



# Meeting Total Fat Requirements for School Lunches

## Influence of School Policies and Characteristics

**Constance Newman, Joanne Guthrie, Lisa Mancino,  
Katherine Ralston, and Melissa Musiker**



## Visit Our Website To Learn More!

You can find additional information about Food Assistance and Nutrition Program Outcomes at our website.

**[www.ers.usda.gov/briefing/programoutcomes](http://www.ers.usda.gov/briefing/programoutcomes)**

## National Agricultural Library Cataloging Record:

Meeting total fat requirements for school lunches : influence of school policies and characteristics.

(Economic research report (United States. Dept. of Agriculture. Economic Research Service); no. 87)

1. School lunchrooms, cafeterias, etc.—United States.
2. Nutrition policy—United States.
3. National school lunch program.
4. Food—Fat content.
5. Obesity in children—United States—Prevention.
6. School children—Food—United States.
7. Vending machines.

I. Newman, Constance.

II. United States. Dept. of Agriculture. Economic Research Service.

III. Title.

TX945.2

**Photo credit:** Jupiterimages

---

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and, where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

To file a complaint of discrimination write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.



United States  
Department  
of Agriculture

Economic  
Research  
Report  
Number 87

November 2009



A Report from the Economic Research Service

[www.ers.usda.gov](http://www.ers.usda.gov)

# Meeting Total Fat Requirements for School Lunches

## Influence of School Policies and Characteristics

**Constance Newman, Joanne Guthrie, Lisa Mancino,  
Katherine Ralston, and Melissa Musiker**

### **Abstract**

Concerns about child obesity have raised questions about the quality of meals served in the National School Lunch Program. Local, State, and Federal policymakers responded to these concerns beginning in the mid-1990s by instituting a range of policies and standards to improve the quality of U.S. Department of Agriculture-subsidized meals. Schools have been successful in meeting USDA nutrient standards except those for total fat and saturated fat. This report uses school-level data from the School Nutrition Dietary Assessment-III to calculate statistical differences between the fat content of NSLP lunches served by schools with different policies (e.g., menu planning) and characteristics like region and size. Positive associations are found between a meal's fat content and the presence of a la carte foods and vending machines, which are thought to indirectly affect the nutrient content of USDA-subsidized meals.

**Keywords:** National School Lunch Program (NSLP), obesity, nutrition

# Contents

**Summary** . . . . . iii

**Introduction** . . . . . 1

**School Food Policies and Environments** . . . . . 4

    Presence of Competitive Foods. . . . . 4

    Nutrition and Purchasing Policies. . . . . 6

    Participation in Special Fruit and Vegetable Purchasing Programs . . . . . 8

    Menu and Food Preparation Characteristics . . . . . 9

**School Characteristics** . . . . . 12

    Urbanicity . . . . . 12

    Regions . . . . . 12

    School Size . . . . . 12

    Economic Characteristics . . . . . 14

**Conclusion** . . . . . 15

**References** . . . . . 16

Recommended citation format for this publication:

Newman, Constance, Joanne Guthrie, Lisa Mancino, Katherine Ralston, and Melissa Musiker. *Meeting Total Fat Requirements for School Lunches: Influence of School Policies and Characteristics*. Economic Research Report 87, U.S. Dept. of Agriculture, Economic Research Service. November 2009.

## Summary

Concerns about child obesity have raised questions about the quality of meals served in the National School Lunch Program (NSLP). Local, State, and Federal policymakers responded to these concerns beginning in the mid-1990s by instituting a range of policies and standards to improve the quality of USDA-subsidized meals. While most of USDA's nutrition standards have been met by schools, total fat and saturated fat as a percent of calories is an ongoing challenge.

### What Is the Issue?

The School Nutrition Dietary Assessment-III, conducted by USDA's Food and Nutrition Service, recently found that while most schools meet requirements for vitamins, protein, calcium, and iron, only one in five schools served lunches that met the standard for total fat, set at 30 percent of calories or less. This report compares the characteristics and food policies of schools serving lunches that met total fat requirements to those serving lunches with fat content that was either 30-35 percent of calories (middle category) or over 35 percent (high). Identifying the food practices and policies of conforming versus nonconforming schools may help to identify effective strategies for improving the nutritional quality of USDA school meals.

### What Did the Study Find?

The fat content of school lunches was statistically correlated with many school policies and characteristics in the spring of 2005. Some policies and practices, such as whether french fries are regularly served, can directly affect the nutritional content of USDA lunches. Other policies, such as a school's allowance of "competitive" foods or foods that bypass nutritional standards, can indirectly affect the content of USDA lunches by offering choices that appeal to students' taste preferences. Among the policies or practices that directly affect the fat content of USDA lunches:

- **Promotion of fresh fruits and vegetables/local foods.** Participation in at least one program that promotes the purchase of locally grown food or fresh fruit and vegetables was significantly higher in elementary and middle/high schools that serve lunches in the lowest fat category, below 30 percent of calories.
- **French fries or dessert.** The provision of french fries or dessert as a part of the USDA lunch was significantly higher among middle/high schools in the highest fat category.
- **Low-fat milk only.** Providing lowfat milk as the only milk choice was significantly higher in the lowest fat category for both elementary and middle/high schools.
- **Meal planning method.** Historically, schools have used a food-based ("traditional") method for planning menus where each meal must consist of certain food types such as a meat, vegetable, starch, etc. In recent years, some schools have adopted a nutrient-based method where lunches are planned according to the nutrient content of food items, or they use a mix of methods called the "enhanced traditional" method. The

traditional meal planning method was used significantly more by schools in the highest fat category for both elementary and middle/high schools, whereas the enhanced traditional method was used more in the lowest fat category for middle/high schools.

Other policies may affect lunch quality since they enable students to choose alternative foods. For example, the availability of a la carte foods in elementary schools was significantly higher in the middle category of fat content than in the lowest category; no relationship across fat categories was found for middle/high schools. And the presence of vending machines was significantly higher among middle/high schools in the highest fat category.

Although school characteristics (rural vs. urban, region, size) are not subject to policy change, they may be useful for targeting lunch improvement efforts. For both elementary and middle/high schools, urban schools were more highly represented in the lowest fat category, and rural schools were more predominant in the highest fat category. Elementary and middle/high schools in the Southeast were more predominant in the two higher fat categories than in the lowest category, whereas Southwest schools were more predominant in the two lower fat categories. Elementary schools in the West were more predominant in the lowest fat category than in the two higher fat categories.

## **How Was the Study Conducted?**

We used nationally representative school-level data from the School Nutrition Dietary Assessment-III to calculate the statistical effect of school policies and characteristics on the fat content of NSLP lunches served by 397 schools. Schools were divided into three categories based on the average fat content of reimbursable school lunches served and chosen by students over a week. The fat content categories were (1) no more than 30 percent of calories from fat, (2) 30 to 35 percent of calories from fat, and (3) more than 35 percent of calories from fat. We compared the policies, practices, and characteristics of schools within each fat category to those in the other two fat categories. Using a student's t-test and school-level sample weights, we indicate mean differences between subgroups that vary with a 90-percent level of significance or above. This threshold was chosen because of small sample size, especially among specific fat content subcategories.

## Introduction

Every weekday, schools around the country strive to provide students with a healthy lunch. To qualify for Federal subsidies under the National School Lunch Program (NSLP), school meals must meet USDA nutrition requirements. At the same time, to fulfill the nutrition goals of the program and maintain the financial viability of the program, these meals must be sufficiently appealing for students to select them.

Since the development of new school meal nutrition standards in the mid-1990s, USDA has emphasized lowering the fat content of school meals. Yet meeting standards for fat and saturated fat remains a problem. A recent study sponsored by USDA's Food and Nutrition Service, School Nutrition Dietary Assessment-III (SNDA-III), found that most schools meet the requirements for vitamins, protein, calcium, and iron. However, few schools meet the total fat and saturated fat requirements (fig. 1).<sup>1</sup> One in five schools served lunches that met the standard for total fat and almost a third met the standard for saturated fat in 2005.

What do we know about the schools that did meet or failed to meet these requirements? This report uses SNDA-III data to compare the food policies, practices, and characteristics of schools that met total fat requirements to those that did not. Identifying such correlations may help to devise strategies for improving the nutritional quality of USDA school meals.

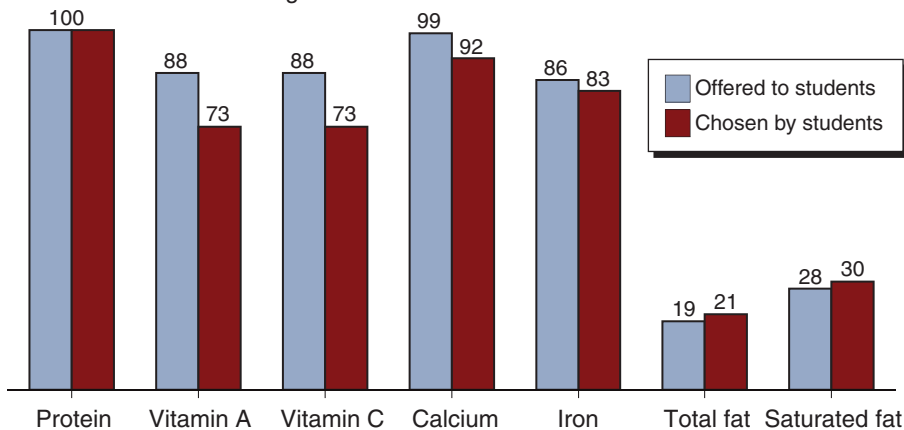
We use SNDA-III school-level data collected from 397 schools in the spring of 2005. Schools fall into one of three categories based on the average fat content of reimbursable school lunches served and chosen by students over a week (henceforth referred to as "served"). An analysis of lunches offered would not fully account for the fact that students usually have some choices, such as the choice between higher or lower fat milk, so this analysis is based on the lunches chosen by students. This measure provides an estimate that

<sup>1</sup> Whereas the majority of NSLP guidelines describe minimum values for essential nutrients, the guidelines for fat and saturated fat suggest maximum values, as a share of calories.

Figure 1

### Most schools meet USDA nutrition standards for National School Lunch Program lunches except for total fat and saturated fat, 2005

Percent of schools meeting USDA standards



Source: USDA, Food and Nutrition Service. *School Nutrition Dietary Assessment-III, Menu Survey*, Nutrition Assistance Program Report Series, November 2007.

considers both the nutritional quality of the items offered by schools and their acceptability to students.<sup>2</sup>

The fat content categories are (1) no more than 30 percent of calories from fat, (2) 30 to 35 percent of calories from fat, and (3) more than 35 percent of calories from fat. Current NSLP total fat standards are based on the *Dietary Guideline for Americans* released in 2000, which recommend keeping fat intake below 30 percent of calories. The 2005 *Dietary Guideline for Americans* relaxed the standard for fat intake to between 25 and 35 percent of calories. Assuming that the NSLP standards will be updated to reflect the change, we identify schools that would meet a requirement of 35 percent but not 30 percent total fat. We report nationally representative results using the school-level sample weights.

This work complements research that analyzes the effect of school environments on children’s dietary outcomes (Briefel et al., 2009) and children’s obesity (Fox et al., 2009) and research that summarizes the characteristics of school environments (Finkelstein et al., 2008; GAO, 2005). Clark and Fox (2009) find that the total fat intake over 24 hours was not higher among NSLP participants than nonparticipants, but that for all children, 24-hour total fat intake exceeded 2005 Dietary Guidelines.

Almost two-thirds of the schools in the weighted sample are elementary schools (63 percent), while 37 percent are middle schools and high schools combined (table 1). Elementary schools were more likely to comply with fat requirements than were middle and high schools, and the differences are statistically significant, meaning they are unlikely to be due to chance. Among elementary schools, 26 percent served lunches that met the requirement (less than 30 percent fat), 43 percent served lunches in the middle category of fat content (between 30 and 35 percent fat), and 31 percent served lunches in the highest fat content category (over 35 percent fat). Among middle/high schools, 12 percent served lunches with the lowest fat content, 36 percent served lunches in the middle category of fat content, and 52 percent served lunches in the highest fat content category.

These results are consistent with other research findings that older students face a less healthy school food environment (Finkelstein et al., 2008; Briefel et al., 2009). Given these large differences and the fact that school food envi-

<sup>2</sup> For space considerations, we made a choice between using meals that are offered by schools (referred to in SNDA-III as “offered”) versus those that are then chosen by students (or “served”). We chose “served” for the reasons mentioned. But we also conducted the analysis using the “offered” version of the variable, and the results were very similar. That work is available upon request from cnewman@ers.usda.gov

Table 1  
**School lunch fat categories by school type, 2005**

	Sample shares	Total fat < 30% (kcal)	Total fat 30-35% (kcal)	Total fat > 35% (kcal)
Unweighted sample	N = 397	n = 76	n = 172	n = 149
		<i>Percent</i>		
Weighted sample	100	21	40	39
School type				
• Elementary school (63%)	100	26*	43	31*
• Middle/high school (37%)	100	12*	36	52*

\* Significant difference between elementary and middle/high schools at the 99% level.

Source: USDA, Economic Research Service, based on calculations from SNDA III.



Table 2

**Percent energy from total fat by fat category and school type, 2005**

		Mean	Median	Minimum	Maximum
Elementary	Total fat < 30% (kcal)	28.1	28.0	22.6	29.9
	Total fat 30-35% (kcal)	32.6	32.6	30.3	35.0
	Total fat > 35% (kcal)	37.3	36.7	35.0	43.8
Middle/High	Total fat < 30% (kcal)	28.2	28.5	23.1	29.9
	Total fat 30-35% (kcal)	32.9	33.1	30.0	34.9
	Total fat > 35% (kcal)	39.0	37.8	35.0	69.5

Source: USDA, Economic Research Service, based on calculations from SNDA III.

ronments differ greatly by school type, we examine elementary and middle/high schools separately.

Table 2 shows the distribution (mean, median, range) of our main variable of interest—the percent of calories from total fat in served meals—within each of the three fat categories. The grouping of the variable helps to identify thresholds that are relevant to USDA requirements, but it is also important to ensure that the underlying distributions of each group can be credibly differentiated. The means reflect a spread of 28 to 37 percent of calories from fat across the three categories for elementary schools and a spread of 28 to 39 percent of calories from fat for middle and high schools.

## School Food Policies and Environments

Many school food policies are determined at the State and local levels. In recent years, concerns about obesity and school nutrition have led to a variety of new policies. For example, in 2004 Congress required NSLP-participating schools to establish “Local Wellness Policies,” which set locally defined nutrition and physical activity goals for improving student health. Such policies have included the introduction of new nutrition education activities or the removal of access to less healthy foods (such as those found in vending machines). And district- or school-level policy changes have occurred independently in schools where local wellness policies may not be fully established. Some States have also entered the child nutrition policy arena by establishing laws for food purchases by school food managers and the availability of competitive foods (i.e., foods that are not served as part of the reimbursable lunch).

We examine policies and practices that can directly affect USDA lunches, such as whether french fries are ever served, and others that can indirectly affect USDA lunches, such as the presence of competitive foods. We divide school policies, whether indirect or direct, into four general types:

- **Competitive food policies** include the presence of vending machines and/or a la carte foods, which may indirectly affect the fat content of USDA lunches by providing students with alternative lunches.
- **Nutrition and purchasing policies**, such as whether the school has a local wellness policy, nutrition education, or nutrient-related food purchasing, may directly or indirectly affect the fat content of USDA lunches.
- **Participation in special programs**, such as programs that promote fresh fruit and vegetables or locally produced foods, is thought to directly affect the fat content of USDA lunches.
- **Menu and food preparation characteristics**, such as whether the menus are planned at the district level or whether food is prepared onsite, directly affect the fat content of the USDA lunch.

We examine how each type of policy may be linked to lunch fat content and the findings for both elementary and middle/high schools. All differences across lunch fat categories are statistically significant differences, unless otherwise noted. We use a significance level of 90 percent (rather than 95 percent) because of the relatively small sample size.

Information about school-level policies was obtained from different sources: the school principal, the school foodservice manager, or a school food authority/SFA (or district) representative. In the few cases where answers differed among sources, we use data developed by the researchers who conducted the survey. They identified the best sources by comparing responses to checklist surveys that they conducted on school grounds.

### Presence of Competitive Foods

The presence of competitive foods in schools has recently come under scrutiny amid concern about children’s diets. Of special concern are vending

machines and a la carte foods, offered alongside NSLP lunches, that are low-nutrition and energy-dense.<sup>3</sup> Competitive foods are usually offered as a way to raise revenue for SFAs who operate as nonprofit providers of the NSLP meals. Most SFAs operate on a break-even basis, and they say that competitive food sales are necessary to cover their costs. School principals, athletic departments, and clubs may also decide to raise revenue through vending machines, school stores, or bake sales.

Competitive foods are so named because they are widely thought to deter NSLP participation by providing an alternative, usually less healthy, lunch for students to choose. To attract students to the NSLP lunch, schools may provide lunches with a higher fat content than would be offered if competitive foods were not available. Also, students may choose reimbursable lunch items with higher fat content than they would choose if competitive foods were not available. The availability of snacks or sweets at school through small stores or bake sale-type fundraising activities has raised similar concerns that the NSLP lunch must “compete” with these foods to be attractive to students. Access to soft drinks and other sweetened beverages is also under scrutiny in schools because of their possible links to obesity. The existence of “pouring contracts,” where a school gives exclusive sales rights to a beverage company, is thought to be associated with greater access to sweetened beverages. That access may also work against the attractiveness of a lower-fat NSLP lunch. To combat this, some schools have restrictions on food and beverage availability.

To test the relationship between a lunch’s fat content and access to competitive food, we examine the correlations between the fat content of lunches served and the availability of: a la carte food of any kind; a la carte food that is low-nutrition, energy-dense; vending machines; vending machines in the foodservice area; pouring contracts; snack bars; school stores; fundraising activities that include sweets or snacks; and food/beverage restrictions (table 3). Large differences in competitive food policy are apparent between elementary and middle/high schools. For example, fewer than 1 in 5 elementary schools have vending machines, whereas 9 out of 10 middle and high schools do. And some policies are adopted much more than others. For example, 78 percent of elementary schools serve a la carte food, while only 9 percent of them have a snack bar or school store.

### *Elementary Schools*

The share of elementary schools selling a la carte food is significantly lower for schools in the lowest fat category (65 percent) than in the middle category (90 percent). Also the share of schools selling low-nutrition, energy-dense foods a la carte was significantly lower in the lowest fat category (23 percent) than in the middle category (50 percent).

Other significant differences were found for the presence of a school store and fundraising activities. Schools with lunches in the lowest fat category had the lowest share of school stores or snack bars (though not significantly lower than schools in the highest fat category). Schools in the middle fat category had the highest share of fundraising activities that sell sweets or snacks (though not significantly higher than schools in the highest fat category).

<sup>3</sup> Foods and beverages were classified as low-nutrient, energy-dense (LNED) items if they were low in nutrients but high in energy or caloric density per unit volume or mass, or were defined as foods of minimal nutritional value by USDA school meal regulations. Sugar-sweetened beverages and the following solid food categories were considered to be LNED items: (1) higher fat baked goods, including muffins and desserts such as cakes, cookies, and brownies; (2) dairy-based desserts (e.g., ice cream); (3) candy (all types) and sweetened gum; (4) french fries and similar potato products; and (5) high-fat chips and other salty snacks (e.g., potato chips, corn chips) (Gordon et al., 2009).

Table 3

**Presence of competitive foods by fat category and school type, 2005**

	Sample share or mean	Total fat < 30% (kcal)	Total fat 30-35% (kcal)	Total fat > 35% (kcal)
<b>Elementary schools – unweighted sample</b>	N = 144	n = 42	n = 69	n = 33
		<i>Percent</i>		
A la carte food sold	78	65 <sup>12</sup>	90 <sup>12</sup>	72
Low-nutrition, energy-dense food sold a la carte (if any sold)	40	23 <sup>12</sup>	50 <sup>12</sup>	41
Vending machines present	16	11	18	19
Vending machines in foodservice area (if vending present)	11	10	7	18
Pouring contracts	46	51	47	39
School store or snack bar sells snacks	9	3 <sup>12</sup>	11 <sup>12</sup>	9
Fundraising activities that sell sweets or snacks	36	31	46 <sup>23</sup>	25 <sup>23</sup>
Restrictions on type of food or snacks sold	39	43	42	33
Restrictions on type of sweet beverages sold	49	52	54	41
<b>Middle and high schools - unweighted sample</b>	N = 253	n = 34	n = 103	n = 116
		<i>Percent</i>		
A la carte food sold	82	81	89	77
Low-nutrition, energy-dense food sold a la carte (if any sold)	55	77 <sup>13</sup>	62 <sup>23</sup>	43 <sup>13,23</sup>
Vending machines present	88	67 <sup>13</sup>	84 <sup>23</sup>	96 <sup>13,23</sup>
Vending machines in foodservice area (if vending present)	44	41	41	46
Pouring contracts	71	69	68	74
School store or snack bar sells snacks	21	31	20	19
Fundraising activities that sell sweets or snacks	53	57	45	59
Restrictions or ban on type of food or snacks sold	37	36	41	34
Restrictions or ban on type of sweet beverages sold	50	57	52	46

<sup>12</sup> Significant difference between category 1 and 2 at the 90% level.

<sup>23</sup> Significant difference between category 2 and 3 at the 90% level.

<sup>13</sup> Significant difference between category 1 and 3 at the 90% level.

Source: USDA, Economic Research Service, based on calculations from SNDA III.

We found no significant differences among fat categories by vending machine policy. However, this is likely due to small sample size. Only 16 percent of elementary schools had vending machines present in schools.

### ***Middle and High Schools***

Among middle and high schools, schools in the highest fat category were significantly more likely to have vending machines (96 percent) than were schools in the other two categories (table 3). Contrary to expectations, however, schools in the highest fat category were significantly less likely to have low-nutrition, energy-dense food in the a la carte line (43 percent) than schools in either of the other two categories (77 percent low and 62 percent middle). Surprisingly, schools did not differ much in fat content by the other competitive food policies, such as pouring rights or presence of vending in the foodservice area.

### **Nutrition and Purchasing Policies**

With increasing interest in school nutrition, schools have instituted various types of nutrition promotion policies that may be correlated with the provision and acceptance of lower fat lunches. We compare lunch fat content across schools with different nutrition policies, such as whether they have nutrient requirements for food purchases, schoolwide wellness policies,<sup>4</sup> nutrition education, and/or nutrition and health advisory councils. Another

<sup>4</sup> Wellness policies are policies that are formed by local stakeholders (e.g., parents, students, interested health and school professionals) in an effort to improve school nutrition. In 2004, Congress required school food authorities to implement “local wellness policies” to improve nutrition policies with local input.

variable that we consider is whether schools use “Child Nutrition (CN) label foods,” a class of foods—mainly pre-prepared foods such as pizzas, burritos, etc.—that are specially marketed for USDA school meals and carry a label indicating how they meet the traditional food group requirements of a meal (how much of the required serving of meat, grain, etc.). CN labels, unlike the standard nutrition labels found on foods in supermarkets, do not contain information on fat or saturated fat content.

### *Elementary Schools*

Elementary schools in the middle fat category were significantly more likely to have district purchases based on nutrition requirements than were schools in the highest fat category (table 4), and were significantly more likely to be in districts requiring CN labels than schools in the lowest fat category. Other nutrition-related policies did not differ significantly across the lunch fat categories, and in many cases, the differences were the opposite of those expected. For example, schools with nutrition education and a nutrition advisory council were not significantly more likely to be in the lowest fat category. And schools serving foods from chain restaurants were not more likely to be in the highest fat category.

### *Middle and High Schools*

The only statistically significant nutrition and purchasing policy difference across lunch fat categories was whether schools make nutrition information available to parents on a routine basis, such as sending home daily menus

Table 4

#### **Nutrition and purchasing policies by fat category and school type, 2005**

	Sample share or mean	Total fat < 30% (kcal) (1)	Total fat 30-35% (kcal) (2)	Total fat > 35% (kcal) (3)
<b>Elementary schools – unweighted sample</b>	N = 144	n = 42	n = 69	n = 33
		<i>Percent</i>		
School has a wellness policy	48	44	54	37
School has nutrition education at every grade	80	78	76	87
School has a nutrition or health advisory council	18	15	19	23
School routinely makes nutrition info available to parents	60	61	67	53
District purchases are based on nutrient requirements	52	48	61 <sup>23</sup>	38 <sup>23</sup>
District requires Child Nutrition* label for some or all foods	63	49 <sup>12</sup>	71 <sup>12</sup>	69
Some foods offered from chain restaurants	30	39	30	23
<b>Middle and high schools - unweighted sample</b>	N = 253	n = 34	n = 103	n = 116
		<i>Percent</i>		
School has a wellness policy	37	46	38	34
School has nutrition education at every grade	53	57	50	46
School has a nutrition or health advisory council	21	25	26	27
School routinely makes nutrition info available to parents	58	75 <sup>12</sup>	54 <sup>12</sup>	58
District purchases are based on nutrient requirements	56	55	65	53
District requires CN* label for some or all foods	64	67	71	60
Some or all foods offered from chain restaurants	27	39	26	21

\* CN = Child Nutrition.

<sup>12</sup> Significant difference between category 1 and 2 at the 90% level.

<sup>23</sup> Significant difference between category 2 and 3 at the 90% level.

<sup>13</sup> Significant difference between category 1 and 3 at the 90% level.

Source: USDA, Economic Research Service, based on calculations from SNDA III.

(table 4). Schools in the lowest fat category were significantly more likely to have this policy (75 percent) than schools in the middle category (54 percent).

## Participation in Special Fruit and Vegetable Purchasing Programs

We examine differences in lunch fat content based on schools' participation in programs designed to increase the availability of fresh food, and in particular, fresh fruit and vegetables. These policies include whether the school district participated in a State or local farm-to-school program,<sup>5</sup> whether the district participated in the U.S. Department of Defense's Fresh Fruit and Vegetable Program,<sup>6</sup> and whether the State or district has regulations that require purchase of locally produced foods or fresh produce.

### Elementary Schools

Schools that participated in at least one of the special programs (table 5) were significantly more likely to be in the lowest fat category (62 percent) and middle category (63 percent) than in the highest fat category (37 percent). Across individual programs, there were few significant differences, but in three out of four programs, the schools in the middle fat category were the most highly represented.

### Middle and High Schools

Similar to the elementary school results, participation in at least one special program was significantly higher for middle/high schools in the lowest and middle fat categories (68 and 61 percent, respectively) than in the highest fat category (43 percent) (table 5).

<sup>5</sup> "Farm to school" is a generic term that refers to any local or State-level program that links local or regional farmers directly to school food services.

<sup>6</sup> The U.S. Department of Defense's (DOD) Fresh Fruit and Vegetable Program is a program through which USDA commodity funds are used for reimbursable school meal food purchases in the DOD's procurement network, which has superior access to fresh fruits and vegetables.

Table 5

### Participation in special programs by fat category and school type, 2005

	Sample share or mean	Total fat < 30% (kcal) (1)	Total fat 30-35% (kcal) (2)	Total fat > 35% (kcal) (3)
<b>Elementary schools</b> – Unweighted sample	N = 144	n = 42	n = 69	n = 33
		<i>Percent</i>		
District participates in, or has, any of the programs below	58	62 <sup>13</sup>	63 <sup>23</sup>	37 <sup>12,23</sup>
District has guidelines for buying locally grown	17	28	11	13
District has guidelines for buying fresh produce	11	10	12	10
District buys from Dept. of Defense Fresh program	39	38	52 <sup>23</sup>	21 <sup>23</sup>
District participates in State farm-to-school program	14	15	16	9
<b>Middle and high schools</b> - Unweighted sample	N = 253	n = 34	n = 103	n = 116
		<i>Percent</i>		
District participates in, or has, any of the programs below	53	68 <sup>13</sup>	61 <sup>23</sup>	43 <sup>13,23</sup>
District has guidelines for buying locally grown	15	21	20	10
District has guidelines for buying fresh produce	8	3 <sup>12</sup>	13 <sup>12</sup>	6
District buys from Dept. of Defense Fresh program	33	41	33	31
District participates in State farm-to-school program	15	16	16	14

<sup>12</sup> Significant difference between category 1 and 2 at the 90% level.

<sup>23</sup> Significant difference between category 2 and 3 at the 90% level.

<sup>13</sup> Significant difference between category 1 and 3 at the 90% level.

Source: USDA, Economic Research Service, based on calculations from SNDA III.

## Menu and Food Preparation Characteristics

Menu and food preparation characteristics include the planning of lunches, the features of lunches (such as whether french fries are served), the average total calorie content, and the share of calories from sources other than fat. In planning meals, some schools have moved from the traditional “food-based” method (where each meal must consist of certain food item types—meat, vegetable, starch, etc.) to a nutrient-based method where meals are planned according to the nutrient content of food items. In theory, this latter method may be a more precise way to meet nutrient requirements, but it also requires more time and sophistication. Less than a third of schools used the nutrient-based method in school year 2004-05. Some schools (22 percent) had opted for the intermediary option of “enhanced” traditional meal planning, which is the food-based method with more fruits, vegetables, grains, and breads.

We hypothesize that schools that have taken specific measures such as not serving either whole or 2-percent milk, not serving french fries, or serving fresh produce daily will be better able to reduce the fat content of their lunches. However, since school lunches are encouraged to provide one-third of students’ total daily calories, school lunch providers may add ingredients that are low in fat but still calorie dense, such as simple carbohydrates and added sugars, for which there are currently no specific guidelines.

We also check for correlations between fat content of lunches and various food preparation policies, such as whether the kitchen uses fully plated lunches from offsite. The offsite preparation of food and the use of processed foods are thought to produce higher fat meals (Miller, 2009).

### *Elementary Schools*

In terms of menu planning methods, there were large and significant differences across elementary schools (table 6). Elementary schools in the lowest fat category had a significantly lower share of traditional menu planning (32 percent) than did schools in the highest fat category (67 percent). This is some evidence in favor of nutrient-based planning. Schools in the middle fat category were significantly more likely to have menus planned at the district level (58 percent) than were schools in the highest fat category (35 percent). Limiting milk offerings to low-fat only was the only other menu variable that showed significant differences among fat categories. Elementary schools in the lowest fat category were significantly more likely to serve only low-fat milk (56 percent) than schools in either of the two other categories.

Elementary schools that served higher fat lunches served more caloric lunches, on average, as well. This was not surprising as fat has more calories per gram than either carbohydrates or protein. We also found that protein and carbohydrate content varied significantly across the three fat categories. Because a calorie is made of fat, protein, or carbohydrate, a lower fat lunch will also contain more protein, carbohydrates or both. However, across fat categories, the variation in carbohydrates was more pronounced than the variation in protein across fat categories. Also, more than half of carbohydrates came from sugars, suggesting schools may find it easier to lower fat (and maintain total calories) by adding more sugar than by adding more complex carbohydrates such as vegetables and whole grains. This also

Table 6

**Menu and food preparation characteristics by fat category and school type, 2005**

	Sample share or mean	Total fat < 30% (kcal) (1)	Total fat 30-35% (kcal) (2)	Total fat > 35% (kcal) (3)
<b>Elementary schools – unweighted sample</b>	N = 144	n = 42	n = 69	n = 33
		<i>Percent</i>		
Type of menu planning				
• Nutrient based	30	39	33	19
• Enhanced	21	29	20	15
• Traditional	49	32 <sup>13</sup>	47	67 <sup>13</sup>
Menus planned at district-level	55	56	58 <sup>23</sup>	35 <sup>23</sup>
Menus planned by foodservice management company	9	3	7	15
Fries are offered 1 or more days per week	71	73	67	67
Dessert is offered 1 or more days per week	73	69	80	59
Fresh fruit and vegetables are offered daily	50	39	46	60
Whole milk and 2% milk are not offered	31	56 <sup>12,13</sup>	30 <sup>12</sup>	20 <sup>13</sup>
Mean total calories	676	660 <sup>13</sup>	658 <sup>23</sup>	714 <sup>13,23</sup>
Mean share of calories from protein	16.6	17.3 <sup>12,23</sup>	16.8 <sup>12,23</sup>	15.9 <sup>13,23</sup>
Mean share of calories from carbohydrates	52.0	56.4 <sup>12,23</sup>	52.1 <sup>12,23</sup>	48.3 <sup>13,23</sup>
Mean share of calories from added sugars*	26.7	29.6 <sup>12,23</sup>	26.7 <sup>12,23</sup>	24.3 <sup>13,23</sup>
Which of the following describes your kitchen?				
• Onsite, meals prepared for this site only	67	60	69	70
• Base kitchen, meals prepared for many schools	8	9	7	9
• Receiving kitchen, meals prepared offsite	25	31	24	20
Receive fully plated meals from offsite	9	7	12	6
<b>Middle and high schools - unweighted sample</b>	N = 253	n = 34	n = 103	n = 116
		<i>Percent</i>		
Type of menu planning				
• Nutrient based	28	36	22	31
• Enhanced	22	40 <sup>13</sup>	24	16 <sup>13</sup>
• Traditional	50	24 <sup>12,13</sup>	54 <sup>12</sup>	53 <sup>13</sup>
Menus planned at district-level	46	44	48	46
Menus planned by food service management company	7	17	9	4
Fries are offered 1 or more days per week	83	62 <sup>12,13</sup>	83 <sup>12</sup>	86 <sup>13</sup>
Dessert is offered 1 or more days per week	77	64 <sup>13</sup>	69 <sup>23</sup>	84 <sup>23,13</sup>
Fresh fruit and vegetables are offered daily	56	48	52	60
Whole milk and 2% milk are not offered	34	69 <sup>12,13</sup>	29 <sup>12</sup>	28 <sup>13</sup>
Mean total calories	765	688 <sup>13</sup>	719 <sup>23</sup>	814 <sup>13,23</sup>
Mean share of calories from protein	15.8	16.6 <sup>13</sup>	16.5 <sup>23</sup>	15.1 <sup>13,23</sup>
Mean share of calories from carbohydrates	50.2	57.0 <sup>12,23</sup>	52.0 <sup>12,23</sup>	47.3 <sup>13,23</sup>
Mean share of calories from added sugars*	23.7	30.1 <sup>12,23</sup>	24.7 <sup>12,23</sup>	21.6 <sup>13,23</sup>
Which of the following describes your kitchen?				
• Onsite, meals prepared for this site only	77	57 <sup>13</sup>	70 <sup>23</sup>	87 <sup>13,23</sup>
• Base kitchen, meals prepared for many schools	15	13	22	11
• Receiving kitchen, meals prepared offsite	8	30 <sup>12,13</sup>	8 <sup>12,13</sup>	3 <sup>12,13</sup>
Receive fully plated meals from offsite	3	5	3	2

\* Percent of energy from sugar was calculated by the authors, using variables from SNDA as:

Percent Energy from Sugar = 100 \* (4 \* Total Sugar) / Total Energy

<sup>12</sup> Significant difference between category 1 and 2 at the 90% level.

<sup>23</sup> Significant difference between category 2 and 3 at the 90% level.

<sup>13</sup> Significant difference between category 1 and 3 at the 90% level.

Source: SDA, Economic Research Service, based on calculations from SNDA III.



illuminates a possible unintended consequence of focusing guidelines too narrowly on fat content alone.

### ***Middle and High Schools***

Menu planning and food preparation policies seem to differ more at the middle and high school level (table 6). As with elementary schools, schools in the lowest fat category were significantly less likely to use traditional menu planning (24 percent) than were schools in the other two categories (53-54 percent), and they were significantly more likely to use enhanced menu planning (40 percent) than were schools in the highest fat category (16 percent). The offering of french fries at least once during the week observed was significantly less likely in the lowest fat category (62 percent) than in the other two categories (83-86 percent), and the offering of dessert at least once a week was significantly lower in the lowest fat category (64 percent) and the middle category (69 percent) than in the highest fat category (84 percent). Offering only lowfat milk was also significantly more likely in schools in the lowest fat category (69 percent) than in the other two categories (28-29 percent).

As with elementary schools, lower fat lunches in middle and high schools contained significantly more protein and carbohydrates (table 6). While the protein content of middle/high school lunches varied less compared to elementary school lunches, the variation in carbohydrates and sugars was more pronounced. As middle and high school students have more freedom to choose (and higher caloric requirements), school cafeteria managers may find it especially difficult to abide by fat recommendations, and thus add flavor and calories by adding sugars.

Surprisingly, middle and high schools in the lowest fat category were significantly less likely to cook lunches onsite and significantly more likely to receive lunches prepared elsewhere. Fifty-seven percent of schools in the lowest fat category had lunches prepared onsite for their site only, versus 70 and 87 percent of the middle and highest fat category schools. Three out of 10 schools in the lowest fat category received lunches prepared offsite, while fewer than 1 in 10 schools in the middle and highest fat categories did so.

## School Characteristics

Identifying characteristics associated with the likelihood of serving lunches that meet fat standards can help to target fat-reduction strategies to the schools most likely to benefit from them. Some differences may reflect regional and cultural food preferences. Other differences—such as the share of students certified to receive a free or a reduced-price lunch or child poverty rates—may suggest the role of economic factors.

### Urbanicity

With 46 percent of the lowest fat lunches served in an urban area, urban elementary schools were statistically more highly represented in the lowest fat category (table 7). And with 73 percent of the highest fat lunches, rural elementary schools (“not near a city”) were most highly represented in the highest fat category. Similar to elementary schools, urban middle and high schools were significantly more likely to serve lunches in the lowest or middle fat category than in the highest fat category.

### Regions

Some regional differences were also statistically significant across elementary schools. Elementary schools in the Southeast were more likely to serve lunches in either the middle or highest fat category than in the lowest fat category. Elementary schools in the West were more likely to serve lunches in the lowest fat category than in the middle or highest fat category. Mid-Atlantic schools were more likely to serve lunches in the middle category than to serve lunches in the lowest fat category (table 7).

Regional differences were found to be significant for middle and high schools in the Southwest, Mountain, and Southeast (table 7). As with elementary schools, middle/high schools in the Southeast were significantly more likely to be in the middle and highest fat categories than in the lowest fat category. The Southwest also had a relatively high share of schools in the middle fat category, which was significantly different from its share in the highest fat category. Middle/high schools in the Mountain region had high shares in both the lowest and the highest fat categories, and both were significantly different from the Mountain’s share in the middle fat category.

### School Size

The smallest elementary schools (fewer than 400 students) were significantly more likely to serve lunches in the highest (than the middle) fat category, while the next size schools, with 400-500 students, were most likely to serve lunches in the middle fat category (table 7). The only other significant differences by size were among schools with 725 to 1,000 students: they were more likely to serve lunches in the lowest or middle categories than in the highest fat category.

School size differences were not as significant for middle and high schools as they were for elementary schools. The only differences were among schools with 725 to 1,000 students: they were significantly more likely to serve lunches in the middle fat category than in the highest fat category.

Table 7

**School characteristics by fat category and school type, 2005**

	Sample share or mean	Total fat < 30% (kcal) (1)	Total fat 30-35% (kcal) (2)	Total fat > 35% (kcal) (3)
<b>Elementary schools – Unweighted sample</b>	N = 144	n = 42	n = 69	n = 33
		<i>Percent</i>		
Urbanicity:				
In a city	34	46 <sup>13</sup>	41 <sup>23</sup>	10 <sup>13,23</sup>
Suburb of a city	20	14	26	17
Not near a city	46	40 <sup>13</sup>	33 <sup>23</sup>	73 <sup>13,23</sup>
Region:				
Mid-Atlantic	11	2 <sup>12</sup>	17 <sup>12</sup>	10
Midwest	19	20	23	14
Mountain	13	16	8	17
Northeast	11	11	7	16
Southeast	18	6 <sup>12,13</sup>	24 <sup>12</sup>	21 <sup>13</sup>
Southwest	16	22	12	14
West	12	23 <sup>12, 13</sup>	9 <sup>12</sup>	8 <sup>13</sup>
School size:				
< 400	35	36	25 <sup>23</sup>	48 <sup>23</sup>
400-500	23	13 <sup>12</sup>	29 <sup>12</sup>	22
500-725	31	37	31	25
725-1,000	8	12 <sup>13</sup>	10 <sup>23</sup>	3 <sup>13,23</sup>
> 1,000	3	2	5	2
Percent of free or reduced-price students	47	48	49	42
District child poverty rate:				
< 20 percent	62	66	58	63
20-30 percent	31	24	34	33
> 30 percent	7	10	8	4
<b>Middle and high schools – Unweighted sample</b>	N = 253	n = 34	n = 102	n = 115
		<i>Percent</i>		
Urbanicity:				
In a city	29	45 <sup>13</sup>	37 <sup>23</sup>	18 <sup>13,23</sup>
Suburb of a city	18	15	17	21
Not near a city	53	40	46	61
Region:				
Mid-Atlantic	9	9	8	10
Midwest	17	17	23	13
Mountain	19	22 <sup>12</sup>	2 <sup>12,23</sup>	31 <sup>23</sup>
Northeast	8	9	8	8
Southeast	19	2 <sup>12,13</sup>	26 <sup>12</sup>	19 <sup>13</sup>
Southwest	14	27	18 <sup>23</sup>	9 <sup>23</sup>
West	12	14	15	10
School size:				
< 400	28	20	25	33
400-500	12	18	14	9
500-725	21	19	17	23
725-1,000	19	23	26 <sup>23</sup>	13 <sup>23</sup>
> 1,000	20	20	18	22
Percent of free or reduced-price students	42	40	46	40
District child poverty rate:				
< 20 percent	62	57	63	63
20-30 percent	31	33	32	30
> 30 percent	6	10	5	7

<sup>12</sup> Significant difference between category 1 and 2 at the 90% level.

<sup>23</sup> Significant difference between category 2 and 3 at the 90% level.

<sup>13</sup> Significant difference between category 1 and 3 at the 90% level.

Source: SDA, Economic Research Service, based on calculations from SNDA III.

## **Economic Characteristics**

We found no statistically significant differences between fat content of school lunches and the two economic characteristics variables: the average share of students receiving free/reduced-price meals and the district's child poverty rate. The lack of statistical differences among these variables may be partially attributed to the small sample size that this survey provides.

## Conclusion

Our findings show that the average fat content of lunches served in schools does differ across various school policies and characteristics. The presence of a la carte foods and vending machines seems to indirectly affect the fat content of USDA lunches, though there was no evidence of a relationship between lunch fat content and other competitive food policies such as pouring rights, food and beverage restrictions, and other sources of snacks.

Nutrition and food-purchasing policies—such as wellness policies, nutrition and health councils, and nutrition education—did not correlate with the fat content in school lunches. Many lunch planning characteristics—such as menu planning method; the offering of french fries, desserts, or fruits/vegetables; and offering only low-fat milk—were significant, especially for high schools.

As a caveat to all of the findings, we may be understating the statistical significance of the associations due to the relatively small sample size. However, these data are unique in providing very high-quality nutrition information as well as good detail on school characteristics, and they document many relevant correlations between school characteristics, policies, and the fat content of school lunches. A la carte provision of foods, vending machines, and traditional meal planning are all significantly associated with higher fat lunches. And elementary or middle/high schools with the lowest fat lunches are more likely to participate in at least one program that promotes school purchases of fresh fruits and vegetables or locally produced food.

## References

- Briefel, Ronette R., Mary Kay Crepinsek, Charlotte Cabili, Ander Wilson, and Philip Gleason. 2009. "School Food Environments and Practices Affect Dietary Behavior of US Public School Children," *Journal of American Dietetic Association* 109(suppl 1): S91-S107.
- Clark, Melissa, and Mary Kay Fox. 2009. "Nutritional Quality of the Diets of the US Public School Children and the Role of the School Meal Programs," *Journal of American Dietetic Association* 109(suppl 1): S44-S56.
- Finkelstein, Daniel M., Elaine L. Hill, and Robert Whitaker. 2008. "School Food Environments and Policies in US Public Schools," *Pediatrics* 122: e251-e259.
- Fox, Mary Kay, Allison Hedley Dodd, Ander Wilson, and Philip Gleason. 2009. "Association Between School Food Environment and Practices and Body Mass Index of US Public School Children," *Journal of American Dietetic Association* 109(suppl 1): S108-S117.
- Gordon, Anne, Elizabeth Condon, Melissa Clark, Karin Zeller, Elaine Hill, Ander Wilson, and Ronette Briefel. 2009. School Nutrition Dietary Assessment Study-III: Public-Use File Documentation, Version 2. February (.pdf file, unpublished).
- Miller, Clare H. 2009. "Commentary: A Practice Perspective on the Third School Nutrition Dietary Assessment Study," *Journal of American Dietetic Association* 109(suppl 1): S14-S17.
- U.S. Government Accountability Office. 2005. *School Meals Programs: Competitive Foods Are Widely Available and Generate Substantial Revenue for Schools*. GAO-05-563.