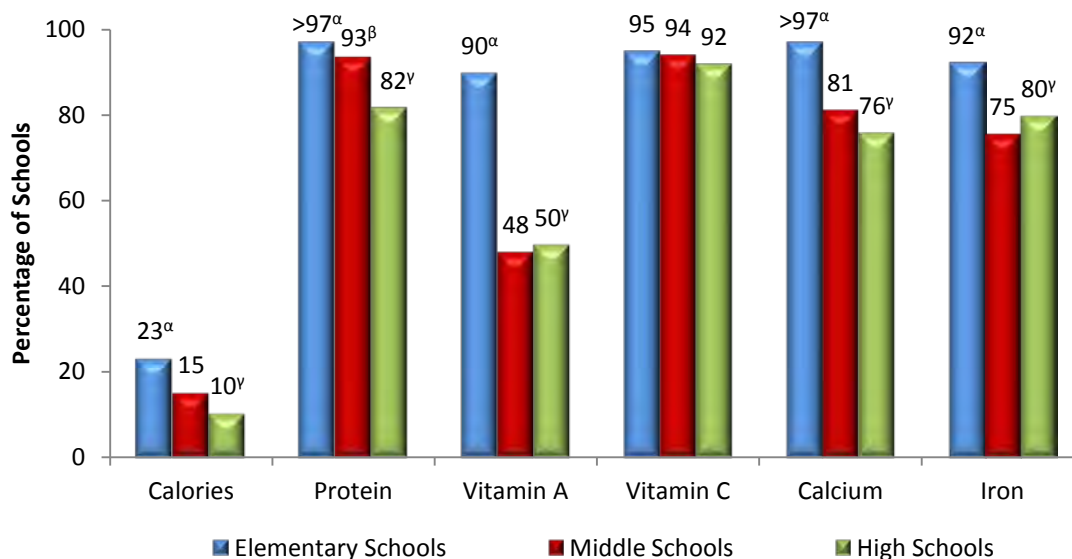
a. Calories and Target Nutrients

Calories. As noted for average breakfasts *offered*, the SMI standard for calories was the most challenging for all three types of schools. On average, fewer than one in five schools *served* breakfasts that met the SMI standard for minimum calories (Figure 7.9). Elementary schools were significantly more likely than either middle or high schools to *serve* breakfasts with average calorie levels below the SMI standard (23 versus 15 and 10 percent, respectively). The SMI standard for calories is a minimum, so lunches *served* in schools that did not meet this standard were low in calories, on average, relative to the standard.

Schools that did not meet the SMI standard for calories varied in how close they came to meeting this target. Twenty-three percent of elementary schools, 9 percent of middle schools, and 13 percent of high schools *served* breakfasts with an average calorie content that was within 10 percent of the SMI standard (Figure 7.10). However, the average calorie content of breakfasts *served* in 20 percent of elementary schools, 36 percent of middle schools, and 41 percent of high schools was 25 percent or more below the SMI standard (Appendix Table G.8). *Offering* and *serving* average SBP lunches that are low in calories, relative to the SMI standard, is not necessarily a negative outcome. Children obtain calories from other meals and snacks consumed both within and outside of school.

¹⁸ As noted in the preceding analysis of breakfasts *offered*, sodium content may be somewhat overestimated because the nutrient analysis protocol did not include entry of individual recipes for all schools.

Figure 7.9. Percentage of Schools *Serving* School Breakfast Program Breakfasts that, on Average, Satisfied SMI Standards for Minimum Levels of Calories and Target Nutrients



Note: The SMI standards are one-fourth of the 1989 *Recommended Energy/Dietary Allowances*.

^α Difference between elementary and middle schools is significantly different from zero at the .05 level.

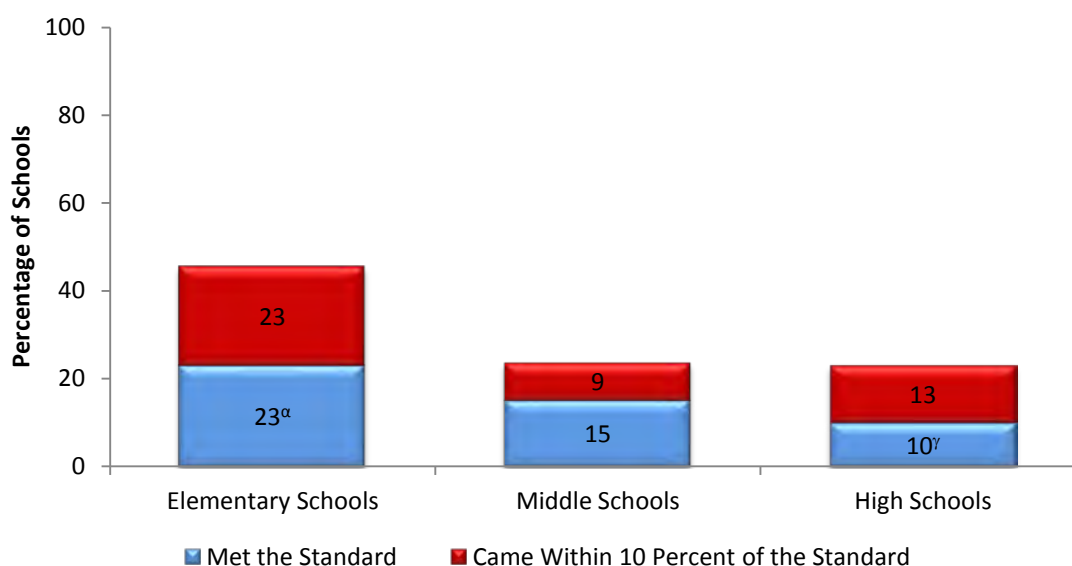
^β Difference between middle and high schools is significantly different from zero at the .05 level.

^γ Difference between elementary and high schools is significantly different from zero at the .05 level.

>97 = Point estimate is between 97 and 100 but is considered less precise than other estimates because the sample size is small or the coefficient of variation is large. The rules used in flagging estimates are described in Chapter 1. When these rules are applied, percentages close to 0 or 100 are often flagged.

SMI = School Meals Initiative for Healthy Children.

Figure 7.10. Percentage of Schools *Serving* School Breakfast Program Breakfasts that, on Average, Satisfied or Came Within 10 Percent of the SMI Standard for Minimum Calories



Note: The SMI standard for calories is one-fourth of the 1989 *Recommended Energy Allowance*.

^α Difference between elementary and middle schools is significantly different from zero at the .05 level.

^γ Difference between elementary and high schools is significantly different from zero at the .05 level.

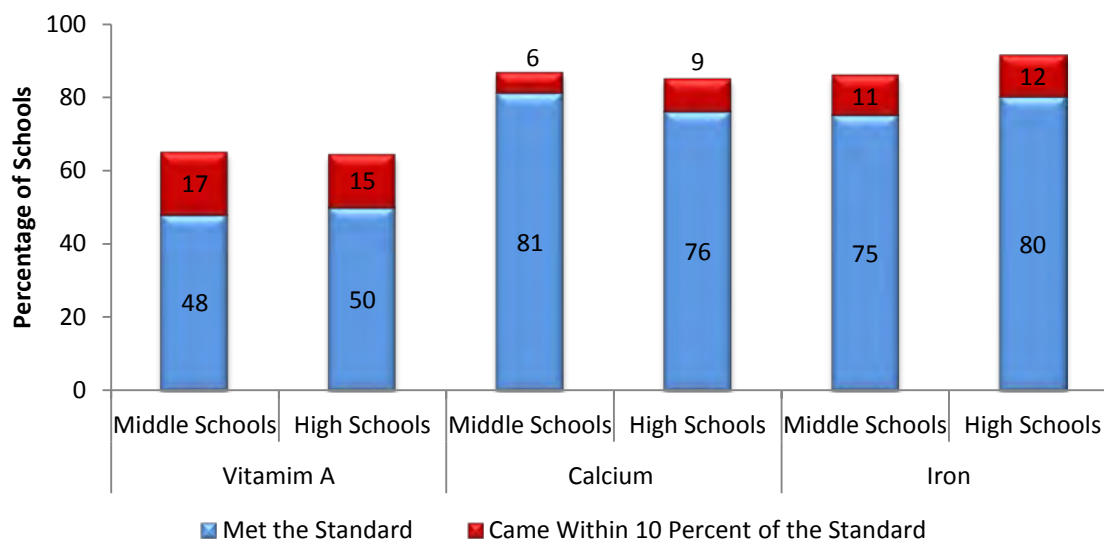
SMI = School Meals Initiative for Healthy Children.

The new requirements for SBP meals, which will begin to take effect in SY 2013–2014, define both minimum and maximum calorie levels.¹⁹ Readers can get some perspective on how SBP breakfasts *served* in SY 2009–2010 compared to these calorie ranges by examining the percentile distributions presented in Appendix Tables G.13 through G.16. Also see the discussion in Section C.3.a. of this chapter).

Target nutrients. On average, SBP breakfasts *served* in virtually all schools met the SMI standard for vitamin C (Figure 7.9). In addition, three-quarters or more of all schools *served* average breakfasts that met the SMI standards for protein, calcium, and iron. However, only about half of middle and high schools *served* SBP breakfasts that met the SMI standard for vitamin A. With the exception of vitamin C, elementary schools were significantly more likely to meet the SMI standards for target nutrients than middle or high schools. In addition, middle schools were significantly more likely to meet the SMI standard for protein than high schools.

There was substantial variation across middle and high schools in how close schools that did not *serve* breakfasts that met SMI standards for target nutrients came to meeting these targets. Fifteen to 17 percent of middle and high schools *served* breakfasts that had an average vitamin A content within 10 percent of the SMI standard (Figure 7.11). However, roughly 20 percent of middle and high schools *served* breakfasts with an average vitamin A content 25 percent or more below the SMI standard (Appendix Table G.8). Six to 12 percent of middle and high schools *served* average breakfasts that came within 10 percent of the SMI standards for calcium and iron (Figure 7.11).

Figure 7.11. Percentage of Middle and High Schools *Serving* School Breakfast Program Breakfasts that, on Average, Satisfied or Came Within 10 Percent of the SMI Standards for Vitamin A, Calcium, and Iron



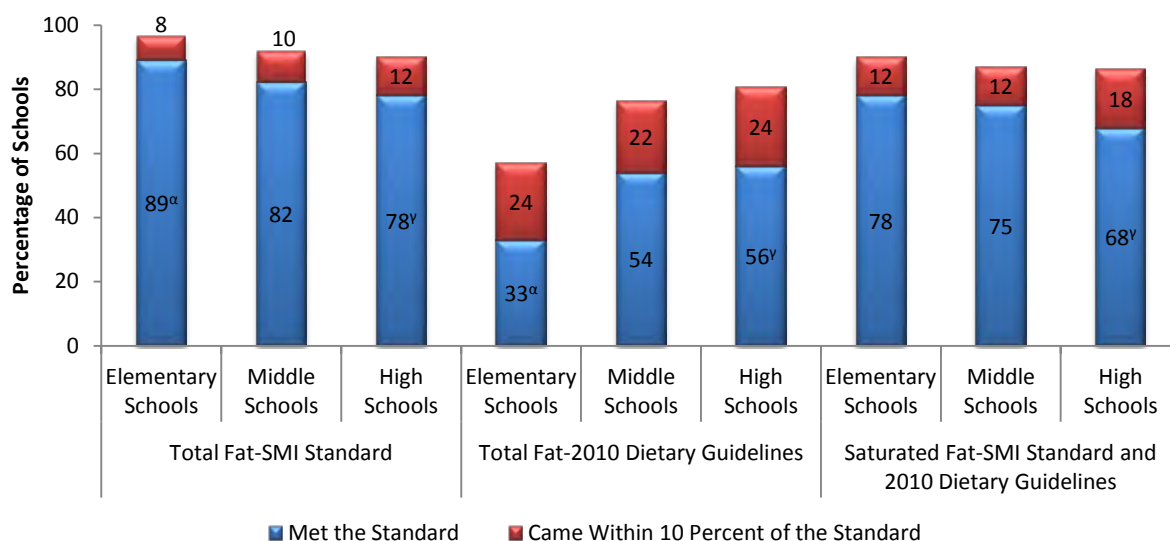
Notes: The SMI standards are one-fourth of the 1989 *Recommended Dietary Allowances*.
None of the differences between middle and high schools are statistically significant.
SMI = School Meals Initiative for Healthy Children.

¹⁹ *Federal Register*, vol. 77, no. 17, January 26, 2012, Rules and Regulations.

b. Percentage of Calories from Total Fat and Saturated Fat

Total fat. The majority of schools of all types *served* average breakfasts that met the SMI standard for the percentage of calories from fat (no more than 30 percent) (Figure 7.12). Elementary schools were significantly more likely than either middle or high schools to meet this standard (89 versus 82 and 78 percent, respectively). Most schools that didn't meet the SMI standard for total fat came close to meeting this target. Eight percent of elementary schools, 10 percent of middle schools, and 12 percent of high schools *served* average breakfasts that were within 10 percent of the SMI standard (equivalent to 30.1 to 33.0 percent of calories).

Figure 7.12. Percentage of Schools *Serving* School Breakfast Program Breakfasts that, on Average, Satisfied or Came Within 10 Percent of the SMI and 2010 *Dietary Guidelines* Standards for Total Fat and Saturated Fat



Notes: The SMI standard for total fat is no more than 30 percent of calories.

The 2010 *Dietary Guidelines* recommendation for total fat for children 4 to 18 years of age is 25–35 percent of calories.

Both the SMI standard and the 2010 *Dietary Guidelines* recommendation for saturated fat are less than 10 percent of calories.

^a Difference between elementary and middle schools is significantly different from zero at the .05 level.

^y Difference between elementary and high schools is significantly different from zero at the .05 level.

SMI = School Meals Initiative for Healthy Children.

The proportions of schools that *served* average breakfasts that met the 2010 *Dietary Guidelines* recommendation for fat (25 to 35 percent of calories) were substantially lower than the proportions that met the SMI standard (Figure 7.12), but the differences were not as dramatic as those for breakfasts *offered* (see Figure 7.4). The average breakfast *served* in one-third of elementary schools and more than half of all middle and high schools (54 and 56 percent, respectively) met the *Dietary Guidelines* recommendation for total fat. Differences between elementary schools and middle and high schools were statistically significant. These results provide further evidence that students, especially in middle and high schools, tend to select breakfast items that have a higher fat content more frequently than items with a lower fat content.

There was considerable variation in how close schools that did not meet the 2010 *Dietary Guidelines* recommendation for total fat came to meeting this target. Twenty-four percent of elementary and high schools and 22 percent of middle schools *served* breakfasts that were within 10 percent of the recommended range (Figure 7.12). The average breakfast *served* in the majority of these schools fell below the lower end of the recommended range, providing 22.5 to 24.9 percent of calories from fat (Appendix Table G.8). (Only 2 to 6 percent of schools *served* average breakfasts that exceeded the upper end of the range [equivalent to 35.1 to 38.5 percent of calories from fat].) However, 14 percent of elementary schools, 7 percent of middle schools, and 7 percent of high schools *served* breakfasts that were 25 percent or more below the lower end of recommended range (equivalent to less than 18.8 percent of calories from fat).

Saturated fat. Close to 80 percent of elementary and middle schools (78 and 75 percent, respectively) and more than two-thirds (68 percent) of high schools *served* average breakfasts that met the SMI standard (and *Dietary Guidelines* recommendation) for saturated fat (Figure 7.12). Elementary schools were significantly more likely than high schools to meet this standard. Twelve percent of elementary schools, 12 percent of middle schools, and 18 percent of high schools *served* SBP breakfasts that came within 10 percent of the SMI standard (equivalent to 10.0 to 10.9 percent of calories from saturated fat).

c. Cholesterol, Sodium, and Dietary Fiber

Overall, 87 percent of schools *served* SBP breakfasts that were consistent with the 2010 *Dietary Guidelines* recommendation for cholesterol (Table 7.8). Elementary schools were significantly more likely to do so than middle or high schools (91 versus 82 and 79 percent, respectively). Fewer than half of all schools (46 percent) *served* breakfasts that were consistent with the 2010 *Dietary Guidelines* recommendation for sodium. Elementary schools were significantly more likely than either middle or high schools to *serve* breakfasts that met this recommendation (53 versus 37 and 36 percent, respectively). Schools that did not meet the sodium recommendation varied in how close they came to meeting this target. Overall, 15 percent of schools *served* breakfasts that came within 10 percent of the recommended maximum (equivalent to 576 to 633 mg sodium) (Appendix Table G.8). However, the average sodium content of breakfasts *served* in 19 percent of elementary schools, 34 percent of middle schools, and 43 percent of high schools exceeded the 2010 *Dietary Guidelines* recommendation by more than 25 percent (Appendix Table G.8). About half of the middle and high schools in this group (17 percent of middle schools and 21 percent of high schools overall) exceeded the sodium recommendation by more than 50 percent.

Essentially, no schools *served* SBP breakfasts that were consistent with the 2010 *Dietary Guidelines* recommendation for dietary fiber (Table 7.8). The average breakfast *served* in most schools fell considerably short of this target. The average dietary fiber content of breakfasts *served* in most schools (71 percent) was more than 50 percent below the recommended level (equivalent to 6.9 g per 1,000 calories or less) (Appendix Table G.8).

d. Combinations of Standards

Table 7.9 presents data on the proportions of schools that met different combinations of the nutrition standards used in evaluating SBP breakfasts. Key findings are summarized below. Readers may want to refer to Table 7.1 and the preceding discussion of results for SBP breakfasts *offered* for background on the combinations examined.

Table 7.8. Proportion of Schools Serving School Breakfast Program Breakfasts that, on Average, Satisfied 2010 Dietary Guidelines Recommendations for Cholesterol, Sodium, and Dietary Fiber

	Elementary Schools	Middle Schools	High Schools	All Schools
Cholesterol	91 ^α	82	79 ^γ	87
Sodium	53 ^α	37	36 ^γ	46
Dietary Fiber	<3	<3	<3	<3
Number of Schools	282	264	257	803

Source: School Nutrition Dietary Assessment Study-IV, Menu Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Note: Benchmarks used in assessing sodium and cholesterol content are one-fourth of the daily limits recommended in the 2010 *Dietary Guidelines* (<75 mg and <575 mg, respectively). The benchmark used for dietary fiber is 14 g per 1,000 calories.

^αDifference between elementary and middle schools is significantly different from zero at the .05 level.

^γDifference between elementary and high schools is significantly different from zero at the .05 level.

<3 = Point estimate is between 0 and 3 but is considered less precise than other estimates because the sample size is small or the coefficient of variation is large. The rules used in flagging estimates are described in Chapter 1. When these rules are applied, percentages close to 0 or 100 are often flagged.

Table 7.9. Percentage of Schools Serving School Breakfast Program Breakfasts that, on Average, Met Different Combinations of Nutrition Standards

Combinations of Standards	Elementary Schools	Middle Schools	High Schools	All Schools
All SMI Standards	14.6 ^α	6.8	3.2 ^γ	10.9
SMI Standards for all Target Nutrients ^a	81.6 ^α	42.1	37.7 ^γ	65.5
SMI Standards for all Target Nutrients ^a and SMI Standard for Saturated Fat	65.7 ^α	33.4	26.2 ^γ	51.8
SMI Standards for all Target Nutrients ^a and SMI Standard for Saturated Fat, and 2010 <i>Dietary Guidelines</i> Standard for Total Fat	11.9	12.6	10.3	11.7
Updated Standards for all Target Nutrients ^b and SMI Standard for Saturated Fat and 2010 <i>Dietary</i> <i>Guidelines</i> Standard for Total Fat	6.5	9.3	4.8	6.7
Number of Schools	282	263	257	802

Source: School Nutrition Dietary Assessment Study-IV, Menu Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research, Inc. are weighted to be representative of all public schools offering the National School Lunch Program.

^aIncludes protein, vitamin A, vitamin C, calcium and iron.

^bUpdated to reflect RDA values included in the *Dietary Reference Intakes*.

^αDifference between elementary and middle schools is significantly different from zero at the .05 level.

^γDifference between elementary and high schools is significantly different from zero at the .05 level.

RDA = *Recommended Dietary Allowances*; SMI = School Meals Initiative for Healthy Children.

- Overall, 11 percent of schools *served* SBP breakfasts that met all of the SMI standards. Elementary schools were significantly more likely than either middle or high schools to *serve* breakfasts that met all of the SMI standards (15 versus 7 and 3 percent, respectively).
- About two-thirds (66 percent) of all schools *served* SBP breakfasts that met all the SMI standards for target nutrients (protein, vitamins A and C, calcium, and iron). (This compares to 85 percent of all schools for average breakfasts *offered*.) Elementary schools were significantly more likely to *serve* such breakfasts than middle or high schools (82 versus 42 and 38 percent, respectively).
- When the SMI standard for saturated fat (which is the same as the 2010 *Dietary Guidelines* recommendation) is added to the SMI standards for all target nutrients, the percentage of schools meeting all of the standards falls from 66 percent to 52 percent. This means that 14 percent of schools *served* SBP breakfasts that met all of the SMI standards for target nutrients, but not the standard for saturated fat. Elementary schools were significantly more likely than either middle or high schools to *serve* average SBP breakfasts that met the SMI standards for all target nutrients as well as the SMI standard for saturated fat (66 versus 33 and 26 percent, respectively).
- When the combination was expanded to include the 2010 *Dietary Guidelines* recommendation for total fat, the proportion of schools that met all the standards dropped precipitously—from 52 percent overall to 12 percent. For this combination, there were no significant differences across school types in the proportion of schools that met all the standards.
- The proportion of schools meeting all the standards decreased by almost 50 percent (from 12 to 7 percent overall) when the above combination (SMI standards for all target nutrients, SMI standard for saturated fat, and 2010 *Dietary Guidelines* recommendation for total fat) was updated to include current RDAs (as specified in the DRIs). There were no statistically significant differences across school types in the proportion of schools that met all of these standards.

E. Calorie and Nutrient Content of SBP Breakfasts *Offered* and *Served*, by Menu-Planning System

In SY 2009–2010, SFAs participating in the SBP had five options for planning menus to meet the SMI nutrition standards. Two of the systems were food-based and included requirements for food groups (meal components) to be included in each meal as well as minimum acceptable serving sizes for children in different grades. Under traditional food-based menu planning, an SBP breakfast must include milk (as a beverage), two servings of meat or meat alternate, two servings of bread or other grain product, or one serving of meat/meat alternate and one serving of bread/grain. Enhanced food-based menu planning has similar specifications but includes the option of offering an additional serving of bread/grain for students in grades 7–12.

SFAs also had the option to use nutrient-based menu planning, referred to as nutrient standard menu planning or NSMP. NSMP requires that SFAs use one of several USDA-approved

computerized nutrient analysis systems to plan menus and imposes few food-based menu requirements.²⁰ A variant known as assisted nutrient standard menu planning (ANSMP) allows SFAs to arrange for external sources to assist with menu planning and/or nutrient analysis. Finally, SFAs could use any other reasonable approach to plan menus, as long as the menus met the nutrition standards.²¹

1. Average Calorie and Nutrient Content Relative to Nutrition Standards

a. Calories and Target Nutrients

On average, SBP breakfasts *offered* and *served* in schools that used each of the different menu-planning systems (traditional food-based, enhanced food-based, and nutrient-based) met the SMI standards (one-third of the 1989 REA/RDA) for all target nutrients but not for calories (Table 7.10).²² There were some statistically significant differences in the average percentage of the 1989 REA/RDA in breakfasts *offered* and *served* in schools that used different menu-planning approaches. Most of the differences were noted for breakfasts *offered*, and most were small in magnitude. On average, breakfasts *offered* in schools that used the traditional food-based menu-planning system provided a significantly smaller share of the 1989 RDAs for calcium and iron than breakfasts *offered* in schools that used nutrient-based menu planning (45 versus 48 percent for calcium and 42 versus 50 percent for iron). Schools that used enhanced food-based menu planning *offered* breakfasts that provided a smaller average share of the 1989 RDA for protein than schools that used nutrient-based menu planning (48 versus 53 percent). Finally, breakfasts *offered* in schools that used the traditional food-based system provided a significantly smaller average share of the 1989 REA than breakfasts *offered* in schools that used the enhanced food-based and nutrient-based menu-planning systems (22 versus 23 and 24 percent, respectively). For breakfasts *served*, the difference in the average percentage of the 1989 REA provided in schools that used the enhanced food-based and nutrient-based menu-planning systems was very small (22 versus 21 percent) but was statistically significant.

²⁰ For breakfast, NSMP requires that milk be offered as a beverage and that at least two other menu items be offered.

²¹ Details about the specific requirements of each menu-planning approach are provided in Appendix A.

²² Data on the average calorie and nutrient content of SBP breakfasts *offered* and *served* in schools that use different menu-planning systems, including standard errors and percentile distributions, are presented in detail in Appendix G.

Table 7.10. Average Percentage of 1989 Recommended Energy/Dietary Allowances in School Breakfast Program Breakfasts Offered and Served, by Menu-Planning System

		Percentage of Schools			Nutrient-Based Menu Planning ^a
		Food-Based Menu Planning			
		Traditional	Enhanced	All	
SMI Standard					
SBP Breakfasts <i>Offered</i>					
Calories	25%	21.5 ^α	22.7	21.9	24.0 ^γ
Protein	25%	47.1	47.8 ^β	47.3	52.9 ^γ
Vitamin A	25%	37.3	39.0	37.8	40.1
Vitamin C	25%	68.2	71.5	69.2	69.3
Calcium	25%	44.8	46.1	45.2	47.6 ^γ
Iron	25%	42.0	44.4	42.7	49.5 ^γ
SBP Breakfasts <i>Served</i>					
Calories	25%	21.8	22.1 ^β	21.9	20.8
Protein	25%	47.3	47.4	47.3	45.4
Vitamin A	25%	33.3	35.5	33.9	32.6
Vitamin C	25%	61.5	63.9	62.2	60.8
Calcium	25%	41.1	41.6	41.2	39.0
Iron	25%	38.7	42.0	39.6	40.8
Number of Schools		396	159	555	248

Source: School Nutrition Dietary Assessment Study-IV, Menu Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

^a Includes both Nutrient Standard Menu Planning (NSMP) and Assisted Nutrient Standard Menu Planning (ANSMP).

^α Difference between traditional and enhanced is significantly different from zero at the .05 level.

^β Difference between enhanced and nutrient-based is significantly different from zero at the .05 level.

^γ Difference between traditional and nutrient-based is significantly different from zero at the .05 level.

SBP = School Breakfast Program; SMI = School Meals Initiative for Healthy Children.

b. Total Fat and Saturated Fat

On average, the fat content of breakfasts *offered* and *served* in schools using each type of menu-planning system met the SMI standard for total fat (no more than 30 percent of calories) (Table 7.11). However, in all schools, the average fat content of SBP breakfasts *offered* fell below the lower bound of the range of fat intake recommended for school-aged children in the 2010 *Dietary Guidelines* (25 to 35 percent of calories). The fat content of the average breakfasts *served* came closer to meeting the 2010 *Dietary Guidelines* recommendation, but generally fell just below the lower bound. On average, only breakfasts *served* in schools that used the enhanced food-based menu system met the 2010 *Dietary Guidelines* recommendation.

For all three menu-planning systems, the average saturated fat content of breakfasts *offered* and *served* met the SMI standard (and 2010 *Dietary Guidelines* recommendation) for saturated fat (less than 10 percent of calories) (Table 7.11).

Table 7.11. Average Total Fat and Saturated Fat Content of School Breakfast Program Breakfasts Offered and Served, Relative to SMI Nutrition Standards, by Menu-Planning System

	SMI Standard	Percentage of Schools			
		Food-Based Menu Planning			Nutrient-Based Menu Planning ^a
		Traditional	Enhanced	All	
SBP Breakfasts Offered					
Total Fat	≤30% ^b	22.4	23.0	22.6	22.7
Saturated Fat	<10% ^c	8.2	8.4	8.3	8.1
SBP Breakfasts Served					
Total Fat	≤30% ^b	24.8	25.1	24.9	24.4
Saturated Fat	<10% ^c	8.8	9.0	8.9	8.5
Number of Schools		396	159	555	248

Source: School Nutrition Dietary Assessment Study-IV, Menu Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Note: None of the differences between menu-planning systems are statistically significant.

^a Includes both Nutrient Standard Menu Planning (NSMP) and Assisted Nutrient Standard Menu Planning (ANSMP).

^b The 2010 *Dietary Guidelines* recommendation for total fat for children 4 to 18 years of age is 25 to 35 percent of calories.

^c The 2010 *Dietary Guidelines* recommendation for saturated fat is the same as the SMI standard (less than 10 percent of calories).

SBP = School Breakfast Program; SMI = School Meals Initiative for Healthy Children.

c. Cholesterol, Sodium, and Dietary Fiber

Cholesterol. SBP breakfasts *offered* and *served* in schools that used each type of menu-planning system were consistent with the 2010 *Dietary Guidelines* recommendation for cholesterol (Table 7.12). The average cholesterol content in all types of schools was well below the benchmark of 75 mg, and ranged from 40 to 49 mg.

Sodium. The average sodium content of breakfasts *offered* in schools that used food-based menu planning was consistent with the 2010 *Dietary Guidelines* recommendation for sodium, but the average sodium content of breakfasts *offered* in schools that used nutrient-based menu planning was not (Table 7.12). The differences in the average sodium content of breakfasts *offered* in schools that used the two food-based menu-planning systems and breakfasts in those that used nutrient-based menu planning were statistically significant (555 mg [traditional] and 552 mg [enhanced] versus 655 mg). The average sodium content of breakfasts *served* in schools that used each of the menu-planning systems was high relative to the 2010 *Dietary Guidelines* recommendation, and there were no statistically significant differences between schools that used different menu-planning systems.

Dietary fiber. On average, SBP breakfasts *offered* and *served* in all types of schools did not meet the *Dietary Guidelines* recommendation for dietary fiber (Table 7.12). The average concentration of dietary fiber in SBP breakfasts *offered* and *served* in all three types of schools was approximately 50 to 60 percent below the benchmark of 14 g of dietary fiber per 1,000 calories. Schools that used nutrient-based menu planning *offered* and *served* breakfasts that provided significantly more dietary

fiber, on average, than schools that used either of the food-based menu-planning systems (7 g per 1,000 calories versus 6 g).

Table 7.12. Average Cholesterol, Sodium, and Dietary Fiber Content of School Breakfast Program Breakfasts Offered and Served, Relative to 2010 Dietary Guidelines Recommendations, by Menu-Planning System

	2010 <i>Dietary Guidelines</i> Recommendation	Percentage of Schools			
		Food-Based Menu Planning			Nutrient-Based Menu Planning ^a
		Traditional	Enhanced	All	
SBP Breakfasts <i>Offered</i>					
Cholesterol (mg)	< 75 mg ^b	40	40 ^β	40	48 ^γ
Sodium (mg)	< 575 mg ^b	555	552 ^β	554	655 ^γ
Dietary Fiber (g/1,000 calories)	14	6	6 ^β	6	7 ^γ
SBP Breakfasts <i>Served</i>					
Cholesterol (mg)	< 75 mg ^b	49	49	49	46
Sodium (mg)	< 575 mg ^b	629	623	627	594
Dietary Fiber (g/1,000 calories)	14	6	6 ^β	6	7 ^γ
Number of Schools		396	159	555	248

Source: School Nutrition Dietary Assessment Study-IV, Menu Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

^a Includes both Nutrient Standard Menu Planning (NSMP) and Assisted Nutrient Standard Menu Planning (ANSMP).

^b Benchmarks are one-fourth of recommended daily limit.

^β Difference between enhanced and nutrient-based is significantly different from zero at the .05 level.

^γ Difference between traditional and nutrient-based is significantly different from zero at the .05 level.

SBP = School Breakfast Program.

2. Percentage of Schools Meeting Standards

a. Calories and Target Nutrients

Calories. For both breakfasts *offered* and *served*, the proportions of schools in all the menu-planning groups that met the SMI standard for calories were markedly lower than the proportions that met the SMI standards for nutrients (Table 7.13). For the average breakfasts *offered*, schools that used the two food-based menu-planning systems were about half as likely as schools that used nutrient-based menu planning to meet the SMI standard for calories (15 percent [traditional] and 16 percent [enhanced] versus 33 percent). This pattern was not observed for the average breakfasts *served*.

Target nutrients. Across all three menu-planning systems, virtually all schools *offered* average SBP breakfasts that met the SMI standards for protein and calcium (Table 7.13). In addition, more than 90 percent of schools in each menu-planning group *offered* and *served* average SBP breakfasts that met the SMI standard for vitamin C, and 85 percent or more of the schools in each group *offered* and *served* average breakfasts that met the SMI standard for iron. Results varied for vitamin A for breakfasts *offered* and breakfasts *served*. More than 90 percent of schools in each menu-planning group

offered average breakfasts that met the SMI standard for vitamin A. However, for the average breakfast *served*, the proportions of schools that met the SMI standard for vitamin A were roughly 15 to 20 percentage points lower, and ranged from 72 to 77 percent. For both breakfasts *offered* and *served*, schools that used the enhanced food-based menu-planning system were significantly more likely than schools that used either the traditional or nutrient-based menu-planning systems to meet the SMI standard for vitamin A.

Table 7.13. Percentage of Schools *Offering* and *Serving* School Breakfast Program Breakfasts that, on Average, Satisfied SMI Standards for Calories and Target Nutrients, by Menu-Planning System

	Percentage of Schools			
	Food-Based Menu Planning			Nutrient-Based Menu Planning ^a
	Traditional	Enhanced	All	
SBP Breakfasts <i>Offered</i>				
Calories	14.5	16.0 ^β	14.9	33.4 ^γ
Protein	>97	>97	>97	>97
Vitamin A	92.0	93.1~	92.3	92.4
Vitamin C	>97 ^α	>97 ^β	>97	94.1
Calcium	>97	>97	>97	>97
Iron	91.9	94.9~	92.7	88.5
SBP Breakfasts <i>Served</i>				
Calories	16.4	23.1	18.3	20.7
Protein	94.4	95.2~	94.6	94.1
Vitamin A	73.9	76.5	74.6	72.2
Vitamin C	94.0 ^α	>97 ^β	95.1	91.5
Calcium	90.8	90.8	90.8	90.5
Iron	85.0	88.0	85.8	88.4
Number of Schools	396	159	555	248

Source: School Nutrition Dietary Assessment Study-IV, Menu Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Note: The SMI standards are one-fourth of the 1989 *Recommended Energy/Dietary Allowances*.

^a Includes both Nutrient Standard Menu Planning (NSMP) and Assisted Nutrient Standard Menu Planning (ANSMP).

^α Difference between traditional and enhanced is significantly different from zero at the .05 level.

^β Difference between enhanced and nutrient-based is significantly different from zero at the .05 level.

^γ Difference between traditional and nutrient-based is significantly different from zero at the .05 level.

~ Point estimate is considered less precise than estimates that are not flagged because the sample size is small or the coefficient of variation is large. The rules used in flagging estimates are described in Chapter 1. When these rules are applied, percentages close to 100 are often flagged. In this table, flagged percentages between 97 and 100 percent are displayed as >97.

SBP = School Breakfast Program; SMI = School Meals Initiative for Healthy Children.

b. Total Fat and Saturated Fat

On average, more than 90 percent of schools in each menu-planning group *offered* breakfasts that met the SMI standard for fat (no more than 30 percent of calories), and more than 80 percent in each group *served* breakfasts that met this standard (Table 7.14). For breakfasts *served*, schools that used the nutrient-based menu-planning system were significantly more likely than schools that used traditional food-based menu planning to meet the SMI standard for fat (90 versus 83 percent). As expected, the proportions of schools that *offered* and *served* average breakfasts that met the 2010 *Dietary Guidelines* recommendation for fat (25 to 35 percent of calories) were substantially lower, ranging from 28 percent to 42 percent. There were no significant differences between menu-planning groups in the proportion of schools that met the 2010 *Dietary Guidelines* recommendation.

More than 80 percent of schools in each menu-planning group *offered* breakfasts that met the SMI (and 2010 *Dietary Guidelines* recommendation) for saturated fat, and more than 70 percent of schools in each group met this standard for breakfasts *served* (Table 7.14). There were no significant differences between menu-planning groups in the proportion of schools that met the SMI standard for saturated fat.

c. Cholesterol, Sodium, and Fiber

The vast majority of schools in each menu-planning group *offered* and *served* average SBP breakfasts that met the 2010 *Dietary Guidelines* recommendation for cholesterol (Table 7.15). Schools that used the two food-based menu-planning systems were significantly more likely than schools that used the nutrient-based system to *offer* average breakfasts that met the recommendation for cholesterol (95 percent [traditional] and 93 percent [enhanced] versus 84 percent).

Half to two-thirds of schools in each menu-planning group *offered* average breakfasts that met the 2010 *Dietary Guidelines* recommendation for sodium (Table 7.15). Schools that used the traditional food-based menu-planning system were significantly more likely than schools that used the nutrient-based menu-planning system to *offer* average breakfasts that met this standard (67 versus 51 percent). Fewer than 50 percent of schools in each menu-planning group *served* average breakfasts that met the *Dietary Guidelines* recommendation for sodium.

Essentially, no schools *offered* or *served* average breakfasts that were consistent with the 2010 *Dietary Guidelines* recommendation for fiber (Table 7.15).

Table 7.14. Percentage of Schools *Offering* and *Serving* School Breakfast Program Breakfasts that, on Average, Satisfied SMI Standards and 2010 *Dietary Guidelines* Recommendations for Total Fat and Saturated Fat, by Menu-Planning System

	Percentage of Schools			
	Food-Based Menu Planning			Nutrient-Based Menu Planning ^a
	Traditional	Enhanced	All	
SBP Breakfasts <i>Offered</i>				
SMI Standard for Total Fat ^b	92.1	94.9~	92.9	94.0
2010 <i>Dietary Guidelines</i> Recommendation for Total Fat ^c	28.0	27.7	27.9	33.4
SMI Standard for Saturated Fat ^d	82.1	81.0	81.8	80.1
SBP Breakfasts <i>Served</i>				
SMI Standard for Total Fat ^b	82.9	83.9	83.2	90.2 ^y
2010 <i>Dietary Guidelines</i> Recommendation for Total Fat ^c	42.2	41.3	41.9	40.4
SMI Standard for Saturated Fat ^d	73.8	70.4	72.8	82.2
Number of Schools	396	159	555	248

Source: School Nutrition Dietary Assessment Study-IV, Menu Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

^a Includes both Nutrient Standard Menu Planning (NSMP) and Assisted Nutrient Standard Menu Planning (ANSMP).

^bThe SMI standard for total fat is no more than 30 percent of calories.

^cThe 2010 *Dietary Guidelines* recommendation for total fat (for school-age children) is 25 to 35 percent of calories.

^dBoth the SMI standard and the 2010 *Dietary Guidelines* recommendation for saturated fat are less than 10 percent of calories.

^y Difference between traditional and nutrient-based is significantly different from zero at the .05 level.

~ Point estimate is considered less precise than estimates that are not flagged because the sample size is small or the coefficient of variation is large. The rules used in flagging estimates are described in Chapter 1.

SBP = School Breakfast Program; SMI = School Meals Initiative for Healthy Children.

Table 7.15. Percentage of Schools *Offering* and *Serving* School Breakfast Program Breakfasts that, on Average, Met 2010 *Dietary Guidelines* Recommendations for Cholesterol, Sodium, and Dietary Fiber, by Menu-Planning System

	Percentage of Schools			
	Food-Based Menu Planning			Nutrient-Based Menu Planning ^a
	Traditional	Enhanced	All	
SBP Breakfasts <i>Offered</i>				
Cholesterol	95	93 ^{β~}	94	84 ^γ
Sodium	67	64	66	51 ^γ
Dietary Fiber	<3	<3	<3	<3
SBP Breakfasts <i>Served</i>				
Cholesterol	87	83	86	89
Sodium	47	48	47	44
Dietary Fiber	<3	<3	<3	<3
Number of Schools	396	159	555	248

Source: School Nutrition Dietary Assessment Study-IV, Menu Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Note: Benchmarks used in assessing sodium and cholesterol content are one-fourth of the daily limit recommended in the 2010 *Dietary Guidelines* (<75 mg and <575 mg, respectively). The benchmark used for dietary fiber is 14 grams per 1,000 calories.

^a Includes both Nutrient Standard Menu Planning (NSMP) and Assisted Nutrient Standard Menu Planning (ANSMP).

^β Difference between enhanced and nutrient-based is significantly different from zero at the .05 level.

^γ Difference between traditional and nutrient-based is significantly different from zero at the .05 level.

~ Point estimate is considered less precise than estimates that are not flagged because the sample size is small or the coefficient of variation is large. The rules used in flagging estimates are described in Chapter 1. When these rules are applied, percentages close to 0 are often flagged. In this table, flagged percentages between 0 and 3 percent are displayed as <3.

SBP = School Breakfast Program.

d. Combinations of Standards

Table 7.16 presents data on the proportions of schools that met different combinations of the nutrition standards used to evaluate SBP breakfasts, by menu-planning system.²³ Three significant differences were observed for SBP breakfasts *offered* in schools using different menu-planning systems, but no significant differences were observed for breakfasts *served*. Schools that used nutrient-based menu planning were significantly more likely than schools that used either of the food-based menu-planning systems to *offer* SBP breakfasts that met all of the SMI standards (25 versus 10 to 12 percent). Schools that used enhanced food-based menu planning were significantly more likely than schools that used nutrient-based menu planning to *offer* breakfasts that met the SMI standards for all of the target nutrients (90 versus 79 percent). Finally, schools that used nutrient-based menu planning were significantly more likely than schools that used traditional food-based menu planning to meet the combination standard that included updated RDAs for all of the SMI target nutrients (14 versus 5 percent).

²³ Readers may want to refer to Table 7.1 and the preceding discussion of results for SBP breakfasts *offered* for background on the combinations examined.

Table 7.16. Percentage of Schools Offering and Serving School Breakfast Program Breakfasts that, on Average, Met Different Combinations of Nutrition Standards, by Menu-Planning System

Combinations of Standards	Food-Based Menu Planning			Nutrient-Based Menu Planning ^a
	Traditional	Enhanced	All	
SBP Breakfasts Offered				
All SMI Standards	10.1	11.8 ^β	10.5	25.1 ^γ
SMI Standards for all Target Nutrients ^b	85.3	90.4 ^β	86.7	79.4
SMI Standards for All Target Nutrients ^b and SMI Standard for Saturated Fat	72.6	75.5	73.4	63.6
SMI Standards for All Target Nutrients ^b and SMI Standard for Saturated Fat and 2010 <i>Dietary Guidelines</i> Standard for Total Fat	11.7	15.3	12.7	16.7
Updated Standards for All Target Nutrients ^c and SMI Standard for Saturated Fat and 2010 <i>Dietary Guidelines</i> Standard for Total Fat	5.4	10.5	6.8	13.5 ^γ
SBP Breakfasts Served				
All SMI Standards	7.9	15.1	9.9	13.2
SMI Standards for all Target Nutrients ^b	65.4	68.0	66.1	64.0
SMI Standards for All Target Nutrients ^b and SMI Standard for Saturated Fat	51.0	51.4	51.1	53.5
SMI Standards for All Target Nutrients ^b and SMI Standard for Saturated Fat and 2010 <i>Dietary Guidelines</i> Standard for Total Fat	10.7	13.3	11.4	12.3
Updated Standards for All Target Nutrients ^c and SMI Standard for Saturated Fat and 2010 <i>Dietary Guidelines</i> Standard for Total Fat	5.5	8.0	6.2	7.9
Number of Schools	159	555	248	259

Source: School Nutrition Dietary Assessment Study-IV, Menu Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research, Inc. are weighted to be representative of all public schools offering the National School Lunch Program.

^a Includes both Nutrient Standard Menu Planning (NSMP) and Assisted Nutrient Standard Menu Planning (ANSMP).

^b Includes protein, vitamin A, vitamin C, calcium and iron.

^c Updated to reflect RDA values included in the *Dietary Reference Intakes*.

^β Difference between enhanced and nutrient-based is significantly different from zero at the .05 level.

^γ Difference between traditional and nutrient-based is significantly different from zero at the .05 level.

RDA = *Recommended Dietary Allowances*; SBP = School Breakfast Program; SMI = School Meals Initiative for Healthy Children.

CHAPTER 8

POTENTIAL CONTRIBUTION OF REIMBURSABLE MEALS TO RECOMMENDED USDA FOOD PATTERNS

The USDA Food Patterns describe the types and amounts of foods included in a healthy dietary pattern—that is, a pattern that is consistent with the 2010 *Dietary Guidelines for Americans*. A healthy dietary pattern stays within recommended calorie levels, limits intakes of sodium, solid fats, added sugars, and refined grains, and emphasizes nutrient-dense foods and beverages—vegetables, fruits, whole grains, fat-free or low-fat dairy products, and lean protein foods (USDA and HHS 2010). To fully assess the nutritional quality of school meals, it is important to examine their potential contribution to healthy dietary patterns. Previous rounds of the SNDA studies have not addressed this issue, so findings from this assessment make an important contribution to the knowledge base on the nutritional quality of school meals.

In this chapter, we describe the average amounts of USDA Food Pattern food groups available in NSLP lunches and SBP breakfasts *offered* and *served* in SY 2009–2010, and compare these average amounts with recommended Food Patterns for school-age children. Findings are based on analysis of data from the menu survey, which was completed by school FSMs for five consecutive school days in the spring of SY 2009–2010 (January to June 2010).^{1,2} Data are presented separately by school type—defined by grade level (elementary, middle, and high schools). The statistical significance of differences between school types was tested using two-tailed *t*-tests.³

A. Summary of Findings

NSLP Lunches

- The average NSLP lunch *offered* and *served* in all three types of schools provided one-third or more of recommended amounts of grains, dairy foods, and oils, or came very close to meeting this target.
- As *offered*, average NSLP lunches provided more than one-third of recommended amounts of fruit (42 to 50 percent depending on school type). As *served*, average NSLP lunches provided substantially smaller shares of recommended amounts of fruit (22 to 32 percent), suggesting that many students did not include a serving of fruit in their lunch.
- As *offered*, average NSLP lunches provided about 30 percent (29 to 33 percent, depending on school type) of recommended amounts of vegetables. As *served*, average NSLP lunches provided about one-quarter (23 to 24 percent) of recommended amounts of vegetables.

¹ Because of school holidays or other school closures, some schools provided data for only four days. A very small number of schools provided data for only three days.

² A detailed description of the protocols used in collecting and processing menu survey data is provided in Volume II of this report.

³ Tests were conducted using SUDAAN statistical software, which adjusts standard errors for the study's complex sample design.

- On average, NSLP lunches *offered* and *served* were low in whole grains, providing 6 to 10 percent of recommended amounts.
- Average NSLP lunches *offered* and *served* were high in calories from solid fats and added sugars (SoFAS). The number of calories from SoFAS in the average NSLP lunch *offered* and *served* in elementary schools was 15 percent above the maximum recommended for the entire day. The average NSLP lunch *offered* and *served* in middle and high schools provided 59 to 74 percent of the maximum limit for calories from SoFAS. The disparity between elementary and secondary schools is driven by the fact that younger students, with lower overall calorie requirements, have less room in their diets for calories from SoFAS. Therefore the maximum limit for calories from SoFAS is substantially lower for elementary school students than for middle and high school students (160 calories versus 260 and 330 calories, respectively).
- In both lunches *offered* and *served*, the majority of calories from SoFAS (62 percent overall) came from solid fats.

SBP Breakfasts

- The average SBP breakfasts *offered* and *served* in all three types of schools provided one-quarter or more of recommended amounts of fruit, grains, and dairy foods, or came very close to meeting this target.
- The average SBP breakfasts *offered* and *served* in all three types of schools provided limited amounts of whole grains (5 to 11 percent of recommended amounts), lean protein foods (6 to 9 percent), and oils (3 to 5 percent). SBP breakfasts rarely included vegetables.
- Average SBP breakfasts *offered* and *served* were high in calories from SoFAS, particularly in elementary schools where students have the lowest calorie requirements and, consequently, less room in their diets for SoFAS calories. The number of SoFAS calories in breakfasts *offered* and *served* in elementary schools was equivalent to about 90 percent of the maximum recommended for the entire day. The number of SoFAS calories in the average SBP breakfast *offered* and *served* in high and middle schools was equivalent to about 50 to 70 percent of the recommended daily maximum, respectively.
- Overall, solid fats and added sugars each contributed about half of the total calories from SoFAS in the average SBP breakfast *offered*. In the average SBP breakfast *served*, which reflects students' food selections, a larger share of calories from SoFAS came from solid fats than from added sugars (54 versus 46 percent).

B. USDA's Food Guidance System

The USDA Food Patterns identify average daily amounts of foods, in nutrient-dense forms, to eat from five major food groups and their subgroups. The Food Patterns are based on the *2010 Dietary Guidelines for Americans* and are designed to meet nutrient needs without exceeding calorie requirements. The five major food groups in the USDA Food Patterns are:

1. Vegetables
2. Fruits
3. Grains
4. Dairy
5. Protein Foods



Foods in the food groups are assumed to be in their most nutrient-dense form—that is, their fat-free or lowest-fat forms—with no added sugars (Britten et al. 2006). The vegetable and fruit groups include all fresh, frozen, canned, dried, and juiced vegetables and fruits. The grains group includes all enriched or whole grains and products made from grains, such as enriched or whole grain breads, cereals, crackers, and rice. The dairy group includes all fluid milk products (including lactose-free, lactose-reduced, and calcium-fortified soy milks), yogurts, dairy desserts, and cheeses. Protein foods include meat, poultry, seafood, eggs, processed soy products, and nuts and seeds. Legumes can also be part of the protein foods group.

Because vegetables vary considerably in nutrient content, the USDA Food Patterns divide vegetables into five subgroups and provide recommendations for the amounts of vegetables in each subgroup to eat *over the course of a week*. The vegetable subgroups and some examples of commonly eaten vegetables in each group include the following:

- Dark Green Vegetables—broccoli, spinach, romaine lettuce, collard and turnip greens
- Red and Orange Vegetables—carrots, tomatoes, red peppers, sweet potato
- Legumes—black beans, pinto beans, black-eyed peas (dry), lentils, chickpeas
- Starchy Vegetables—corn, potatoes, green peas, plantains, black-eyed peas (not dry)
- Other Vegetables—iceberg lettuce, cucumbers, green beans, celery, avocado, onions.

Finally, the Food Patterns specify a target for whole grains; an allowance for oils (such as olive, canola, and corn oils, and oils found in fish, nuts and seeds); and a suggested maximum limit for calories from solid fats and added sugars (calories from SoFAS, also referred to as empty calories). The limit on calories from SoFAS reflects the balance of calories remaining in a person's calorie requirement after accounting for the calories in the specified amounts of nutrient-dense foods recommended in the food groups and the allowance for oils.

USDA Food Pattern recommendations for individuals depend on calorie requirements, which are determined by age, gender, and activity level. The system includes 12 different Food Patterns,

ranging from 1,000 to 3,200 calories, which are designed to meet the needs of healthy individuals 2 years of age and older, as well as those at risk for developing chronic disease. To assess the potential contribution of school meals to USDA Food Pattern recommendations, we used Food Patterns for 1,800, 2,000, and 2,400 calories as reference standards for elementary, middle, and high schools, respectively. These are the calorie levels used by the IOM in developing recommendations for revised nutrition standards for school meals (IOM 2010). The USDA Food Pattern recommendations for these three calorie levels are summarized in Table 8.1. Appendix Tables H.1–H.12 provide comparisons to other calorie levels that might be applicable to specific subgroups of students in each type of school.⁴ In addition, Appendix Tables H.13–H.16 present data on concentrations of USDA Food Pattern food groups per 1,000 calories.

C. Overview of Data Sources and Methods

The approach used to estimate average amounts of USDA Food Pattern food groups in NSLP and SBP meals *offered* and *served* was analogous to the approach used to estimate average nutrient content (see Chapters 5 and 7 and Appendix D). To obtain data on the food group content of NSLP and SBP meals, food items reported in daily menus were linked to the MyPyramid Equivalents Database (MPED) for USDA Survey Foods (version 2.0) (Bowman et al. 2008).^{5,6} In the MPED, single-ingredient foods that are in their lowest-fat, lowest-sugar form, such as a fresh peach, skim milk, or fresh carrots, are assigned to a single major food group. Foods that have added fat and/or sugar, such as peaches canned in heavy syrup or whole milk, have MPED entries for both the relevant food group and for solid fats and/or added sugars. Food mixtures that have ingredients from more than one food group are disaggregated and individual ingredients are assigned to appropriate food groups. For example, the grain in a pizza crust contributes to the grain group, the tomato sauce contributes to the vegetable group (and to the red and orange vegetables subgroup), the cheese contributes to the dairy group, other toppings would contribute to the protein foods group and/or the vegetables group, and values for SoFAS would be assigned based on the composition of the various ingredients.

For the most part, the USDA Food Pattern food groups are consistent with the food groups (meal components) used in planning NSLP and SBP meals. However, there is one exception to bear in mind when interpreting these findings. In the NSLP and SBP, milk is considered a separate meal component (by law, fluid milk must be offered in NSLP and SBP meals). Other dairy foods, such as cheese and yogurt are counted as meat alternates. This difference in how milk and cheese are counted in NSLP and SBP menus and USDA Food Patterns contributes to higher average amounts of dairy and lower average amounts of protein foods than might be expected by NSLP and SBP menu planners.

⁴ Additional comparisons include 1,200-, 1,400-, and 1,600-calorie Food Patterns for elementary schools; 1,600- and 1,800-calorie Food Patterns for middle schools; and 1,800-, 2,000-, and 2,200-calorie Food Patterns for high schools.

⁵ In June 2010, MyPlate replaced the former MyPyramid food guidance system. MyPlate uses the same major food groups as MyPyramid so, at the time this report was prepared, the MPED was the optimal data source for assessing food group content.

⁶ Technically, oils and calories from SoFAS are not food groups. However, we use this term to simplify the discussion.

Table 8.1. USDA Food Patterns Used to Assess Potential Contributions of School Meals to Recommended Dietary Patterns

	Elementary Schools	Middle Schools	High Schools
Calories	1,800	2,000	2,400
Vegetables (cups)	2.5	2.5	3
Dark green (cups/week)	1.5	1.5	2
Red and orange (cups/week)	5.5	5.5	6
Legumes (cups/week)	1.5	1.5	2
Starchy (cups/week)	5	5	6
Other (cups/week)	4	4	5
Fruits (cups)	1.5	2	2
Grains (oz)	6	6	8
Whole grains (oz)	3	3	4
Dairy (cups)	3	3	3
Protein Foods (oz)	5	5.5	6.5
Oils (tsp)	5	6	7
Calories From Solid Fats and Added Sugars (maximum limit)	160	260	330

Source: U.S. Department of Agriculture and U.S. Department of Health and Human Services 2010, Appendix 7, and www.Choosemyplate.com.

Note: Unless otherwise noted, recommendations are average daily amounts. Recommended food group amounts are reported in cup or ounce (oz) equivalents. See U.S. Department of Agriculture and U.S. Department of Health and Human Services 2010, Appendix 7, or www.Choosemyplate.com for information about quantity equivalents for each food group.

cup = cup equivalents; oz = ounce equivalents; tsp = teaspoons.

The MPED reports data in cup equivalents for the vegetable, fruit, and dairy groups and in ounce equivalents for grains and protein foods. A cup equivalent is the amount of food considered to be equivalent to one cup of cut-up fruit or vegetable or one cup of milk, and an ounce equivalent is the amount of food considered to be equivalent to a one-ounce slice of bread or one ounce of cooked lean meat, poultry, or fish (Bowman et al. 2008). In the USDA Food Patterns, legumes can count as either vegetables or protein foods. We assigned legumes to one of these groups based on how the food was used in the menu. Legumes offered as a vegetable choice or included in combination entrees were counted in the vegetables group. Legumes offered as a meat alternate were counted in the protein foods group.

MPED data on oils and solid fats are reported in grams and data on added sugars are reported in teaspoons. To facilitate comparison to the Food Pattern recommendations, we converted data on oils from grams to teaspoons and converted data on solid fats and added sugars into calories to produce an estimate of the number of calories from SoFAS.⁷

⁷ 4.5 grams oil = 1 teaspoon; calories from SoFAS = (solid fat (g) * 9 calories) + (added sugar (tsp) * 16 calories).

D. Food Group Content of NSLP Lunches *Offered* and *Served*

1. Average Food Group Content of NSLP Lunches

Table 8.2 presents data on the average amounts of food groups included in NSLP lunches *offered* and *served* to students during a typical school week in SY 2009–2010. On average, NSLP lunches *offered* to students included more than three-quarters of a cup of vegetables, more than three-quarters of a cup of fruit, 2.5 ounces of grains, 1.4 cups of dairy foods, 1.5 ounces of lean protein foods, 2 teaspoons of oil, and 190 calories from SoFAS. NSLP lunches provided small amounts of whole grains (less than one-third of an ounce).

In general, average amounts of all food groups increased from elementary schools to middle schools and from middle schools to high schools. This is consistent with the pattern observed in the calorie and nutrient content of average NSLP lunches (see Chapter 5) and with menu-planning guidance that specifies larger portions of some foods (food-based menu planning) or higher calorie targets (nutrient-based menu planning) for students in higher grades. Most of the differences between school types were statistically significant.

The average food group content of lunches *served* was lower than lunches *offered*. This is also consistent with findings on the calorie and nutrient content of average NSLP lunches (see Chapter 5) and reflects the impact of students' food selections. Overall, the difference between lunches *offered* and *served* was greatest for fruit and vegetables; however, the disparity between lunches *offered* and lunches *served* was notably larger for fruit (0.81 versus 0.48 cups) than for vegetables (0.77 versus 0.61 cups). An analysis of SNDA-III data completed by Fox and colleagues (2010) provides a potential explanation for this pattern. They found that the leading sources of fruit in the diets of NSLP participants were 100% juice and individual fruits. Students can easily elect not to include these items in their lunches. In contrast, the leading sources of vegetables were more varied—french fries and similar potato products, other white potatoes, condiments, and pizza and pizza products—and included menu items that tend to be popular with students. The difference between lunches *offered* and lunches *served* was smallest for calories from SoFAS (190 versus 187 calories). This suggests that students tended to select items that included solid fats and/or added sugars.

2. Average Food Group Content of NSLP Lunches Relative to Recommendations

We used USDA Food Patterns for 1,800, 2,000, and 2,400 calories as reference standards for assessing the average food group content of NSLP lunches in elementary, middle, and high schools, respectively (Table 8.1). To provide additional context for NSLP lunches, we used the one-third benchmark used in the SMI nutrition standards for NSLP meals. If the SMI standard were applied to the USDA Food Patterns, the expectation would be that NSLP lunches would provide one-third of recommended amounts of food groups and oils and no more than one-third of the maximum limit for calories from SoFAS.

Table 8.2. Average Amounts of Food Groups in National School Lunch Program Lunches *Offered* and *Served*

	Elementary Schools	Middle Schools	High Schools	All Schools
Lunches Offered				
Vegetables (cups)	0.72 ^α	0.82 ^β	0.89 ^γ	0.77
Dark green (cups/week)	0.19	0.21	0.25 ^γ	0.20
Red and orange (cups/week)	1.06	1.12	1.20 ^γ	1.10
Legumes (cups/week) ^a	0.15	0.15	0.15	0.15
Starchy (cups/week)	0.92 ^α	1.13	1.28 ^γ	1.02
Other (cups/week)	1.21 ^α	1.41 ^β	1.58 ^γ	1.31
Fruits (cups)	0.75 ^α	0.85 ^β	0.92 ^γ	0.81
Grains (oz)	2.36 ^α	2.68 ^β	2.89 ^γ	2.52
Whole grains (oz)	0.28	0.29	0.29	0.29
Dairy (cups)	1.38 ^α	1.42	1.44 ^γ	1.40
Protein Foods (oz) ^b	1.49 ^α	1.57	1.66 ^γ	1.54
Oils (tsp)	2.01 ^α	2.25 ^β	2.58 ^γ	2.17
Calories From Solid Fats and Added Sugars (SoFAS)	184 ^α	194 ^β	206 ^γ	190
Total calories from solid fats	113 ^α	123 ^β	130 ^γ	118
Total calories added sugars	71	71	76	72
Percentage of SoFAS calories from solid fats	61.5 ^α	63.6	63.7 ^γ	62.3
Percentage of SoFAS calories from added sugars	38.5 ^α	36.4	36.3 ^γ	37.7
Lunches Served				
Vegetables (cups)	0.58	0.61 ^β	0.71 ^γ	0.61
Dark green (cups/week)	0.11	0.12	0.15	0.12
Red and orange (cups/week)	0.88	0.88 ^β	1.02 ^γ	0.91
Legumes (cups/week) ^a	0.12	0.10	0.12	0.11
Starchy (cups/week)	0.99	1.11 ^β	1.30 ^γ	1.07
Other (cups/week)	0.76	0.80 ^β	0.99 ^γ	0.81
Fruits (cups)	0.48 ^α	0.45 ^β	0.49	0.48
Grains (oz)	2.24 ^α	2.48 ^β	2.60 ^γ	2.35
Whole grains (oz)	0.25	0.25	0.23	0.24
Dairy (cups)	1.30 ^α	1.25	1.29	1.29
Protein Foods (oz) ^b	1.34	1.38 ^β	1.48 ^γ	1.38
Oils (tsp)	1.60 ^α	1.79 ^β	2.16 ^γ	1.75
Calories From Solid Fats and Added Sugars (SoFAS)	184	186	195 ^γ	187
Total calories from solid fats	111 ^α	117 ^β	123 ^γ	114
Total calories from added sugars	73	69	72	72
Percentage of SoFAS calories from solid fats	60.4 ^α	63.1	63.4 ^γ	61.5
Percentage of SoFAS calories from added sugars	39.6 ^α	36.9	36.6 ^γ	38.5
Number of Schools	318	287	279	884

Source: School Nutrition Dietary Assessment Study-IV, Menu Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Table 8.2 (continued)

Notes: Averages for vegetable subgroups include only schools that provided menu information for five days.

The sample size for lunches *served* is 880 schools because four schools did not provide the detailed information on students' food selections needed to estimate the food group content of lunches *served*.

^a Includes legumes indicated as offered as a vegetable on the menu survey or included in combination entrees.

^b Includes legumes indicated as offered as a meat alternate on the menu survey.

^α Difference between elementary and middle schools is significantly different from zero at the .05 level.

^β Difference between middle and high schools is significantly different from zero at the .05 level.

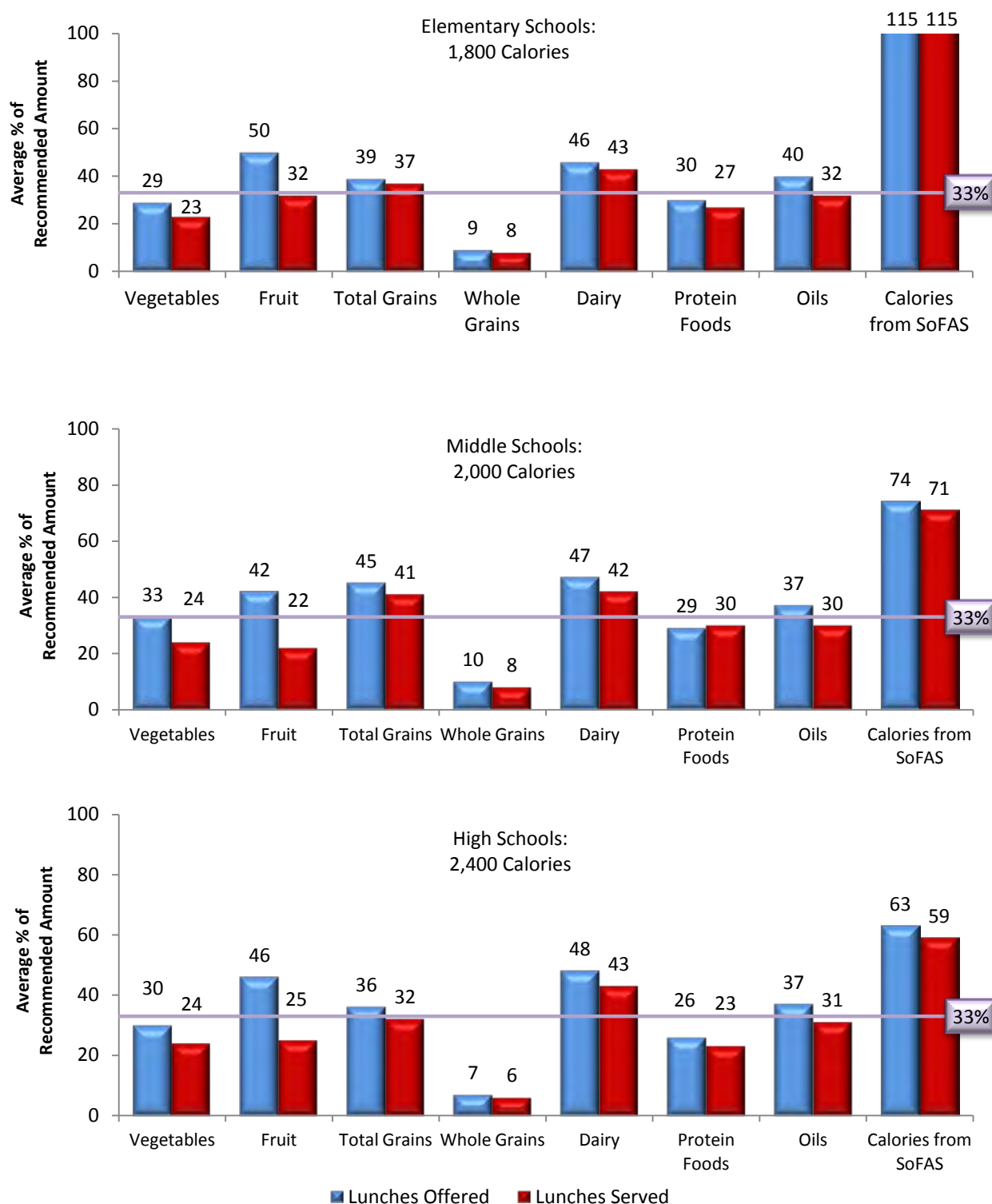
^γ Difference between elementary and high schools is significantly different from zero at the .05 level.

cups = cup equivalents; oz = ounce equivalents; tsp = teaspoons.

Figure 8.1 shows the average food group content of NSLP lunches *offered* and *served*, expressed as percentages of USDA Food Pattern recommendations. Key findings, which also draw on data shown in Table 8.2, include the following:

- The average NSLP lunch *offered* and *served* in all three types of schools provided one-third or more of recommended amounts of grains, dairy foods, and oils, or came very close to meeting this target.
- The average NSLP lunch *offered* in all three types of schools provided more than one-third of recommended amounts of fruits (42 to 50 percent). The amount of fruit in the average lunch *served* was notably smaller (22 to 32 percent), suggesting that many students did not include a serving of fruit in their lunch.
- On average, NSLP lunches *offered* provided about 30 percent (29 to 33 percent, depending on school type) of recommended amounts of vegetables. As *served*, NSLP lunches provided about one-quarter (23 to 24 percent) of recommended amounts of vegetables.
- NSLP lunches *offered* and *served* were low in whole grains, providing 6 to 10 percent of recommended amounts.
- NSLP lunches *offered* and *served* in elementary and middle schools provided roughly 30 percent of recommended amounts of protein foods. NSLP lunches *offered* and *served* in high schools provided about one-quarter of recommended amounts of protein foods.
- NSLP lunches *offered* and *served* were high in calories from SoFAS, particularly in elementary schools. The number of SoFAS calories in the average NSLP lunch *offered* and *served* in elementary schools was 15 percent above the maximum recommended for the entire day. The average NSLP lunch *offered* and *served* in middle and high schools provided 59 to 74 percent of the maximum limit for calories from SoFAS. The disparity between elementary and secondary schools is driven by the fact that younger students, with lower overall calorie requirements, have less room in their diets for calories from SoFAS. Therefore the maximum limit for calories from SoFAS is substantially lower for elementary school students than for middle and high school students (160 calories versus 260 and 330 calories, respectively) (See Table 8.1).
- In both lunches *offered* and *served*, the majority of SoFAS calories (62 percent overall) came from solid fats (see Table 8.2). Chapter 9 provides information about the leading sources of SoFAS calories in NSLP lunches.

Figure 8.1. Average Amounts of Food Groups in National School Lunch Program Lunches *Offered* and *Served*, Relative to Reference USDA Food Patterns



Notes: The reference USDA Food Patterns are based on the calorie levels used by the Institute of Medicine (2010) in developing recommendations for the revised nutrition standards for school meals.

The 33 percent benchmark is used for illustrative purposes only and is based on the SMI standard that National School Lunch Program lunches should provide one-third of students' average daily calorie and nutrient needs.

SMI = School Meals Initiative for Healthy Children; SoFAS = solid fats and added sugars.

The finding that NSLP meals provided less than one-third of the recommended amount of protein foods might be surprising, given that NSLP meals more than satisfied the SMI standard for protein when measured at the nutrient level (see Chapter 5). Several factors contribute to this apparent discrepancy. First, protein comes from many sources and two major sources of protein in NSLP meals—fluid milk and cheese included in mixed dishes (see Chapter 9)—are not included in the protein foods group. (They are included in the dairy foods group.) Second, estimates of the amounts of protein foods included in NSLP meals are based on ounce equivalents of *lean meat*, as reported in the MPED. Many meat, poultry, and fish items that are popular with children are breaded and/or fried or are not lean choices (Gordon et al. 2007; Condon et al. 2009; also see Chapter 4). So, ounce for ounce, these items provide fewer lean meat equivalents than plain, lean choices. For example, 100 g of baked or broiled chicken breast, without the skin, provides 3.53 oz. lean meat equivalents. A comparable portion of chicken nuggets or breaded chicken patty provides only 2.14 oz. lean meat equivalents. Similarly, 100 g of lean roast beef provides 3.53 oz. lean meat equivalents, whereas comparable portions of all-beef bologna or all-beef hot dogs provide 2.79 and 2.71 oz. lean meat equivalents, respectively (Fox et al. 2010).⁸

Vegetable Subgroups

USDA Food Pattern recommendations for vegetable subgroups are defined on a weekly basis. Thus, in assessing the potential contribution of NSLP lunches to these recommendations, we limited the analysis to schools that provided menu information for five days (a full school week). Further, to provide appropriate context, we used a benchmark of 23 percent rather than the 33 percent benchmark used in assessing recommendations. Assuming that consumption of vegetable subgroups was distributed evenly across the week, a five-day period would cover 71 percent of the recommendation ($5 \text{ days} \div 7 \text{ days} = 71 \text{ percent}$). The assumption (for illustrative purposes only) that NSLP lunches are expected to provide one-third of recommended amounts of food groups translates into a benchmark of 23 percent ($71 \text{ percent} * 0.33$). Thus, the 23 percent benchmark represents the percentage of recommended amounts of vegetable subgroups that NSLP lunches would contribute if these meals provided a fair share of weekly requirements.

⁸ It is possible that the approach we took to classifying legumes, which can be counted as either a vegetable or a meat alternate in NSLP menus, underestimated the contribution of legumes to the protein foods group and overestimated the contribution of legumes to the vegetable group. However, given the small amounts of legumes counted as vegetables (see Table 8.2), it is likely that this issue had a relatively minor influence on estimated amounts of protein foods in NSLP lunches.

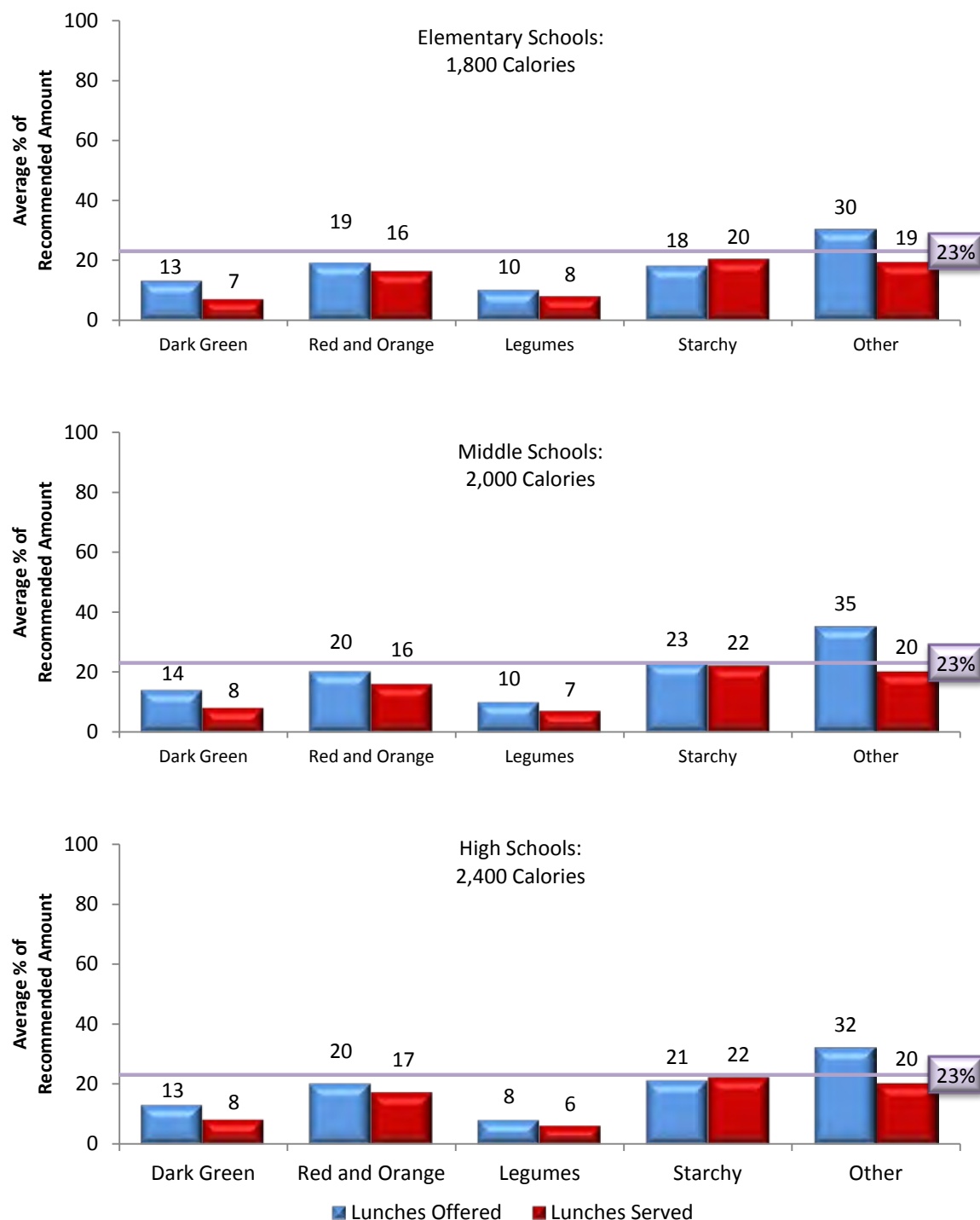
Figure 8.2 summarizes data for vegetable subgroups in NSLP lunches *offered* and *served*. Key findings include the following:

- The average NSLP lunch *offered* and *served* in all three types of schools was low in dark green vegetables and legumes, providing 6 to 14 percent of recommended amounts.
- The average NSLP lunch *offered* and *served* provided 16 to 20 percent of recommended amounts of red and orange vegetables.⁹
- On average, NSLP lunches *offered* and *served* provided 18 to 23 percent of recommended amounts of starchy vegetables and 19 to 35 percent of recommended amounts of other vegetables. Differences between lunches *offered* and *served* were relatively minor for starchy vegetables, which indicates that students selected vegetables in this subgroup more frequently than they selected vegetables in the other vegetables subgroup.

These results are consistent with data on the vegetables commonly offered in NSLP lunches (see Chapter 4, Table 4.3). Cooked starchy vegetables were offered in half of all daily lunch menus. The most commonly offered items in this group—french fries and similar potato products, corn, and other white potatoes—are known to be popular with students. Vegetables in the other vegetables subgroup appeared in raw form (mainly iceberg lettuce and other vegetables in side salads and salad bars) on 50 percent of daily lunch menus and in cooked form (mainly string beans and vegetable blends) on 25 percent of daily menus. Red and orange vegetables were more common in NSLP menus than either dark green vegetables or legumes (dried beans and peas). This includes raw carrots (19 percent of all daily menus), cooked orange vegetables (mainly carrots; 6 percent of daily menus), and additional contributions from side salads, salad bars, and entree salads (for example, tomatoes, carrots, and red peppers) and entree items that included tomatoes or tomato sauce, such as pizza, Mexican-style entrees, and spaghetti.

⁹ Amounts of red and orange vegetables might be slightly underestimated because the MPED does not have a separate category for red vegetables. To estimate amounts of red and orange vegetables, we combined the orange vegetables and tomatoes variables in the MPED with the individual code for red peppers. The MPED variables capture all orange vegetables and tomatoes that were coded as distinct menu items or found in mixed dishes. The individual red pepper code captures red peppers that were coded as distinct menu items, but not those that were part of a mixed dish. No other red vegetables were reported as distinct items in the menus.

Figure 8.2. Average Amounts of Vegetable Subgroups in National School Lunch Program Lunches *Offered* and *Served*, Relative to Reference USDA Food Patterns



Notes: The reference USDA Food Patterns are based on the calorie levels used by the Institute of Medicine (2010) in developing recommendations for revised nutrition standards for school meals.

Figure includes only schools that provided five days (a full school week) of menu data.

The 23 percent benchmark is used for illustrative purposes only and is based on the assumption that 71 percent of the weekly recommendations should be met in a five-day school week ($5 \text{ days} \div 7 \text{ days} = 71 \text{ percent}$), and the SMI standard that National School Lunch Program lunches should provide one-third of students' average daily calorie and nutrient needs (0.71×0.33).

SMI = School Meals Initiative for Healthy Children.

E. Food Group Content of SBP Breakfasts *Offered* and *Served*

1. Average Food Group Content of SBP Breakfasts

Table 8.3 presents data on the average amounts of food groups included in SBP breakfasts *offered* and *served* to students during a typical school week in SY 2009–2010. The average SBP breakfast *offered* to students included more than one-half (0.6) cup of fruit, 1.7 ounces of grains, 1.1 cups of dairy foods, about one-third of an ounce of protein foods, one-quarter of a teaspoon of oil, and 156 calories from SoFAS. As *offered*, SBP breakfasts included small amounts of whole grains (less than one-third of an ounce, on average) and marginal amounts of vegetables.

In general, average amounts of all food groups increased from elementary schools to middle schools and from middle schools to high schools. This is consistent with the pattern observed in the calorie and nutrient content of average SBP breakfasts (see Chapter 7) and with menu-planning guidance that specifies larger portions of some foods (food-based menu planning) or higher calorie targets (nutrient-based menu planning) for students in higher grades. Most of the differences between elementary schools and middle and high schools were statistically significant.

The average food group content of breakfasts *served* was lower than breakfasts *offered* for some food groups and higher for others. Overall, the difference between breakfasts *offered* and *served* was greatest for fruit (0.61 versus 0.52 cups) and protein foods (0.35 versus 0.41 ounces); the average amount of fruit was lower in breakfasts *served* relative to breakfasts *offered* and the average amount of protein foods was higher. These patterns suggest that students were more likely to omit the fruit component of their breakfast and to choose items that included protein foods. This could include sausage or eggs served separately or combination items such as breakfast sandwiches or sausages/corn dogs on a stick (see Chapter 4, Table 4.7). The difference between breakfasts *offered* and *served* was smallest for calories from SoFAS (overall, the averages [156] were identical). This suggests that students tended to select items that included solid fat and/or added sugars.

2. Average Food Group Content of SBP Breakfasts Relative to Recommendations

We used USDA Food Patterns for 1,800, 2,000, and 2,400 calories as reference standards for assessing the average food group content of SBP breakfasts in elementary, middle, and high schools, respectively (see Table 8.1). To provide additional context for SBP breakfasts, we used the one-quarter benchmark used in the SMI nutrition standards for SBP meals. If the SMI standard were applied to the USDA Food Patterns, the expectation would be that SBP breakfasts would provide one-quarter of recommended amounts of food groups and oils and no more than one-quarter of the maximum limit for calories from SoFAS.

Table 8.3. Average Amounts of Food Groups in School Breakfast Program Breakfasts Offered and Served

	Elementary Schools	Middle Schools	High Schools	All Schools
Breakfasts Offered				
Vegetables (cups)	0.01 ^α	0.02	0.02 ^γ	0.02
Fruits (cups)	0.59 ^α	0.64	0.66 ^γ	0.61
Grains (oz)	1.59 ^α	1.85	1.95 ^γ	1.71
Whole grains (oz)	0.33 ^α	0.26	0.27 ^γ	0.30
Dairy (cups)	1.11 ^α	1.14	1.12	1.12
Protein Foods (oz) ^a	0.32 ^α	0.39	0.40 ^γ	0.35
Oils (tsp)	0.26	0.24	0.27	0.25
Calories From Solid Fats and Added Sugars (SoFAS)	146 ^α	171	174 ^γ	156
Total calories from solid fats	73 ^α	87	91 ^γ	79
Total calories from added sugars	74 ^α	84	82 ^γ	77
Percentage of SoFAS calories from solid fats	49.6	50.3	52.2 ^γ	50.3
Percentage of SoFAS calories from added sugars	50.4	49.7	47.9 ^γ	49.7
Breakfasts Served				
Vegetables (cups)	0.01 ^α	0.03	0.03 ^γ	0.02
Fruits (cups)	0.50	0.54 ^β	0.58 ^γ	0.52
Grains (oz)	1.60 ^α	1.97	2.11 ^γ	1.77
Whole grains (oz)	0.28 ^α	0.22	0.22 ^γ	0.26
Dairy (cups)	0.99	0.99	0.93 ^γ	0.98
Protein Foods (oz) ^a	0.35 ^α	0.50	0.51 ^γ	0.41
Oils (tsp)	0.23	0.24	0.24	0.23
Calories From Solid Fats and Added Sugars (SoFAS)	144 ^α	177	171 ^γ	156
Total calories from solid fats	76 ^α	98	100 ^γ	85
Total calories from added sugars	69	79	71	71
Percentage of SoFAS calories from solid fats	52.4 ^α	55.3 ^β	57.9 ^γ	54.1
Percentage of SoFAS calories from added sugars	47.6 ^α	44.7 ^β	42.1 ^γ	45.9
Number of Schools	282	264	257	803

Source: School Nutrition Dietary Assessment Study-IV, Menu Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Notes: The sample size for breakfasts *served* is 802 schools because one middle school did not provide the detailed information on students' food selections needed to estimate the food group content of breakfasts *served*.

Vegetables were rarely offered in School Breakfast Program breakfasts, so vegetables are not included in the table. Data are shown in Appendix Tables H.7 to H.12.

^a Includes legumes indicated as offered as a meat alternate on the menu survey.

^α Difference between elementary and middle schools is significantly different from zero at the .05 level.

^β Difference between middle and high schools is significantly different from zero at the .05 level.

^γ Difference between elementary and high schools is significantly different from zero at the .05 level.

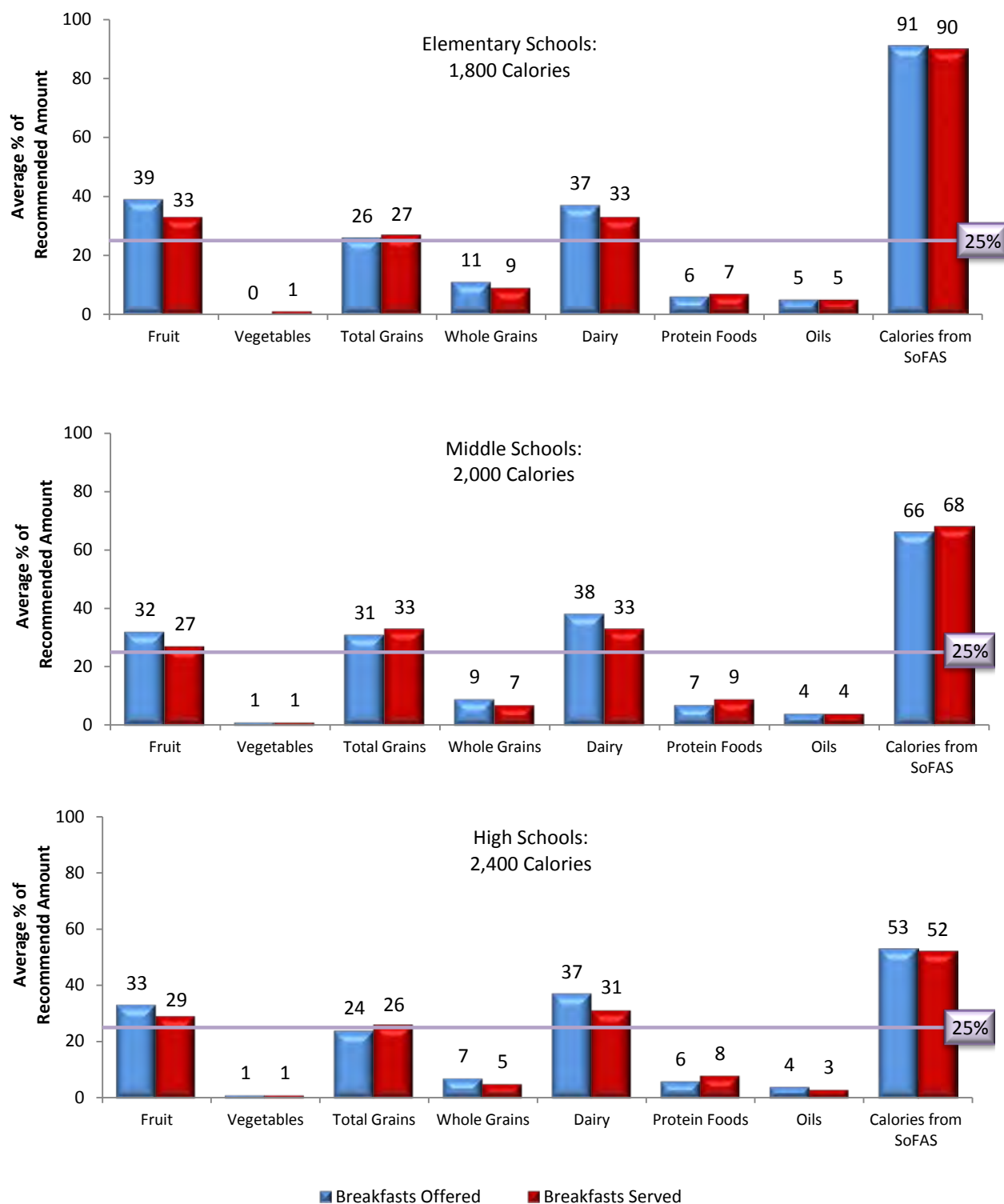
cup = cup equivalents; oz = ounce equivalents; tsp = teaspoons.

Figure 8.3 shows the average food group content of SBP breakfasts *offered* and *served*, expressed as percentages of USDA Food Pattern recommendations. Key findings, which also draw on data shown in Table 8.3, include the following:

- The average SBP breakfast *offered* and *served* in all three types of schools provided one-quarter or more of recommended amounts of fruit, grains, and dairy foods, or came very close to meeting this target.
- The average SBP breakfast *offered* and *served* in all three types of schools provided limited amounts of whole grains (5 to 11 percent of recommended amounts), protein foods (6 to 9 percent), and oils (3 to 5 percent). SBP breakfasts rarely offered vegetables.
- The average number of SoFAS calories in breakfasts *offered* and *served* in elementary schools was equivalent to about 90 percent of the suggested maximum. The average lunches *offered* and *served* in middle and high schools included about two-thirds and one-half of the suggested maximum for SoFAS calories, respectively.
- Overall, solid fats and added sugars each contributed about half of the total calories from SoFAS in the average SBP breakfast *offered* (Table 8.3).
- In the average SBP breakfast *served*, which reflects students' food selection patterns, solid fats contributed a larger share of SoFAS calories than added sugars (54 percent versus 46 percent for all schools combined) (Table 8.3).
- There was some variation in this pattern by school type. Solid fats accounted for a significantly larger share of SoFAS calories in the average breakfasts *served* in middle and high schools, relative to elementary schools (55 and 58 percent, respectively, versus 52 percent), and added sugars accounted for a significantly smaller share of SoFAS calories (45 and 42 percent, respectively, versus 48 percent). Chapter 9 provides information about the leading sources of SoFAS calories in SBP breakfasts.

The finding that average SBP breakfasts *offered* and *served* were high in SoFAS calories may seem inconsistent with findings presented in Chapter 7, which showed that a majority of schools *offered* and *served* breakfasts that were consistent with the SMI standard for saturated fat (most of the fat in solid fats is saturated fat). The data presented in Table 8.3 provide insight into these apparently contradictory findings. On average, calories from solid fats in SBP breakfasts fell below the maximum limit for SoFAS calories. However, calories from solid fats accounted for only about half of SoFAS calories overall, and it is the combined total of calories from solid fats and added sugars that is high, relative to the maximum limit (Figure 8.3).

Figure 8.3. Average Amounts of Food Groups in School Breakfast Program Breakfasts *Offered* and *Served*, Relative to Reference USDA Food Patterns



Notes: The reference USDA Food Patterns are based on the calorie levels used by the Institute of Medicine (2010) in developing recommendations for revised nutrition standards for school meals.

The 25 percent benchmark is used for illustrative purposes only and is based on the SMI standard that School Breakfast Program breakfasts should provide one-fourth of students' average calorie and nutrient needs.

SMI = School Meals Initiative for Healthy Children; SoFAS = solid fat and added sugars.

CHAPTER 9

SOURCES OF CALORIES AND NUTRIENTS IN SCHOOL MEALS OFFERED

To increase the likelihood that meals offered in the NSLP and SBP meet current and future nutrition standards, it is important to understand how foods offered in these meals contribute to average nutrient content. Information about the relative contributions of foods and food groups to the calories and nutrients available in school meals provides insights about the menu items that drive average calorie and nutrient content. Such information can be useful to policymakers and school foodservice practitioners in planning strategies to improve the nutritional quality of school meals and to program administrators in developing training and technical assistance materials. For example, if school meals provide too much or too little of a particular nutrient, identifying the major food sources of that nutrient is an important step in implementing practical and meaningful changes to bring the meals into compliance.

In this chapter, we describe the major food sources of calories and nutrients in NSLP lunches and SBP breakfasts. We examine the relative contributions of broad (major) food groups as well as more specific foods/food groups (minor food groups) to the nutrient content of average school meals *offered* to students.¹ The relative contribution of a food/food group as a source of a particular nutrient or dietary component is determined by both the composition of the food and the frequency with which it is offered (Subar et al. 1998). For this reason, foods commonly offered in school meals, such as milk and particular types of entrees, make more substantial contributions to some nutrients or dietary components than might be anticipated based on nutrient content alone.

We present summary findings for calories and all of the nutrients and dietary components included in the detailed assessments of school meals presented in Chapters 5, 7, and 8—these include protein, vitamins A and C, calcium, iron, total fat, saturated fat, cholesterol, sodium, and dietary fiber, as well as solid fats, added sugars, and calories from SoFAS. More detailed results, including findings for additional nutrients and contributions from all foods that provided at least 1 percent of calories or a given nutrient/dietary component, are presented in Appendix I. All tables present data separately for elementary and secondary schools (middle and high schools combined), as well as for all schools combined. The statistical significance of differences between elementary and secondary schools was tested using two-tailed *t*-tests. Statistical tests were conducted using SUDAAN software (Research Triangle Institute 2006), which adjusts standard errors for the study's complex sample design. Most of the observed differences were small in magnitude and are not always discussed in the text.

¹ All of the analyses presented in this chapter are based on the calorie and nutrient content of the average meals *offered* to students (as opposed to average meals *served*). We use the italics here, as well as in the table titles, to clarify this issue for the reader. However, we do not italicize the term in body of the text because there is no need to differentiate results for analyses of meals *offered* and meals *served*, as is the case in some other chapters.

A. Summary of Findings

NSLP Lunches

- The leading sources of calories in NSLP lunches offered to students were combination entrees and milk (providing 38 and 17 percent of total calories, on average, respectively). Flavored 1% milk was the top single food source of calories overall. Pizza and pizza products, sandwiches with peanut butter or plain meat and poultry, hamburgers and cheeseburgers, and Mexican-style entrees made the largest contributions to lunch calories among the entrees.
- Combination entrees were also the main sources of total fat and saturated fat in NSLP lunches, contributing about half of the total amounts of fat in the average lunch (47 and 52 percent, respectively). Although most of the milk offered in NSLP lunches was low-fat or skim/nonfat (see Chapter 4), milk was the second leading source of saturated fat in NSLP lunches. Accompaniments to the reimbursable meal—condiments, toppings, spreads and salad dressings—supplied a substantial proportion (17 percent) of the total fat in average NSLP lunches.
- Together, combination entrees, accompaniments, and vegetables contributed 75 percent of the average sodium in NSLP lunches offered. Condiments, toppings, spreads and salad dressings were the single most important sources of sodium, followed by sandwiches with meat/poultry, pizza/pizza products and hamburgers/cheeseburgers. Entree salad bars and lettuce salads (mainly side salad bars), which included an average serving of salad dressing, were also leading contributors to the sodium content of average NSLP lunches.
- The major sources of dietary fiber in NSLP lunches were combination entrees (30 percent), fruit (26 percent), and vegetables (23 percent). Apples, citrus fruit, peanut butter sandwiches, pizza/pizza products, and salads were among the top five specific sources of dietary fiber.
- The major sources of SoFAS calories in NSLP lunches were combination entrees (38 percent), milk (21 percent), and desserts (11 percent). The leading specific contributors to SoFAS calories in average NSLP lunches were 1% flavored milk (10 percent), cookies, cakes and brownies (8 percent), pizza and pizza products (6 percent), condiments, toppings and spreads (6 percent), and flavored skim/nonfat milk (5 percent). There was some variation in the relative contribution of these foods to SoFAS calories in lunches offered in elementary and secondary schools and, among secondary schools, hamburgers and cheeseburgers rather than flavored skim/nonfat milk was the fifth leading contributor of SoFAS calories.

SBP Breakfasts

- The leading sources of calories in average SBP breakfasts offered to students were breads and grains, which provided 37 percent of total calories on average. About one-quarter (26 percent) of the calories in average SBP breakfasts came from milk. Fruit contributed 12 percent of the calories in the average SBP breakfast, and combination entrees, including breakfast sandwiches made with egg, meat, and/or cheese, contributed 12 percent.

- Milk contributed half of the protein in the average SBP breakfast. The leading contributors to protein in average SBP breakfasts were unflavored and flavored 1% milks, which contributed 16 and 11 percent, respectively, of total protein.
- The main sources of total fat in SBP breakfasts were breads and grains (41 percent of total fat), combination entrees (21 percent), and milk (18 percent). Individually, sweet rolls, donuts, and toaster pastries were the leading contributors of total fat in SBP breakfasts (12 percent), followed by breakfast sandwiches (8 percent), muffins and sweet/quick breads (8 percent), and unflavored 1% milk (6 percent).
- Milk was the leading source of saturated fat in SBP breakfasts, contributing more than one-third (34 percent) of the saturated fat in SBP breakfasts offered in elementary schools and 30 percent of the saturated fat in SBP breakfasts offered in secondary schools.
- Breads and grains contributed close to half (45 percent) of the sodium in average SBP breakfasts offered. Combination entrees and milk were the second and third leading contributors of sodium in SBP breakfasts (contributing 22 and 19 percent of total sodium, respectively). Individually, cold cereal and breakfast sandwiches were the leading contributors of sodium.
- The leading contributor of dietary fiber in SBP breakfasts offered was breads and grains (48 percent of total fiber), followed by fruit (28 percent). Individual foods that were top sources of dietary fiber in SBP breakfasts included cold (ready-to-eat) cereal; apples; flavored 1% milk; muffins and sweet/quick breads; and sweet rolls, donuts, and toaster pastries.
- The leading contributors of SoFAS calories in SBP breakfasts offered were breads and grains (42 percent), followed by milk (23 percent). Overall, the top five contributors to SoFAS calories in the average SBP breakfast offered were sweet rolls, donuts, and toaster pastries (13 percent); condiments, toppings and spreads (12 percent); cold cereal (10 percent); flavored 1% milk (10 percent); and muffins and sweet/quick breads (5 percent). Together, these five foods accounted for half of the SoFAS calories in SBP breakfasts.

B. Sources of Calories and Nutrients in NSLP Lunches as Offered

To identify the food sources of calories and nutrients in lunches offered, we began with the food-grouping system that classified all lunch menu items into nine major food groups and 229 minor food groups (see Appendix Table C.1 for a complete list of major and minor food groups). To simplify the presentation of findings for this analysis, we combined some minor food groups to create an abbreviated set of 103 minor food groups. For example, we combined four pizza-related minor food groups (pizza with meat; pizza without meat; pizza pockets, pizza sticks, and calzones with meat; and pizza pockets, pizza sticks, and calzones without meat) to create a single food sources minor food group (pizza and pizza products).

For each of the nutrients and dietary components assessed in this analysis, we computed the percentage contribution of the nine major food groups and each of the 103 food sources minor food groups by (1) summing the total amount of the nutrient/dietary component provided by a given food group across the school week (using weighting assumptions for meals as offered [see Appendix D]), and (2) dividing this sum by the amount of the nutrient/dietary component provided in the average meal offered. The relative contribution of a food/food group as a source of a

particular nutrient is determined by both the composition of the food and the frequency with which it is offered (Subar et al. 1998). For this reason, foods commonly offered in school meals, such as milk, make more substantial contributions to some nutrients or dietary components than might be anticipated based on nutrient content alone.

Findings are presented in Table 9.1. For calories and each nutrient/dietary component, the table shows the relative contributions of the nine major food groups and identifies the 10 minor food groups that made the largest contributions to NSLP lunches offered to students. Data are presented for elementary schools, secondary schools, and all schools. Key findings are discussed in the sections that follow. More detailed results, including findings for additional nutrients and contributions from all minor food groups that contributed at least 1 percent of calories or a given nutrient/dietary component, are presented in Appendix Tables I.1 through I.31.

1. Calories and Target Nutrients in NSLP Lunches

Calories. The leading source of calories in NSLP lunches offered in SY 2009–2010 was combination entrees, which contributed 38 percent of total calories (Table 9.1). Entrees such as pizza and pizza products, peanut butter sandwiches, sandwiches with plain meat or poultry, hamburgers/cheeseburgers, and Mexican-style entrees made the largest contributions. Consistent with their relative availability in school lunches (see Chapter 4), pizza/pizza products and hamburgers/cheeseburgers contributed a significantly larger share of calories in secondary schools than elementary schools, whereas peanut butter sandwiches made a significantly larger contribution to calories in elementary schools than secondary schools. Milk, primarily flavored and unflavored 1% milk, was the second largest contributor of calories in lunches offered in both elementary schools (17 percent) and secondary schools (16 percent). Vegetables and fruit each contributed 10 percent of calories in NSLP lunches, and breads/grains contributed 9 percent. Seven percent of the calories in NSLP lunches came from accompaniments offered with the reimbursable meal, including salad dressings and other condiments, toppings, and spreads (such as ketchup, mayonnaise, sour cream, and ranch dip), and 5 percent came from desserts.

Protein. Together, combination entrees (48 percent) and meats and meat alternates offered separately (8 percent) accounted for more than half of the protein in NSLP lunches as offered (Table 9.1). Milk contributed another quarter (26 percent) of the protein in NSLP lunches. Compared to lunches offered in secondary schools, a significantly larger share of the protein in lunches offered in elementary schools came from milk and meat/meat alternates and a significantly smaller share came from combination entrees.

Vitamin A. Vegetables (40 percent) and milk, which is fortified with vitamin A (31 percent), were the primary sources of vitamin A in NSLP lunches as offered (Table 9.1). The great majority of the vitamin A from vegetables came from carrots (raw and cooked), which were the leading contributor for both elementary schools (24 percent) and secondary schools (19 percent). Lettuce salads and mixed vegetables were also leading sources of vitamin A (very likely because they included carrots), whereas other dark orange and green vegetables (yams/sweet potatoes and leafy greens) contributed less than 3 percent of the vitamin A in lunches offered (see Appendix Table I.10). Combination entrees accounted for 19 percent of the vitamin A in NSLP lunches; entree salads and entree salad bars were the top contributors in this group, and significantly more so in secondary schools than elementary schools.

Table 9.1. Food Sources of Calories and Nutrients in National School Lunch Program Lunches Offered to Students

Major Food Groups	Percentage Contribution to Average Amount Offered			Top 10 Minor Food Groups	Percentage Contribution to Average Amount Offered		
	Elementary Schools	Secondary Schools	All Schools		Elementary Schools	Secondary Schools	All Schools
Calories							
Combination Entrees	37.7	37.5	37.6	1% milk, flavored	6.4	5.9	6.2
Milk	17.3	15.9 ^β	16.8	Pizza and pizza products	5.3	6.8 ^β	5.9
Vegetables	9.3	10.1	9.6	Peanut butter sandwiches	5.7	2.6 ^β	4.4
Fruit	9.5	9.7	9.6	Sandwiches with plain meat or poultry ^b	4.4	4.5	4.4
Breads/Grains	8.6	9.3	8.9	Hamburgers/cheeseburgers	3.7	4.7 ^β	4.1
Accompaniments ^a	7.1	7.9	7.4	Condiments, toppings, and spreads	3.7	4.2	3.9
Desserts	4.6	4.6	4.6	Bread, rolls, bagels	3.4	4.2 ^α	3.7
Meat/Meat Alternate	5.0	3.5 ^β	4.4	Mexican-style entrees	3.9	3.4	3.7
Other	0.8	1.4 ^β	1.0	Salad dressings	3.4	3.8	3.5
				1% milk, unflavored	3.8	3.2 ^β	3.5
Protein							
Combination Entrees	47.0	49.7 ^β	48.1	Sandwiches with plain meat or poultry ^b	7.2	7.6	7.3
Milk	26.8	24.7 ^β	26.0	1% milk, flavored	7.5	7.1	7.3
Meat/Meat Alternate	8.7	6.5 ^β	7.8	1% milk, unflavored	7.3	6.3 ^β	6.9
Breads/Grains	5.7	6.4	6.0	Pizza and pizza products	6.2	7.9 ^β	6.9
Vegetables	5.8	6.1	5.9	Hamburgers/cheeseburgers	5.1	6.7 ^β	5.8
Fruit	2.0	2.1	2.0	Entree salads, entree salad bars ^c	5.2	6.3	5.7
Accompaniments ^a	1.9	2.0	1.9	Mexican-style entrees	4.9	4.5	4.7
Desserts	1.6	1.7	1.6	Skim or nonfat milk, flavored	4.8	4.3	4.6
Other	0.5	0.8	0.7	Peanut butter sandwiches	4.8	2.2 ^β	3.8
				Skim or nonfat milk, unflavored	3.9	3.4	3.7
Vitamin A ^d							
Vegetables	41.1	37.9	39.9	Carrots	23.9	19.2 ^α	22.1
Milk	30.8	31.1	30.9	1% milk, flavored	8.8	9.1	8.9
Combination Entrees	18.0	19.4	18.6	1% milk, unflavored	8.3	7.9	8.2
Fruit	3.9	4.4 ^α	4.1	Entree salads, entree salad bars ^c	6.7	8.6 ^α	7.4
Accompaniments ^a	2.8	3.3	3.0	Lettuce salads ^e	5.3	6.2	5.6
Desserts	1.2	1.4	1.3	Mixed vegetables	5.2	5.8	5.4
Breads/Grains	1.1	1.3	1.1	Skim or nonfat milk, flavored	5.3	5.2	5.2
Meat/Meat Alternate	0.7	0.5 ^β	0.6	Skim or nonfat milk, unflavored	4.7	4.5	4.6
Other	0.4	0.6	0.4	2% milk, unflavored	3.1	3.5	3.3
				Entree food bars, bag/pre-plated lunches	3.3	2.1	2.9

Table 9.1 (continued)

Major Food Groups	Percentage Contribution to Average Amount Offered			Top 10 Minor Food Groups	Percentage Contribution to Average Amount Offered		
	Elementary Schools	Secondary Schools	All Schools		Elementary Schools	Secondary Schools	All Schools
Vitamin C							
Fruit	57.5	58.3	57.8	Citrus fruit	23.6	26.2	24.7
Vegetables	22.6	21.1	22.0	Fruit juice, 100%	19.4	18.1	18.8
Combination Entrees	10.0	10.1	10.1	Lettuce salads ^e	5.7	5.4	5.6
Accompaniments ^a	3.1	3.2	3.1	Broccoli	5.2	4.4	4.8
Desserts	2.9	2.4	2.7	Entree salads, entree salad bars ^c	3.5	4.1	3.8
Other	1.4	2.4	1.8	French fries/potato products	3.1	3.6	3.3
Milk	1.4	1.3	1.4	Condiments, toppings, and spreads	3.0	3.1	3.0
Breads/Grains	0.6	0.8	0.7	Apple	2.7	3.0	2.8
Meat/Meat Alternate	0.5	0.3 ^a	0.4	Entree food bars, bag/pre-plated lunches	2.5	2.5	2.5
				Mixed vegetables	2.2	2.1	2.1
Calcium							
Milk	54.1	52.1 ^β	53.3	1% milk, flavored	15.0	14.9	14.9
Combination Entrees	29.0	29.8	29.3	1% milk, unflavored	14.6	13.3 ^α	14.1
Vegetables	4.1	4.4	4.2	Skim or nonfat milk, flavored	9.4	8.8	9.2
Breads/Grains	3.7	4.4 ^α	4.0	Skim or nonfat milk, unflavored	8.3	7.5	8.0
Fruit	2.9	3.2	3.0	Pizza and pizza products	6.3	7.8 ^β	6.9
Meat/Meat Alternate	2.6	1.3 ^β	2.1	2% milk, unflavored	5.6	6.1	5.8
Accompaniments ^a	1.8	2.1	1.9	Sandwiches with plain meat or poultry ^b	4.1	4.2	4.1
Desserts	1.6	1.9	1.7	Entree salads, entree salad bars ^c	3.7	4.1	3.8
Other	0.3	0.6	0.4	Mexican-style entrees	3.0	2.8	2.9
				Entree food bars, bag/pre-plated lunches	3.1	2.4	2.8
Iron							
Combination Entrees	48.0	49.5	48.6	Pizza and pizza products	7.8	9.7 ^β	8.6
Breads/Grains	14.4	15.2	14.8	Bread, rolls, bagels	6.8	8.3	7.4
Vegetables	11.8	11.4	11.6	Sandwiches with plain meat or poultry ^b	6.5	6.6	6.6
Fruit	7.5	7.1	7.3	Hamburgers/cheeseburgers	5.8	7.4 ^β	6.5
Milk	6.3	5.6 ^β	6.0	Mexican-style entrees	4.8	4.1	4.5
Meat/Meat Alternate	5.1	3.8 ^β	4.6	Peanut butter sandwiches	5.1	2.3 ^β	3.9
Desserts	3.7	3.7	3.7	Entree salads, entree salad bars ^c	3.1	4.0 ^α	3.4
Accompaniments ^a	2.5	2.6	2.6	Entree food bars, bag/pre-plated lunches	3.4	3.6	3.4
Other	0.7	1.1	0.8	Breaded/fried meat or poultry sandwich	2.4	4.5 ^β	3.3
				Cookies, cakes, brownies	3.0	2.9	3.0

Table 9.1 (continued)

Major Food Groups	Percentage Contribution to Average Amount Offered			Top 10 Minor Food Groups	Percentage Contribution to Average Amount Offered		
	Elementary Schools	Secondary Schools	All Schools		Elementary Schools	Secondary Schools	All Schools
Total Fat							
Combination Entrees	47.7	45.6	46.8	Salad dressings	8.9	9.9	9.3
Accompaniments ^a	15.6	18.1 ^α	16.6	Condiments, toppings, and spreads	6.7	8.2 ^α	7.3
Vegetables	9.9	11.3	10.4	Peanut butter sandwiches	9.1	4.1 ^β	7.0
Milk	8.1	7.5 ^α	7.8	Pizza and pizza products	5.7	7.3 ^β	6.4
Meat/Meat Alternate	7.1	5.2 ^β	6.3	Hamburgers/cheeseburgers	4.4	5.7 ^β	4.9
Breads/Grains	6.2	6.3	6.2	Mexican-style entrees	5.1	4.4	4.9
Desserts	4.0	3.8	3.9	Sandwiches with plain meat or poultry ^b	4.8	4.9	4.8
Other	0.9	1.6 ^β	1.2	Entree salads, entree salad bars ^c	4.4	5.1	4.7
Fruit	0.7	0.7	0.7	Lettuce salads ^e	4.5	4.5	4.5
				Entree food bars, bag/pre-plated lunches	3.6	3.5	3.6
Saturated Fat							
Combination Entrees	52.6	52.2	52.4	Pizza and pizza products	7.4	9.6 ^β	8.3
Milk	16.3	15.4	15.9	Sandwiches with plain meat or poultry ^b	6.6	6.7	6.6
Accompaniments ^a	9.6	11.2 ^α	10.3	Entree salads, entree salad bars ^c	6.3	6.8	6.5
Vegetables	5.9	6.8	6.3	Hamburgers/cheeseburgers	5.3	7.0 ^β	6.0
Meat/Meat Alternate	6.5	4.6 ^β	5.8	Condiments, toppings, and spreads	5.3	6.2	5.7
Breads/Grains	4.4	4.7	4.5	Mexican-style entrees	6.0	5.2	5.7
Desserts	3.6	3.5	3.6	1% milk, flavored	5.2	4.9	5.1
Other	0.6	1.2	0.9	1% milk, unflavored	5.1	4.3 ^β	4.8
Fruit	0.4	0.4	0.4	Salad dressings	4.4	5.0	4.6
				Peanut butter sandwiches	5.9	2.7 ^β	4.6
Cholesterol							
Combination Entrees	57.6	61.9 ^β	59.4	Entree salads, entree salad bars ^c	11.5	13.0	12.1
Milk	17.4	15.8 ^β	16.7	Sandwiches with plain meat or poultry ^b	10.1	10.1	10.1
Meat/Meat Alternate	14.4	10.5 ^β	12.8	Hamburgers/cheeseburgers	6.5	8.1 ^β	7.1
Accompaniments ^a	2.9	3.4	3.1	Mexican-style entrees	6.4	5.6	6.0
Breads/Grains	2.8	3.1	2.9	1% milk, unflavored	5.8	4.8 ^β	5.4
Desserts	2.8	2.4	2.7	Pizza and pizza products	4.6	6.2 ^β	5.3
Vegetables	1.6	2.1 ^α	1.8	Breaded/fried chicken products	5.5	4.5	5.1
Other	0.4	0.8	0.6	1% milk, flavored	4.5	4.1	4.3
Fruit	0.0	0.0	0.0	Unbreaded poultry/meat/fish	4.4	3.6	4.1
				2% milk, unflavored	3.6	3.6	3.6

Table 9.1 (continued)

Major Food Groups	Percentage Contribution to Average Amount Offered			Top 10 Minor Food Groups	Percentage Contribution to Average Amount Offered		
	Elementary Schools	Secondary Schools	All Schools		Elementary Schools	Secondary Schools	All Schools
Sodium							
Combination Entrees	43.6	44.3	43.9	Condiments, toppings, and spreads	9.3	9.3	9.3
Accompaniments ^a	16.6	16.9	16.7	Salad dressings	7.3	7.6	7.4
Vegetables	14.0	13.9	14.0	Sandwiches with plain meat or poultry ^b	6.8	7.0	6.9
Breads/Grains	8.7	9.5	9.1	Pizza and pizza products	6.2	7.8 ^β	6.8
Milk	8.0	7.2 ^β	7.7	Hamburgers/cheeseburgers	4.6	5.4 ^α	4.9
Meat/Meat Alternate	6.2	4.7 ^β	5.5	Entree salads, entree salad bars ^c	3.5	4.5	3.9
Desserts	1.9	1.8	1.9	Lettuce salads ^e	3.8	3.8	3.8
Other	0.8	1.5 ^α	1.1	Mexican-style entrees	3.8	3.1 ^α	3.5
Fruit	0.2	0.2	0.2	Bread, rolls, bagels	3.2	4.0	3.5
				Entree food bars, bag/pre-plated lunches	3.2	3.5	3.4
Dietary Fiber							
Combination Entrees	31.0	29.0	30.2	Apple	6.1	7.4 ^α	6.6
Fruit	24.8	27.0	25.7	Citrus fruit	4.6	5.5	4.9
Vegetables	23.6	23.0	23.4	Peanut butter sandwiches	5.9	2.7 ^β	4.6
Breads/Grains	8.1	8.2	8.2	Pizza and pizza products	4.1	5.0 ^β	4.5
Milk	5.6	5.3	5.5	Lettuce salads ^e	3.9	4.0	4.0
Accompaniments ^a	2.3	2.6	2.4	Bread, rolls, bagels	3.6	4.2	3.9
Desserts	2.2	2.6	2.3	Pears	3.5	4.2	3.8
Meat/Meat Alternate	1.5	1.1 ^β	1.4	Legumes	3.8	3.2	3.5
Other	0.8	1.2 ^α	0.9	Entree salads, entree salad bars ^c	3.1	3.9	3.5
				Entree food bars, bag/pre-plated lunches	3.2	2.9	3.1
Calories from Solid Fats and Added Sugars							
Combination Entrees	37.9	38.6	38.2	1% milk, flavored	10.1	9.8	10.0
Milk	21.2	20.7	21.0	Cookies, cakes, brownies	8.0	7.4	7.8
Desserts	11.1	11.0	11.1	Pizza and pizza products	5.7	7.5 ^β	6.4
Accompaniments ^a	7.2	7.2	7.2	Condiments, toppings, and spreads	5.6	5.4	5.5
Breads/Grains	6.4	6.4	6.4	Skim or nonfat milk, flavored	5.0	4.6	4.9
Meat/Meat Alternate	6.4	4.3 ^β	5.6	Hamburgers/cheeseburgers	3.7	5.0 ^β	4.2
Vegetables	4.6	5.6 ^β	5.0	Entree salads, entree salad bars ^c	3.9	4.4	4.1
Fruit	4.5	4.6	4.5	Sandwiches with plain meat or poultry ^b	4.0	4.1	4.0
Other	0.7	1.6 ^α	1.1	Mexican-style entrees	3.9	3.5	3.7
				Entree food bars, bag/pre-plated lunches	3.5	3.1	3.4

Table 9.1 (continued)

Major Food Groups	Percentage Contribution to Average Amount Offered			Top 10 Minor Food Groups	Percentage Contribution to Average Amount Offered		
	Elementary Schools	Secondary Schools	All Schools		Elementary Schools	Secondary Schools	All Schools
Solid Fats							
Combination Entrees	50.5	52.3	51.2	Pizza and pizza products	8.1	10.5 ^β	9.1
Milk	15.2	14.4	14.9	Cookies, cakes, brownies	6.5	5.7	6.2
Breads/Grains	7.5	7.3	7.4	Entree salads, entree salad bars ^c	5.8	6.4	6.1
Meat/Meat Alternate	8.2	6.1 ^β	7.3	Mexican-style entrees	6.3	5.5	6.0
Desserts	7.2	6.6	7.0	Hamburgers/cheeseburgers	5.1	6.7 ^β	5.7
Accompaniments ^a	5.7	5.8	5.7	Sandwiches with plain meat or poultry ^b	5.7	5.6	5.7
Vegetables	5.1	6.2 ^α	5.6	1% milk, flavored	5.1	4.8	5.0
Other	0.6	1.3 ^α	0.9	Condiments, toppings, and spreads	4.8	4.9	4.8
Fruit	0.0	0.0	0.0	1% milk, unflavored	4.6	3.9 ^β	4.3
				2% milk, unflavored	3.8	3.9	3.9
Added Sugars							
Milk	30.8	31.5	31.1	1% milk, flavored	18.1	18.4	18.2
Desserts	17.4	18.6	17.8	Skim or nonfat milk, flavored	12.1	11.6	11.9
Combination Entrees	17.8	15.0 ^α	16.7	Cookies, cakes, brownies	10.3	10.2	10.3
Fruit	11.6	12.6	12.0	Condiments, toppings, and spreads	6.9	6.2	6.7
Accompaniments ^a	9.6	9.7	9.7	Peanut butter sandwiches	5.9	2.9 ^β	4.7
Breads/Grains	4.6	4.8	4.7	Peaches	3.7	4.9 ^β	4.2
Vegetables	3.7	4.4	4.0	Fruit-based desserts	3.3	3.5	3.4
Meat/Meat Alternate	3.6	1.2 ^β	2.7	Salad dressings	2.7	3.5 ^β	3.0
Other	0.8	2.2	1.3	Entree food bars, bag/pre-plated lunches	3.2	2.4	2.9
				Lettuce salads ^e	2.2	2.6	2.3

Source: School Nutrition Dietary Assessment Study-IV, Menu Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Note: See Appendix Table C.1 for a detailed listing of food items included in each major food group.

^a Includes condiments, toppings, spreads, and salad dressings.

^b Includes sandwiches with or without cheese.

^c Entree salads may include hard-cooked eggs or egg salad. Entree salad bars include an average serving of salad dressing.

^d In mcg RE (retinol equivalents).

^e Includes side salad bars, which include an average serving of salad dressing.

^α Difference between elementary and secondary schools is significantly different from zero at the .05 level.

^β Difference between elementary and secondary schools is significantly different from zero at the .01 level.

Vitamin C. As might be expected, fruits and vegetables were the major contributors of vitamin C in NSLP lunches (58 and 22 percent, respectively) (Table 9.1). Citrus fruit supplied the largest share of vitamin C (25 percent), followed by 100% fruit juice (19 percent). Other fruits contributing to vitamin C were apples, bananas, peaches, berries, pineapple, and kiwi (see Appendix Table I.12). Among the vegetables offered, leading sources of vitamin C included lettuce salads, broccoli, french fries and similar potato products, and mixed vegetables. There were no differences in food sources of vitamin C by school type.

Calcium. Milk provided more than half (53 percent) of the calcium in NSLP lunches as offered (Table 9.1). The proportions of calcium contributed by the various types of milk were similar across school types, with the exception of 1% unflavored milk which contributed significantly more calcium in elementary school lunches than secondary school lunches (15 versus 13 percent). Combination entrees, many of which included cheese, provided close to a third (29 percent) of the calcium in the average lunch offered. Major contributors in this group included pizza/pizza products, sandwiches with plain meat/poultry (which could have included cheese), entree salads/entree salad bars, Mexican-style entrees, and entree food bars and bag/pre-plated lunches. Similar to the pattern observed for calories, a significantly larger proportion of the calcium in secondary school lunches was supplied by pizza/pizza products than in elementary school lunches.

Iron. Almost half of the iron (49 percent) in NSLP lunches as offered was derived from combination entrees (Table 9.1). Separate breads/grains (required to be enriched or whole grain) contributed another 15 percent of the iron in NSLP lunches, and vegetables contributed 12 percent. Pizza/pizza products, hamburgers/cheeseburgers, entree salads/salad bars, and breaded/fried sandwiches contributed significantly larger shares of the iron in secondary school lunches than in elementary school lunches, and peanut butter sandwiches contributed a significantly larger share of the iron in elementary school lunches than in secondary school lunches.

2. Total Fat and Saturated Fat in NSLP Lunches

Total fat. Combination entrees were also the leading contributor of total fat in NSLP lunches as offered (47 percent) (Table 9.1). Among the entrees offered, peanut butter sandwiches were the leading contributor to total fat in lunches offered in elementary schools and pizza/pizza products and hamburgers/cheeseburgers were the two leading contributors in secondary school lunches. Accompaniments were the second leading source of total fat in both elementary and secondary school lunches, supplying 17 percent of the fat in lunches offered overall. In this group, salad dressings and condiments, toppings, and spreads were leading contributors; however, condiments, toppings, and spreads provided slightly but significantly more fat in secondary school lunches than in elementary school lunches. Vegetables also contributed a notable share (10 percent) of the total fat in NSLP lunches. Virtually all of this fat came from lettuce salads (mainly side salad bars, which include an average serving of dressing) and from french fries and similar potato products (see Appendix Table I.2).

Saturated fat. Approximately two-thirds of the saturated fat in NSLP lunches as offered was contributed by combination entrees (52 percent) and milk (16 percent) (Table 9.1). Accompaniments (condiments, topping, spreads, and salad dressings) accounted for another 10 percent of the saturated fat in NSLP lunches. Pizza/pizza products, sandwiches with plain meat/poultry (and sometimes cheese), and entree salads/salad bars were the leading contributors of saturated fat overall; hamburgers/cheeseburgers were among the top three sources of saturated fat in lunches offered in secondary schools. Also of note is that separate meat/meat alternates contributed significantly more of the saturated fat in lunches offered in elementary schools than lunches offered

in secondary schools, although this group contributed relatively small proportions of saturated fat for both school types (5 to 7 percent).

3. Cholesterol, Sodium, and Dietary Fiber in NSLP Lunches

Cholesterol. Menu items composed mainly of animal products contributed almost all of the cholesterol in NSLP lunches as offered (89 percent) (Table 9.1). Combination entrees contributed 59 percent, milk contributed 17 percent, and separate meats/meat alternates contributed 13 percent. The top two sources of cholesterol in NSLP lunches were entree salads/salad bars (12 percent) and sandwiches with plain meat/poultry (10 percent). In keeping with the patterns noted for calories and other nutrients, hamburgers/cheeseburgers and pizza/pizza products contributed significantly greater shares of the cholesterol in secondary school lunches than in elementary school lunches, and 1% unflavored milk accounted for more of the cholesterol in elementary school lunches than in secondary school lunches.

Sodium. Together, combination entrees (44 percent), accompaniments (17 percent), and vegetables (14 percent) accounted for three-quarters of the sodium in NSLP lunches as offered (Table 9.1). Overall, the top two food sources of sodium were condiments, toppings, and spreads (one minor food group) and salad dressings, followed by sandwiches with plain meat/poultry, pizza/pizza products, hamburgers/cheeseburgers, and entree salads/salad bars. The majority of the sodium supplied by vegetables came from lettuce salads, including side salad bars with salad dressing, and french fries/similar potato products (see Appendix Table I.25).

Dietary fiber. Combination entrees, fruit, and vegetables each contributed roughly a quarter of the dietary fiber in NSLP lunches as offered (30, 26, and 23 percent, respectively) (Table 9.1). The leading entree sources were peanut butter sandwiches, pizza/pizza products, entree salads/salad bars, and other entree food bars (for example, baked potato bars and nacho/taco bars). Among fruits, apples, citrus fruits, and pears (all forms) contributed the largest shares of dietary fiber. In addition to lettuce salads, legumes were among the top 10 sources of dietary fiber despite being offered in only 10 percent of lunch menus overall (see Chapter 4, Table 4.3). Discrete breads/grains contributed about 8 percent of total dietary fiber, suggesting that whole grain options were relatively uncommon in NSLP lunches.

4. Solid Fats and Added Sugars in NSLP Lunches

The analyses presented in Chapter 8 showed that NSLP lunches were high in calories from SoFAS relative to the daily limits recommended in USDA Food Patterns. In this section, we look first at the sources of SoFAS calories in NSLP lunches and then at the sources of solid fats and added sugars individually. These data will be useful to policymakers and school foodservice practitioners in identifying potential changes in food offerings that could lower the level of SoFAS calories in NSLP lunches.

Calories from SoFAS. Seventy percent of the SoFAS calories in NSLP lunches offered to students came from combination entrees (38 percent), milk (21 percent), and desserts (11 percent). The top five contributors to SoFAS calories were 1% flavored milk (10 percent); cookies, cakes and brownies (8 percent); pizza/pizza products (6 percent); condiments, toppings and spreads (6 percent); and flavored skim/nonfat milk (5 percent) (Table 9.1). There was some variation in the relative contribution of these foods to SoFAS calories in lunches offered in elementary and secondary schools, and, among secondary schools, hamburgers/cheeseburgers rather than flavored skim/nonfat milk was the fifth leading contributor of SoFAS calories.

Solid fats. Combination entrees contributed more than half (51 percent) of the solid fats in NSLP lunches (Table 9.1). Minor food groups that were leading contributors to solid fats in NSLP lunches included pizza/pizza products (9 percent); cookies, cakes and brownies (6 percent); entree salads/salad bars (6 percent); Mexican-style entrees (6 percent); and hamburgers/cheeseburgers (6 percent). Pizza/pizza products and hamburgers/cheeseburgers made significantly greater contributions to the solid fats in NSLP lunches offered in secondary schools than lunches offered in elementary schools, and unflavored 1% milk made a significantly greater contribution to solid fats in elementary school lunches than in secondary school lunches.

Added sugars. Milk accounted for 31 percent of the added sugars in average NSLP lunches offered, followed by desserts (18 percent) and combination entrees (17 percent) (Table 9.1). The five leading contributors to added sugars in NSLP lunches were 1% flavored milk (18 percent); skim/nonfat flavored milk (12 percent); cookies, cakes and brownies (10 percent); condiments, toppings and spreads (7 percent); and peanut butter sandwiches (which may include jelly) (5 percent). There was some variation in the relative contribution of these foods to added sugars in lunches offered in elementary and secondary schools. Among secondary schools, peaches rather than peanut butter sandwiches was the fifth leading contributor of added sugars.

C. Sources of Calories and Nutrients in SBP Breakfasts as Offered

Foods offered in breakfast menus were coded using the nine major and 229 minor food groups described in the preceding section on NSLP lunches (see Appendix Table C.1).² Similar to the approach used in the analysis of NSLP lunches, we aggregated some minor food groups to create an abbreviated set of minor food groups for use in this analysis ($n = 74$). (The food sources minor food groups differed for the analyses of NSLP lunches and SBP breakfasts because the mix of foods offered to students differs for the two meals.) We computed the percentage contribution of the nine major food groups and each of the 74 food sources minor food groups using the approach described in the preceding section on NSLP lunches.

Results are presented in Table 9.2. The table shows the relative contributions of each of the nine major food groups and identifies the 10 minor food groups that made the largest contributions to the calorie/nutrient content of SBP breakfasts offered to students. Key findings are discussed in the sections that follow. More detailed results, including findings for additional nutrients and contributions from all minor food groups that accounted for at least 1 percent of calories or a given nutrient/dietary component, are presented in Appendix Tables I.32 through I.62.

1. Calories and Target Nutrients in SBP Breakfasts

Calories. Breads and grains and milk were the leading source of calories in SBP breakfast offered in school year 2009–2010, providing 37 and 26 percent of total calories, respectively (Table 9.2). Fruit, including 100% fruit juice, was the third leading source of calories in SBP breakfasts (13 percent). Among the minor food groups, the top five contributors to calories in SBP breakfasts were cold cereal; 100% fruit juice; flavored 1% milk; sweet rolls, donuts, and toaster pastries; and unflavored 1% milk. There was some variation by school type in the relative importance of these minor food groups as sources of calories.

² The desserts included in breakfast menus were mainly cookies; however, frozen juice bars, gelatin, and fruit snacks were also reported.

Table 9.2. Food Sources of Calories and Nutrients in School Breakfast Program Breakfasts Offered to Students

Major Food Groups	Percentage Contribution to Average Amount Offered			Top 10 Minor Food Groups	Percentage Contribution to Average Amount Offered		
	Elementary Schools	Secondary Schools	All Schools		Elementary Schools	Secondary Schools	All Schools
Calories							
Breads/Grains	37.6	36.9	37.3	Cold cereal	10.7	8.1 ^β	9.6
Milk	26.4	24.4 ^β	25.6	Fruit juice, 100%	9.1	8.5	8.8
Fruit	13.5	12.7 ^α	13.2	1% milk, flavored	7.7	7.9	7.8
Combination Entrees	10.5	13.1 ^β	11.6	Sweet rolls, donuts, toaster pastries	5.8	10.3 ^β	7.7
Accompaniments ^a	5.5	6.6 ^α	6.0	1% milk, unflavored	7.9	5.7 ^β	7.0
Meat/Meat Alternate	5.6	5.0	5.3	Condiments, toppings, and spreads	5.5	6.6 ^α	6.0
Desserts	0.4	0.5	0.4	Muffins, sweet/quick breads	4.9	4.7	4.9
Other	0.4	0.4	0.4	Breakfast sandwiches ^c	3.3	4.9 ^β	3.9
Vegetables ^b	0.2	0.4 ^α	0.3	Skim or nonfat milk, flavored	3.7	4.2	3.9
				2% milk, unflavored	3.7	3.6	3.7
Protein							
Milk	51.2	46.9 ^β	49.5	1% milk, unflavored	18.3	13.6 ^β	16.4
Breads/Grains	21.7	21.7	21.7	1% milk, flavored	10.8	11.5	11.1
Combination Entrees	12.4	17.0 ^β	14.3	Skim or nonfat milk, unflavored	7.9	6.3 ^α	7.3
Meat/Meat Alternate	9.2	8.5	8.9	2% milk, unflavored	7.1	7.1	7.1
Fruit	3.4	3.4	3.4	Skim or nonfat milk, flavored	6.3	7.4	6.7
Accompaniments ^a	1.3	1.8	1.5	Breakfast sandwiches ^c	4.3	6.8 ^β	5.3
Other	0.5	0.5	0.5	Cold cereal	5.2	4.0 ^β	4.7
Desserts	0.1	0.2	0.1	Sweet rolls, donuts, toaster pastries	2.4	4.2 ^β	3.1
Vegetables ^b	0.1	0.1 ^α	0.1	Bread, rolls, bagels	2.5	3.9 ^β	3.1
				Yogurt	2.6	2.7	2.6
Vitamin A ^d							
Milk	50.8	50.3	50.6	Cold cereal	27.9	23.9 ^β	26.4
Breads/Grains	36.4	34.0 ^α	35.4	1% milk, unflavored	18.1	14.5 ^β	16.7
Fruit	4.6	4.7	4.7	1% milk, flavored	10.9	12.6 ^α	11.6
Combination Entrees	4.2	5.2	4.6	Skim or nonfat milk, unflavored	8.2	7.1	7.8
Accompaniments ^a	1.6	3.5 ^β	2.3	2% milk, unflavored	6.8	7.3	7.0
Meat/Meat Alternate	2.4	1.9 ^α	2.2	Skim or nonfat milk, flavored	6.0	7.7 ^α	6.6
Desserts	0.0	0.2	0.1	Sweet rolls, donuts, toaster pastries	1.9	4.3 ^β	2.8
Vegetables ^b	0.0	0.2	0.1	Fruit juice, 100%	2.6	2.8	2.7
Other	0.0	0.0	0.0	Condiments, toppings, and spreads	1.6	3.5 ^β	2.3
				Pancakes, waffles, french toast	1.8	1.9	1.8

Table 9.2 (continued)

Major Food Groups	Percentage Contribution to Average Amount Offered			Top 10 Minor Food Groups	Percentage Contribution to Average Amount Offered		
	Elementary Schools	Secondary Schools	All Schools		Elementary Schools	Secondary Schools	All Schools
Vitamin C							
Fruit	82.8	84.1	83.3	Fruit juice, 100%	67.9	65.9	67.1
Breads/Grains	13.0	11.2 ^β	12.3	Citrus fruit	9.5	13.2 ^α	11.0
Milk	1.2	1.6	1.4	Cold cereal	10.3	8.2 ^β	9.5
Combination Entrees	1.2	1.2	1.2	Sweet rolls, donuts, toaster pastries	1.4	1.9	1.6
Other	0.9	0.5	0.7	Banana	1.3	1.3	1.3
Meat/Meat Alternate	0.3	0.3	0.3	Apple	1.0	1.5 ^β	1.2
Accompaniments ^a	0.2	0.5 ^β	0.3	1% milk, flavored	1.0	1.1	1.0
Vegetables ^b	0.2	0.3 ^α	0.2	Grain/fruit cereal bars, granola bars	1.1	0.7	0.9
Desserts	0.1	0.3	0.2	Peaches	0.9	0.7	0.8
				Berries	0.9	0.7	0.8
Calcium							
Milk	67.7	65.5 ^α	66.8	1% milk, unflavored	24.0	18.9 ^β	22.0
Breads/Grains	16.4	15.8	16.2	1% milk, flavored	14.1	16.0	14.9
Combination Entrees	5.1	7.2 ^β	5.9	Skim or nonfat milk, unflavored	10.9	9.2	10.2
Meat/Meat Alternate	5.9	5.6	5.8	2% milk, unflavored	9.3	9.8	9.5
Fruit	4.3	5.0	4.6	Skim or nonfat milk, flavored	8.1	10.1 ^α	8.9
Accompaniments ^a	0.5	0.8 ^β	0.6	Cold cereal	7.4	6.4 ^α	7.0
Desserts	0.0	0.1	0.1	Fruit juice, 100%	3.4	3.8	3.6
Other	0.0	0.0	0.0	Yogurt	3.4	3.7	3.5
Vegetables ^b	0.0	0.0 ^β	0.0	Sweet rolls, donuts, toaster pastries	1.6	2.7 ^β	2.0
				Breakfast sandwiches ^c	1.5	2.5 ^β	1.9
Iron							
Breads/Grains	76.5	72.7 ^β	75.0	Cold cereal	52.0	42.9 ^β	48.5
Combination Entrees	8.3	10.8 ^α	9.3	Fruit juice, 100%	6.5	6.7	6.6
Fruit	8.1	8.1	8.1	Sweet rolls, donuts, toaster pastries	4.3	8.7 ^β	6.0
Milk	4.5	5.0 ^α	4.7	Bread, rolls, bagels	3.8	6.8 ^β	5.0
Meat/Meat Alternate	1.6	1.7	1.6	Pancakes, waffles, french toast	3.5	3.1	3.3
Accompaniments ^a	0.7	1.0 ^β	0.8	Muffins, sweet/quick breads	3.2	3.0	3.1
Desserts	0.2	0.4	0.3	Breakfast sandwiches ^c	2.3	4.0 ^β	3.0
Other	0.1	0.1	0.1	Grain/fruit cereal bars, granola bars	2.7	1.9	2.4
Vegetables ^b	0.0	0.1 ^β	0.1	Buttered toast/bagels with cream cheese	2.3	2.5	2.3
				1% milk, flavored	1.9	2.2	2.0

Table 9.2 (continued)

Major Food Groups	Percentage Contribution to Average Amount Offered			Top 10 Minor Food Groups	Percentage Contribution to Average Amount Offered		
	Elementary Schools	Secondary Schools	All Schools		Elementary Schools	Secondary Schools	All Schools
Total Fat							
Breads/Grains	41.4	40.4	40.9	Sweet rolls, donuts, toaster pastries	9.6	15.8 ^β	12.3
Combination Entrees	19.6	23.2 ^α	21.1	Breakfast sandwiches ^c	6.9	9.6 ^β	8.1
Milk	19.7	16.6 ^β	18.4	Muffins, sweet/quick breads	7.9	7.2	7.6
Meat/Meat Alternate	11.3	9.1 ^α	10.4	1% milk, unflavored	7.3	4.9 ^β	6.3
Accompaniments ^a	5.3	7.4 ^α	6.2	Condiments, toppings, and spreads	5.3	7.4 ^α	6.2
Fruit	1.4	1.2 ^α	1.3	2% milk, unflavored	5.9	5.3	5.6
Other	0.6	0.8	0.7	1% milk, flavored	4.5	4.4	4.5
Vegetables ^b	0.4	0.8 ^α	0.6	Cold cereal	4.9	3.3 ^α	4.2
Desserts	0.4	0.5	0.5	Sausages, hot dogs, cold cuts	4.3	4.2	4.2
				Pancakes, waffles, french toast	4.7	3.3 ^β	4.1
Saturated Fat							
Milk	34.0	29.6 ^β	32.2	1% milk, unflavored	13.0	9.1 ^β	11.3
Breads/Grains	27.9	28.0	27.9	2% milk, unflavored	10.2	9.6	10.0
Combination Entrees	18.3	22.0 ^α	19.8	Sweet rolls, donuts, toaster pastries	6.2	11.0 ^β	8.2
Meat/Meat Alternate	12.3	9.4 ^β	11.1	Breakfast sandwiches ^c	6.7	9.5 ^β	7.9
Accompaniments ^a	5.8	9.0 ^β	7.1	1% milk, flavored	7.7	7.8	7.7
Fruit	0.7	0.6	0.7	Condiments, toppings, and spreads	5.8	9.0 ^β	7.1
Other	0.5	0.6	0.5	Muffins, sweet/quick breads	4.5	4.5	4.5
Vegetables ^b	0.3	0.4	0.3	Grain/fruit cereal bars, granola bars	4.2	3.1	3.8
Desserts	0.3	0.4	0.3	Sausages, hot dogs, cold cuts	3.7	3.6	3.6
				Pizza and pizza products	2.9	3.8 ^α	3.3
Cholesterol							
Combination Entrees	25.0	33.5 ^β	28.5	Breakfast sandwiches ^c	13.0	20.5 ^β	16.1
Milk	26.0	23.0 ^α	24.7	Eggs	16.5	12.7 ^α	14.9
Meat/Meat Alternate	24.5	20.4 ^α	22.8	1% milk, unflavored	10.6	7.6 ^β	9.4
Breads/Grains	21.6	18.7	20.4	Pancakes, waffles, french toast	9.5	6.2 ^β	8.1
Accompaniments ^a	2.2	3.9 ^β	2.9	Mexican-style entrees	7.6	6.6	7.2
Other	0.5	0.5	0.5	2% milk, unflavored	6.7	6.5	6.6
Desserts	0.1	0.1	0.1	Muffins, sweet/quick breads	5.4	5.4	5.4
Fruit	0.0	0.0	0.0	Sweet rolls, donuts, toaster pastries	5.0	5.9	5.4
Vegetables ^b	0.0	0.0	0.0	Sausages, hot dogs, cold cuts	4.5	5.1	4.7
				1% milk, flavored	4.7	4.8	4.7

Table 9.2 (continued)

Major Food Groups	Percentage Contribution to Average Amount Offered			Top 10 Minor Food Groups	Percentage Contribution to Average Amount Offered		
	Elementary Schools	Secondary Schools	All Schools		Elementary Schools	Secondary Schools	All Schools
Sodium							
Breads/Grains	46.3	42.4 ^β	44.7	Cold cereal	13.6	10.4 ^β	12.3
Combination Entrees	19.9	25.8 ^β	22.4	Breakfast sandwiches ^c	7.3	10.5 ^β	8.6
Milk	20.2	17.7 ^β	19.1	1% milk, unflavored	6.9	4.8 ^β	6.0
Meat/Meat Alternate	7.6	6.5	7.1	Sweet rolls, donuts, toaster pastries	4.5	7.8 ^β	5.9
Accompaniments ^a	3.8	5.4 ^β	4.5	Pancakes, waffles, french toast	6.4	4.5 ^β	5.6
Other	1.0	0.9	1.0	1% milk, flavored	5.4	5.4	5.4
Fruit	0.6	0.5 ^β	0.5	Condiments, toppings, and spreads	3.8	5.4 ^β	4.5
Vegetables ^b	0.4	0.6 ^α	0.5	Bread, rolls, bagels	3.7	5.0 ^α	4.2
Desserts	0.3	0.3	0.3	Biscuits, croissants, cornbread	4.1	4.0	4.0
				Muffins, sweet/quick breads	4.2	3.9	4.0
Dietary Fiber							
Breads/Grains	50.1	44.0 ^β	47.6	Cold cereal	20.1	14.8 ^β	17.9
Fruit	27.2	28.7	27.8	Apple	6.0	8.4 ^β	7.0
Milk	10.5	12.0 ^α	11.1	1% milk, flavored	5.9	6.4	6.1
Combination Entrees	8.6	11.3 ^β	9.7	Muffins, sweet/quick breads	6.1	5.3	5.8
Accompaniments ^a	2.0	2.3	2.1	Sweet rolls, donuts, toaster pastries	4.3	7.0 ^β	5.4
Meat/Meat Alternate	0.7	0.7	0.7	Citrus fruit	4.5	6.3 ^α	5.2
Desserts	0.5	0.3	0.4	Fruit juice, 100%	4.9	4.6	4.8
Vegetables ^b	0.3	0.6 ^α	0.4	Bread, rolls, bagels	4.0	5.3 ^α	4.5
Other	0.2	0.1	0.1	Skim or nonfat milk, flavored	4.1	4.6	4.3
				Banana	4.3	4.1	4.2
Calories from Solid Fats and Added Sugars							
Breads/Grains	43.0	41.5	42.4	Sweet rolls, donuts, toaster pastries	10.5	16.9 ^β	13.2
Milk	23.7	22.5	23.2	Condiments, toppings, and spreads	11.0	13.3 ^α	11.9
Accompaniments ^a	11.0	13.3 ^α	11.9	Cold cereal	11.3	8.5 ^β	10.1
Combination Entrees	10.5	12.5 ^α	11.4	1% milk, flavored	9.7	9.6	9.7
Meat/Meat Alternate	8.9	7.4 ^α	8.3	Muffins, sweet/quick breads	4.9	4.6	4.8
Fruit	1.7	1.1 ^β	1.5	Skim or nonfat milk, flavored	4.4	4.8	4.6
Desserts	0.5	0.8	0.6	Breakfast sandwiches ^c	3.7	5.2 ^β	4.4
Other	0.5	0.5	0.5	1% milk, unflavored	4.7	3.2 ^β	4.1
Vegetables	0.3	0.3	0.3	Yogurt	4.1	3.6	3.9
				2% milk, unflavored	4.0	3.7	3.8

Table 9.2 (continued)

Major Food Groups	Percentage Contribution to Average Amount Offered			Top 10 Minor Food Groups	Percentage Contribution to Average Amount Offered		
	Elementary Schools	Secondary Schools	All Schools		Elementary Schools	Secondary Schools	All Schools
Solid Fats							
Breads/Grains	39.1	40.2	39.6	Sweet rolls, donuts, toaster pastries	12.5	20.2 ^β	15.8
Milk	25.5	21.0 ^β	23.5	1% milk, unflavored	9.5	6.2 ^β	8.1
Combination Entrees	17.7	20.7	19.0	Breakfast sandwiches ^c	7.0	9.3 ^α	8.0
Meat/Meat Alternate	11.3	8.3 ^β	10.0	2% milk, unflavored	8.0	7.0	7.6
Accompaniments ^a	4.8	7.9 ^β	6.1	Condiments, toppings, and spreads	4.8	7.9 ^β	6.1
Other	0.6	0.6	0.6	1% milk, flavored	6.1	5.7	5.9
Desserts	0.5	0.7	0.6	Buttered toast/bagels with cream cheese	4.7	3.8	4.3
Vegetables	0.5	0.6	0.6	Sausages, hot dogs, cold cuts	4.1	3.7	3.9
Fruit	0.0	0.0	0.0	Pizza and pizza products	3.3	4.1	3.7
				Muffins, sweet/quick breads	3.5	3.7	3.6
Added Sugars							
Breads/Grains	46.8	42.9 ^α	45.2	Cold cereal	19.6	15.4 ^β	17.9
Milk	22.0	24.2 ^α	22.9	Condiments, toppings, and spreads	17.0	19.1	17.9
Accompaniments ^a	17.0	19.1	17.9	1% milk, flavored	13.3	13.8	13.5
Meat/Meat Alternate	6.6	6.4	6.5	Sweet rolls, donuts, toaster pastries	8.6	13.4 ^β	10.6
Combination Entrees	3.4	3.7	3.5	Skim or nonfat milk, flavored	8.1	9.3	8.6
Fruit	3.4	2.4 ^α	2.9	Yogurt	6.6	6.4	6.5
Desserts	0.4	0.9	0.6	Muffins, sweet/quick breads	6.3	5.6	6.0
Other	0.4	0.3	0.4	Grain/fruit cereal bars, granola bars	4.1	2.7	3.5
Vegetables	0.0	0.0 ^α	0.0	Crackers and pretzels	3.9	1.7 ^β	3.0
				Pancakes, waffles, French toast	1.9	1.4 ^α	1.7

Source: School Nutrition Dietary Assessment Study-IV, Menu Survey, school year 2009–2010. Tabulations prepared by Mathematica Policy Research are weighted to be representative of all public schools offering the National School Lunch Program.

Note: See Appendix Table C.1 for a detailed listing of food items included in each major food group.

^a Includes condiments, toppings, spreads, and salad dressings.

^b Mainly hash browns, potato puffs, and french fries.

^c Includes sandwiches with egg, cheese, sausage, ham, or other types of meat on a biscuit, English muffin, bagel, or croissant.

^d In mcg RE (Retinol equivalents).

^α Difference between elementary and secondary schools is significantly different from zero at the .05 level.

^β Difference between elementary and secondary schools is significantly different from zero at the .01 level.

Protein. Overall, milk contributed half of the protein in average SBP breakfasts offered, followed by breads and grains (22 percent) and combination entrees (14 percent) (Table 9.2). Among the minor food groups, the top five contributors to protein in SBP breakfasts were all milks. Other minor food groups included in the top 10 contributors to protein in SBP breakfasts include breakfast sandwiches; cold cereal; sweet rolls, donuts, and toaster pastries; bread, rolls, and bagels; and yogurt.

Vitamin A. More than three-quarters of the vitamin A in SBP breakfasts offered was provided by vitamin A-fortified foods, including milk (51 percent) and cold cereal (26 percent) (Table 9.2). Elementary school breakfasts derived significantly more vitamin A from cold cereal (28 percent) than did breakfasts in secondary schools (24 percent). In addition, secondary school breakfasts derived more vitamin A from flavored milk and from sweet rolls, donuts, and toaster pastries, relative to elementary school breakfasts.

Vitamin C. Fruit (including 100% fruit juice) provided more than 80 percent of the vitamin C in SBP breakfasts offered (Table 9.2). This came mainly from 100% fruit juice (67 percent) and citrus fruit (11 percent). Citrus fruit supplied almost one-third more of the vitamin C in the average breakfast in secondary schools than in elementary schools (13 versus 10 percent). Cold cereal, including vitamin-fortified varieties, was the third leading source of vitamin C, contributing 10 percent of the vitamin C in elementary school breakfasts and 8 percent in secondary school breakfasts.

Calcium. Milk provided about two-thirds of the calcium in SBP breakfasts offered (Table 9.2). Breads and grains were the next leading source of calcium, providing 16 percent of the total calcium overall. Among the minor food groups, the top five contributors to calcium in SBP breakfasts were milks. Other minor food groups included in the top 10 contributors to calcium in SBP breakfasts include cold cereal; 100% fruit juice; yogurt; sweet rolls, donuts, and toaster pastries; and breakfast sandwiches.

Iron. The leading contributor of iron in average SBP breakfasts offered was breads/grains (75 percent) (Table 9.2). Almost half (49 percent) of iron in SBP breakfasts was supplied by cold cereals, many of which are enriched or fortified with iron. Cold cereals contributed significantly more of the iron in elementary school breakfasts than secondary school breakfasts (52 versus 43 percent). Other breads/grain items, such as sweet rolls, donuts, and toaster pastries and breads, rolls, and bagels made more substantial contributions to iron in breakfasts offered in secondary schools. Breakfast sandwiches were among the top food sources of iron, but contributed twice as much in secondary school breakfasts as in elementary school breakfasts.

2. Total Fat and Saturated Fat in SBP Breakfasts

Total fat. Among the major food groups, breads/grains was the leading source of total fat (41 percent) in SBP breakfasts offered, followed by combination entrees (21 percent) and milk (18 percent) (Table 9.2). Sweet rolls, donuts, and toaster pastries were the single largest contributor to total fat in SBP breakfasts, but made a significantly greater contribution to secondary school breakfasts than to elementary school breakfasts (16 versus 10 percent). Breakfast sandwiches; muffins and sweet/quick breads; unflavored 1% milk; and condiments, toppings and spreads (cream cheese, gravy, margarine, and butter) were also among the top five contributors to the fat content of average SBP breakfasts offered. There was some variation between school types in the relative importance of these minor foods groups as sources of total fat in SBP breakfasts.

Saturated fat. Overall, about one-third (32 percent) of the saturated fat in SBP breakfasts offered came from milk; however, milk contributed a significantly larger share of the saturated fat in elementary schools (34 percent) than in secondary schools (30 percent) (Table 9.2). Unflavored 1% milk and unflavored 2% milk made the greatest contributions. Breads and grains and combination entrees were the second and third leading sources of saturated fat in SBP breakfasts, respectively contributing 28 and 20 percent of saturated fat overall. Among the minor food groups, the top five sources of saturated fat in SBP breakfasts included unflavored 1% and 2% milks; sweet rolls, donuts, and toaster pastries; breakfast sandwiches; and flavored 1% milk.

3. Cholesterol, Sodium, and Dietary Fiber in SBP Breakfasts

Cholesterol. Sources of cholesterol in SBP breakfasts were fairly equally distributed across four major food groups: combination entrees (29 percent), milk (25 percent), meat/meat alternates (23 percent), and breads/grains (20 percent) (Table 9.2). The top five contributors were breakfast sandwiches (which generally contain eggs); eggs offered separately; 1% unflavored milk; pancakes, waffles, and french toast; and Mexican-style entrees (such as breakfast burritos, which often contain eggs). With the exception of breakfast sandwiches and Mexican-style entrees, these food items contributed significantly more cholesterol in breakfasts offered in elementary schools than in secondary schools.

Sodium. Forty-five percent of the sodium in SBP breakfasts came from breads/grains (Table 9.2). Major sources include cold cereal; sweet rolls, donuts, and toaster pastries; pancakes, waffles, and french toast; and biscuits, croissants, and cornbread. Combination entrees and milk each provided approximately 20 percent of the total sodium content of the average SBP breakfast. As noted for other nutrients, cold cereal and 1% unflavored milk were more important contributors to sodium in elementary school breakfasts than secondary school breakfasts, and secondary school breakfasts derived more sodium from breakfast sandwiches and sweet rolls, donuts, and toaster pastries than did elementary school breakfasts. Condiments, toppings and spreads (ketchup, gravy, butter, margarine, and salsa) were another notable source of sodium in SBP breakfasts, especially in secondary schools.

Dietary fiber. The major food groups contributing to dietary fiber in SBP breakfasts offered were breads/grains (48 percent) and fruits (28 percent) (Table 9.2). Cold cereals, some of which contain whole grain ingredients, were the leading minor food group, especially in elementary schools. Other leading contributors within the breads/grains group were muffins and sweet/quick breads; sweet rolls, donuts, and toaster pastries; and bread, rolls, and bagels. Fruit, specifically apples and citrus fruits, contributed significantly more dietary fiber in secondary school breakfasts than in elementary school breakfasts. Also among the top 10 food sources of dietary fiber for both school types were 100% fruit juice and bananas. Another 10 percent of dietary fiber in school breakfasts was supplied by flavored (primarily chocolate) 1% and skim milk.³

³ Some of the ingredients added to flavored milks include dietary fiber. USDA's Food and Nutrient Database for Dietary Studies (version 3.0), which was used to analyze the SNDA-IV menu survey data, indicates that one cup (8 fluid oz.) of 1% chocolate milk contains 1.2 g dietary fiber, and one cup of skim chocolate milk contains 1.14 g of dietary fiber. Comparable portions of unflavored 1% and skim milks contain 0 g dietary fiber.

4. Solid Fats and Added Sugars in SBP Breakfasts

The analyses presented in Chapter 8 showed that SBP breakfasts were high in calories from SoFAS, relative to the daily limits recommended in USDA Food Patterns. In this section, we look first at the sources of SoFAS calories in SBP breakfasts and then at the sources of solid fats and added sugars individually. These data will be useful to school foodservice practitioners and policy-makers in identifying potential changes in food offerings that could lower the level of SoFAS calories in SBP breakfasts.

Calories from SoFAS. Overall, the top five contributors to SoFAS calories in the average SBP breakfast offered were sweet rolls, donuts, and toaster pastries (13 percent); condiments, toppings and spreads (12 percent); cold cereal (10 percent); flavored 1% milk (10 percent); and muffins and sweet/quick breads (5 percent) (Table 9.2). Together, these five foods accounted for half of the SoFAS calories in SBP breakfasts. There was some variation in the relative contribution of these foods to SoFAS calories in breakfasts offered in elementary and secondary schools. Among secondary schools, breakfast sandwiches rather than muffins and sweet/quick breads was the fifth leading contributor of SoFAS calories. In addition, sweet rolls, donuts and toaster pastries; condiments, toppings and spreads; and breakfast sandwiches made significantly greater contributions to SoFAS calories in breakfasts offered in secondary schools than in elementary schools. Cold cereals made significantly greater contributions to SoFAS calories in elementary school breakfasts than in secondary school breakfasts.

Solid fats. Major contributors to solid fats in SBP breakfasts were bread/grain products (40 percent) and milk (24 percent) (Table 9.2). Together, these two major food groups contributed 64 percent of the solid fats in average SBP breakfasts offered. The leading individual contributors to solid fats in SBP breakfasts included sweet rolls, doughnuts, and toaster pastries (16 percent); 1% unflavored milk (8 percent); breakfast sandwiches (8 percent); 2% unflavored milk (8 percent); and condiments, toppings and spreads (6 percent). Sweet rolls, donuts, and toaster pastries; breakfast sandwiches; and condiments, toppings and spreads made significantly greater contributions to solid fats in secondary school breakfasts than in elementary school breakfasts. The difference was most pronounced for sweet rolls, donuts, and toaster pastries (20 versus 13 percent). Unflavored 1% milk was a more important source of solid fats in elementary school breakfasts than secondary school breakfasts (10 percent/second-leading contributor versus 6 percent/fifth-leading contributor).

Added sugars. Bread/grain products were the leading source of added sugars in SBP breakfasts (45 percent), followed by milk (23 percent), and accompaniments (18 percent)⁴ (Table 9.2). The top five contributors to added sugars in average SBP breakfasts offered were cold cereals (18 percent); condiments, toppings and spreads (which includes items like syrup and jelly) (18 percent); flavored 1% milk (14 percent); sweet rolls, donuts, and toaster pastries (11 percent); and flavored skim milk (9 percent). Together, these foods accounted for 70 percent of the added sugars in SBP breakfasts offered. Consistent with the patterns observed for solid fats, sweet rolls, donuts, and toaster pastries made a significantly greater contribution to added sugars in secondary school breakfasts than in elementary school breakfasts, and the reverse was true for cold cereal (more important source of added sugars in elementary school breakfasts than in secondary school breakfasts).

⁴ Accompaniments include condiments, toppings, spreads, and salad dressings.