

**SCHOOL NUTRITION AND MEAL COST STUDY
VOLUME 4: STUDENT PARTICIPATION, SATISFACTION,
PLATE WASTE, AND DIETARY INTAKES**

APPENDIX A-H

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APPENDIX A
SUPPLEMENTARY PARTICIPATION ANALYSES

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This appendix presents findings from supplementary analyses of average target-day and average usual participation rates in the NSLP and SBP. “Target-day” participation measured students’ participation on the single school day covered in the student’s 24-hour dietary recall. It provides a reasonable estimate of student participation on a typical school day. “Usual” participation measured students’ self-reported participation in a typical school week. It provides an estimate of the percentage of students who usually eat the school meal.

Section A discusses how target-day participation rates changed over the 10 years between the SNDA-III (SY 2004–2005) and SNMCS (SY 2014–2015) studies, and how target-day participation rates vary within the SNMCS study when measured using two definitions of target-day participation. Section B discusses how usual participation rates changed in the 10 years between SNDA-III and SNMCS. Tables with cross-study comparisons include statistical tests for differences in average participation rates across school years.

A. Comparison of Target-day Participation Rates

1. Target-day Participation Rates Based on Foods Consumed in SYs 2004–2005 and 2014–2015

Tables A.1 and A.2 present analyses that compare how NSLP and SBP participation rates changed over the 10 years between the SNDA-III and SNMCS studies. Changes in target-day participation rates are based on the SNDA-III measure definition for all students in the two studies. That is, participation was measured based primarily on foods that students reported in their 24-hour dietary recall as consumed for lunch or breakfast. Note, comparisons between studies should be interpreted with caution because of methodological differences in SNDA-III and SNMCS (see Chapter 2). The key methodological difference is that the SNMCS study, when determining a student to be a target-day participant based on reimbursable meal items consumed, applied the updated school meal pattern requirements under the updated nutrition standards that took effect in SY 2012–2013.

Between SY 2004–2005, when SNDA-III was conducted, and SY 2014–2015, when SNMCS was conducted, average target-day participation rates in the NSLP fell nearly 5 percentage points among students, from 62 to 57 percent (Table A.1). This decline was statistically significant. Participation rates decreased for students of all school types and among boys and girls. However, the declines were statistically significant only among middle school students (7 percentage points) and boys (5 percentage points). Decreases in participation rates over time among higher income groups were statistically significant and larger: participation by children from households with incomes more than 185 percent of the poverty level decreased by 12 percentage points. Participation also decreased by 9 percentage points among students who did not receive a free or reduced-price lunch. The drop in participation among white students and students from other races was also statistically significant.

Average target-day participation rates in the SBP increased slightly between SY 2004–2005 and SY 2014–2015, from 18 to 20 percent (Table A.2). Increased participation was statistically significant among Hispanic students (10 percentage points), students that received and did not receive free or reduced-price breakfasts (6 and 3 percentage points), high school students, (4 percentage points), and girls (4 percentage points).

Table A.1. Comparison of Average Target-Day Participation Rates in the NSLP in SY 2004–2005 and SY 2014–2015 Based on Foods Consumed

Child Characteristic	Average Target Day Participation Rates		
	SY 2004–2005 (SNDA-III)	SY 2014–2015 (SNMCS)	Difference (SY 2014-2015 – SY 2004-2005)
All Students	61.7	57.3	-4.4 **
School Type			
Elementary	72.6	69.7	-2.9
Middle	60.2	53.6	-6.6 **
High	43.9	43.4	-0.5
Gender			
Male	65.4	60.7	-4.7*
Female	58.0	53.8	-4.2
Household Poverty Level			
Less than or equal to 130 percent	75.7	80.8	5.1*
More than 130 to 185 percent	75.5	76.0	0.5
More than 185 percent	52.6	40.8	-11.8***
Receipt of Free or Reduced-Price Lunches ^a			
Receives free or reduced-price lunches	78.8	82.6	3.8*
Does not receive free or reduced-price lunches	49.6	41.6	-8.0***
Race/Ethnicity ^b			
Hispanic	67.4	71.8	4.4
White, non-Hispanic	57.3	48.6	-8.7***
Black, non-Hispanic	70.3	75.7	5.4
Other (including multi-racial)	56.7	47.5	-9.2
Number of Students	2,314	2,165	

Source: Data for SY 2004-2005 were estimated using data from the third School Nutrition Dietary Assessment Study (SNDA-III) (Gordon et al. 2007), Child Interview, Dietary Recall, Parent Interview, and are representative of all students in public NSLP schools in SY 2004-2005. Data for SY 2014-2015 are from the School Nutrition and Meal Cost Study, Child/Youth Interview, Dietary Recall, Parent Interview, Reimbursable Meal Sale Form, and student roster data from schools, and are weighted to be representative of all students in public, non-charter schools offering the National School Lunch Program.

Note: See text for details about how target-day participation was defined in each school year.

^aIn SY 2014-2015, students who attended schools that operated under Provision 2 or 3 for lunch or under the Community Eligibility Provision received lunches at no charge and were assumed to receive free lunch.

^bIn SY 2014-2015, data on race/ethnicity were missing for 183 students.

Difference between SY 2014-2015 and SY 2004-2005 is significantly different from zero at the *** 0.001 level, ** 0.01 level, or * 0.05 level. Standard error calculations used to test the statistical significance of differences between school years by gender, household poverty level, receipt of free or reduced-price lunches, and race/ethnicity used SY 2014-2015 sample sizes to impute subgroup sample sizes for SY 2004-2005 because information about subgroup sample sizes in SY 2004-2005 were unavailable.

NSLP= National School Lunch Program; SNDA = School Nutrition Dietary Assessment Study; SNMCS = School Nutrition and Meal Cost Study; SY = school year.

Table A.2. Comparison of Average Target-Day Participation Rates in the SBP in SY 2004–2005 and SY 2014–2015 Based on Foods Consumed

Child Characteristic	Average Target-Day Participation Rates		
	SY 2004–2005 (SNDA-III)	SY 2014–2015 (SNMCS)	Difference (SY 2014-2015 - SY 2004-2005)
All Students	17.7	19.9	2.2
School Type			
Elementary	23.1	26.6	3.5
Middle	15.3	15.4	0.1
High	10.1	13.9	3.8*
Gender			
Male	21.0	21.4	0.4
Female	14.5	18.3	3.8*
Household Poverty Level			
Less than or equal to 130 percent	31.2	34.3	3.1
More than 130 to 185 percent	25.2	27.4	2.2
More than 185 percent	10.0	10.3	0.3
Receipt of Free or Reduced-Price Breakfasts ^a			
Receives free or reduced-price breakfasts	32.3	38.5	6.2**
Does not receive free or reduced-price breakfasts	7.2	10.2	3.0**
Race/Ethnicity ^b			
Hispanic	20.9	30.7	9.8***
White, non-Hispanic	12.5	13.2	0.7
Black, non-Hispanic	31.6	31.3	-0.3
Other (including multi-racial)	15.5	17.9	2.4
Number of Students	2,314	2,165	

Source: Data for SY 2004-2005 were estimated using data from the third School Nutrition Dietary Assessment Study (SNDA-III) (Gordon et al. 2007), Child Interview, Dietary Recall, Parent Interview, and are representative of all students in public NSLP schools in SY 2004-2005. Data for SY 2014-2015 are from the School Nutrition and Meal Cost Study, Child/Youth Interview, Dietary Recall, Parent Interview, Reimbursable Meal Sale Form, and student roster data from schools, and are weighted to be representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: See text for details about how target-day participation was defined in each school year.

The sample includes students in schools that did not offer the School Breakfast Program.

^aIn SY 2014-2015, students who attended schools that operated under Provision 2 or 3 for breakfast, operated under the Community Eligibility Provision, or offered universal free breakfasts received breakfasts at no charge and were assumed to receive free breakfast.

^bIn SY 2014-2015, data on race/ethnicity were missing for 183 students.

Difference between SY 2014-2015 and SY 2004-2005 is significantly different from zero at the *** 0.001 level, ** 0.01 level, or * 0.05 level. Standard error calculations used to test the statistical significance of differences between school years by gender, household poverty level, receipt of free or reduced-price breakfasts, and race/ethnicity used SY 2014-2015 sample sizes to impute subgroup sample sizes for SY 2004-2005 because information about subgroup sample sizes in SY 2004-2005 were unavailable.

SBP = School Breakfast Program; SNDA = School Nutrition Dietary Assessment Study; SNMCS = School Nutrition and Meal Cost Study; SY= school year.

2. Target-day Participation Rates in SY 2014–2015 Using Two Definitions of the Target-Day Measure

The SNMCS used school administrative data on meal transaction records, collected using the Reimbursable Meal Sale Form, as the primary means to determine students' target-day participation in the NSLP and SBP. This approach marked a change from the target-day participation measure used in SNDA-III, which was based on foods consumed in the 24-hour dietary recall. In SNDA-III, students were counted as NSLP participants if they reported consuming either:

- food items from at least three of the five meal components required to be offered at lunch (for example, one vegetable, one meat/meat alternate, and milk), and all three foods were on the school menu; or
- a food from at least one of the five meal components that was on the lunch menu and the student reported eating a school lunch on the target day.

Students were counted as SBP participants if they reported consuming a food from at least one of the three meal components required at breakfast (one fruit or vegetable, one grain or meat/meat alternate, and milk); the item was on the school breakfast menu; and the student reported consuming a school breakfast on the target-day.

Tables A.3 and A.4 compare NSLP and SBP target-day participation rates in SY 2014–2015 derived from (1) the Reimbursable Sale Form and (2) the dietary recall, using the approach used in SNDA-III to identify participants. Results indicate that estimates of target-day participation are very similar regardless of how participation was defined, although the rates based on the Reimbursable Meal Form were a little higher for a few student subgroups.

For the NSLP, the estimated target-day participation rate for all students differs by only one percentage point, on average, when measured using the two data sources (Table A.3). Similarly, most NSLP participation rates varied by 1 to 2 percentage points for each subgroup of students, although rates based on the Reimbursable Meal Sale Form exceeded those from the dietary recall by about 5 percentage points for high school students and black students. For the SBP, estimates of target-day participation rates among all students differed by only 1.5 percentage points between the two definitions (Table A.4). The rates based on the Reimbursable Meal Sale Form were marginally (3 percentage points) higher for middle school students, students certified for free or reduced-price breakfasts, and students of other races when compared with rates based on the dietary recall.

B. Comparison of Usual Participation Rates Between SYs 2004–2005 and 2014–2015

Usual participation provides a picture of students' participation during a typical school week. To assess this measure, interviewers asked older students how many days per week they usually ate the school meal (they asked separate questions for lunch and breakfast). They asked younger students a simpler version of the question: whether they usually ate the school meal three or more times per week. The study team considered students usual participants if they reported that they usually consumed a school meal three or more times per week.

Table A.3. Average Target-Day Participation Rates in the NSLP in SY 2014–2015 Using Two Different Definitions

Child Characteristic	Average Target Day Participation Rates in SY 2014-2015, Based Primarily On The...	
	Reimbursable Meal Sale Form	Dietary Recall
All Students	56.1	57.3
School Type		
Elementary	71.3	69.7
Middle	52.0	53.6
High	38.9	43.4
Gender		
Male	59.1	60.7
Female	53.1	53.8
Household Poverty Level ^a		
From lower income households	78.5	79.3
From higher income households	39.3	40.8
Certification Status ^b		
Certified for free or reduced-price lunches	78.1	80.2
Not certified for free or reduced-price lunches	35.2	35.5
Race/Ethnicity ^c		
Hispanic	70.3	71.8
White, non-Hispanic	48.2	48.6
Black, non-Hispanic	71.1	75.7
Other (including multi-racial)	49.6	47.5
Number of Students	2,165	2,165

Source: School Nutrition and Meal Cost Study, Child/Youth Interview, Dietary Recall, Parent Interview, Reimbursable Meal Sale Form, student roster data provided by schools, school year 2014-15. Tabulations are weighted to be representative of all students in public, non-charter schools offering the National School Lunch Program.

Note: See the text for a description of the two methods used to define target-day participants.

^aLower income households had incomes less than or equal to 185 percent of the Federal poverty level; higher income households had incomes greater than 185 percent of the Federal poverty level.

^bStudents who attended schools that operated under Provision 2 or 3 for lunch or under the Community Eligibility Provision received lunches at no charge and were assumed to receive free lunch.

^cData on race/ethnicity were missing for 183 students.

NSLP= National School Lunch Program; SY = school year.

Table A.4. Average Target-Day Participation Rates in the SBP in SY 2014–2015 Using Two Different Definitions

Child Characteristic	Average Target Day Participation Rates in SY 2014-2015, Based Primarily On The...	
	Reimbursable Meal Sale Form	Dietary Recall
All Students	21.4	19.9
School Type		
Elementary	28.2	26.6
Middle	18.6	15.4
High	14.3	13.9
Gender		
Male	23.2	21.4
Female	19.6	18.3
Household Poverty Level ^a		
From lower income households	35.7	32.9
From higher income households	11.0	10.3
Certification Status ^b		
Certified for free or reduced-price breakfasts	37.2	34.3
Not certified for free or reduced-price breakfasts	5.0	4.9
Race/Ethnicity ^c		
Hispanic	31.5	30.7
White, non-Hispanic	14.8	13.2
Black, non-Hispanic	33.1	31.3
Other (including multi-racial)	21.1	17.9
Number of Students	2,165	2,165

Source: School Nutrition and Meal Cost Study, Child/Youth Interview, Dietary Recall, Parent Interview, Reimbursable Meal Sale Form, student roster data provided by schools, school year 2014-15. Tabulations are weighted to be representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: See the text for a description of the two methods used to define target-day participants.
The sample includes students in schools that did not offer the School Breakfast Program.

^aLower income households had incomes less than or equal to 185 percent of the Federal poverty level; higher income households had incomes greater than 185 percent of the Federal poverty level.

^bStudents who attended schools that operated under Provision 2 or 3 for breakfast, operated under the Community Eligibility Provision, or offered universal free breakfasts received breakfasts at no charge and were assumed to receive a free breakfast.

^cData on race/ethnicity were missing for 183 students.

SBP= School Breakfast Program; SY = school year.

Between SYs 2004–2005 and 2014–2015, average usual participation rates in the NSLP declined by 14 percentage points among all students, from 72 to 58 percent (Table A.5). This decrease was statistically significant and is notably larger than the 5 percentage point decrease in NSLP target-day participation over the same period. Usual participation rates fell significantly among boys and girls and among students of all school types. As with NSLP target-day participation rates, usual participation fell among students from higher income households. However, the drop was sharper when examining usual participants—a 23 percentage point decline for students from households with incomes more than 185 percent of the poverty level, and a 19 percentage point decline for students who did not receive a free or reduced-price lunch. Usual participation rates fell by 19 and 20 percentage points for white students and students of other races, respectively.

Average usual participation rates in the SBP remained stable between SY 2004–2005 and SY 2014–2015, increasing slightly from 25 to 27 percent (Table A.6). Participation rates increased significantly, however, among elementary school students (by 7 percentage points) and Hispanic students (by 6 percentage points).

Table A.5. Comparison of Average Usual Participation Rates in the NSLP in SY 2004–2005 and SY 2014–2015

Child Characteristic	Average Usual Participation Rates		
	SY 2004–2005 (SNDA-III)	SY 2014–2015 (SNMCS)	Difference (SY 2014- 2015 – SY 2004-2005)
All Students	71.9	58.4	-13.5 ***
School Type			
Elementary	80.4	67.8	-12.6 ***
Middle	73.8	58.0	-15.8 ***
High	56.3	46.5	-9.8 ***
Gender			
Male	76.0	61.9	-14.1***
Female	67.9	54.8	-13.1***
Household Poverty Level			
Less than or equal to 130 percent	84.1	82.4	-1.7
More than 130 percent to 185 percent	82.5	77.6	-4.9
More than 185 percent	64.4	41.5	-22.9***
Receipt of Free or Reduced-Price Lunches ^a			
Receives free or reduced-price lunches	88.7	83.8	-4.9***
Does not receive free or reduced-price lunches	60.4	42.6	-17.8***
Race/Ethnicity ^b			
Hispanic	76.3	73.2	-3.1
White, non-Hispanic	68.0	49.0	-19.0***
Black, non-Hispanic	78.2	72.9	-5.3
Other (including multi-racial)	73.6	53.4	-20.2***
Number of Students	2,314	2,158	

Sources: Data for SY 2004-2005 were estimated using data from the third School Nutrition Dietary Assessment Study (SNDA-III) (Gordon et al. 2007), Child Interview, Dietary Recall, Parent Interview, and are representative of all students in public NSLP schools in SY 2004-2005. Data for SY 2014-2015 are from the School Nutrition and Meal Cost Study, Child/Youth Interview, Parent Interview, Reimbursable Meal Sale Form, and student roster data from schools, and are weighted to be representative of all students in public, non-charter schools offering the National School Lunch Program.

Note: Usual participation was defined as usually consuming a school lunch three or more times per week, according to student report.

^aIn SY 2014-2015, students who attended schools that operated under Provision 2 or 3 for lunch or under the Community Eligibility Provision received lunches at no charge and were assumed to receive free lunches.

^bIn SY 2014-2015, data on race/ethnicity were missing for 183 students.

Difference between SY 2014-2015 and SY 2004-2005 is significantly different from zero at the *** 0.001 level. Standard error calculations used to test the statistical significance of differences between school years by gender, income relative to poverty, receipt of free or reduced-price lunches, and race/ethnicity used SY 2014-2015 sample sizes to impute subgroup sample sizes for SY 2004-2005 because information about subgroup sample sizes in SY 2004-2005 were unavailable.

NSLP = National School Lunch Program; SNDA = School Nutrition Dietary Assessment Study; SNMCS = School Nutrition and Meal Cost Study; SY = school year.

Table A.6. Comparison of Average Usual Participation Rates in the SBP in SY 2004–2005 and SY 2014–2015

Child Characteristic	Average Usual Participation Rates		
	SY 2004–2005 (SNDA-III)	SY 2014–2015 (SNMCS)	Difference (SY 2014-2015 – SY 2004-2005)
All Students	24.9	26.5	1.6
School Type			
Elementary	31.2	38.5	7.3**
Middle	22.1	20.2	-1.9
High	16.3	14.9	-1.4
Gender			
Male	28.1	28.9	0.8
Female	21.7	24.1	2.4
Household Poverty Level			
Less than or equal to 130 percent	43.9	45.2	1.3
More than 130 percent to 185 percent	33.8	33.0	-0.8
More than 185 percent	14.1	13.4	-0.7
Receipt of Free or Reduced-Price Breakfasts ^a			
Receives free or reduced-price breakfasts	45.3	48.5	3.2
Does not receive free or reduced-price breakfasts	10.5	12.4	1.9
Race/Ethnicity ^b			
Hispanic	30.7	36.7	6.0*
White, non-Hispanic	16.9	17.8	0.9
Black, non-Hispanic	44.0	46.4	2.4
Other (including multi-racial)	23.8	22.3	-1.5
Number of Students	2,011	2,010	

Sources: Data for SY 2004-2005 were estimated using data from the third School Nutrition Dietary Assessment Study (SNDA-III) (Gordon et al. 2007), Child Interview, Dietary Recall, Parent Interview, and are representative of all students in public NSLP schools in SY 2004-2005. Data for SY 2014-2015 are from the School Nutrition and Meal Cost Study, Child/Youth Interview, Parent Interview, Reimbursable Meal Sale Form, and student roster data from schools, and are weighted to be representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Usual participation was defined as usually consuming a school breakfast three or more times per week, according to student report.

The samples include only students who attended schools that offered the School Breakfast Program.

^aIn SY 2014-2015, students who attended schools that operated under Provision 2 or 3 for breakfast, operated under the Community Eligibility Provision, or offered universal free breakfasts received breakfasts at no charge and were assumed to receive free breakfast.

^bIn SY 2014-2015, data on race/ethnicity were missing for 173 students.

Difference between SY 2014-2015 and SY 2004-2005 is significantly different from zero at the ** 0.01 level or * 0.05 level. Standard error calculations used to test the statistical significance of differences between school years by gender, household poverty level, receipt of free or reduced-price breakfasts, and race/ethnicity used SY 2014-2015 sample sizes to impute subgroup sample sizes for SY 2004-2005 because information about subgroup sample sizes in SY 2004-2005 was unavailable.

SBP = School Breakfast Program; SNDA = School Nutrition Dietary Assessment Study; SNMCS = School Nutrition and Meal Cost Study; SY = school year.

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APPENDIX B

CHAPTER 2 AND 3 SUPPLEMENTAL TABLES

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Table B.1. Student Sample Sizes for Target-Day Participation Analyses

Student Characteristic	Number of Students			
	Elementary Schools	Middle Schools	High Schools	All Schools
All Students	748	714	703	2,165
Gender				
Male	376	383	366	1,125
Female	372	331	337	1,040
Household Poverty Level ^a				
From lower income households	411	316	277	1,004
From higher income households	337	376	406	1,119
Missing	0	22	20	42
Certification Status ^b				
Certified for free or reduced-price lunches	471	391	325	1,187
Not certified for free or reduced-price lunches	277	308	365	950
Missing	0	15	13	28
Race/Ethnicity				
Hispanic	251	179	142	572
White, non-Hispanic	332	306	315	953
Black, non-Hispanic	100	71	98	269
Other (including multi-racial)	62	66	60	188
Missing	3	92	88	183

Source: School Nutrition and Meal Cost Study, Reimbursable Meal Sale Form, 24-Hour Dietary Recall, and Child/Youth Interview, school year 2014-15. Some data on student characteristics were obtained from the Parent Interview and student rosters.

Note: Target day participation is based primarily on whether the student was identified as having taken a reimbursable meal on the Reimbursable Meal Sale Form. See further discussion in the text.

^aLower income households had incomes less than or equal to 185 percent of the Federal poverty level; higher income households had incomes greater than 185 percent of the Federal poverty level.

^bStudents who attended schools that operated under Provision 2 or 3 for lunch or under the Community Eligibility Provision were considered to be certified to receive free lunches.

NSLP= National School Lunch Program.

Table B.2. Weight Status of NSLP Participants and Nonparticipants

Student Characteristic	Percentage of NSLP Participants				Percentage of Nonparticipants			
	Underweight	Healthy Weight	Overweight	Obese	Underweight	Healthy Weight	Overweight	Obese
All Students	1.0	56.0	14.6	21.8	3.8	62.2	15.8	13.4
School Type								
Elementary	--	55.6	14.0	23.4	2.1	60.1	21.2	8.5
Middle	--	53.1	21.0	19.9	7.6	63.1	13.7	10.8
High	--	59.5	10.9	19.5	3.0	63.0	13.5	17.6
Gender								
Male	--	54.1	15.4	23.3	4.2	61.3	12.3	16.1
Female	--	58.3	13.7	20.1	3.4	62.9	18.9	11.0
Certification Status ^a								
Certified for free or reduced-price lunches	--	54.3	12.7	23.8	2.7	53.2	14.9	19.5
Not certified for free or reduced-price lunches	--	61.2	17.9	17.5	4.2	66.0	16.3	10.2
Household Poverty Level ^b								
From lower income households	--	56.1	12.7	21.8	3.5	54.0	13.5	20.3
From higher income households	--	57.0	16.9	21.7	4.0	65.2	16.5	10.4
Race/Ethnicity ^c								
Hispanic	--	50.8	15.8	22.2	1.6	58.7	19.5	16.1
White, non-Hispanic	--	60.9	13.8	20.3	4.9	65.4	13.0	12.2
Black, non-Hispanic	--	53.9	14.7	26.0	0.5	51.6	11.6	20.5
Other (including multi-racial)	--	67.6	15.3	12.8	1.8	59.2	31.1	7.9
Number of Students	17	686	198	281	31	554	138	138

Sources: School Nutrition and Meal Cost Study, Reimbursable Meal Sale Form and Child/Youth Interview, school year 2014-15. Some data on student characteristics were obtained from the Parent Interview and student rosters. Tabulations are weighted to be representative of all students in public, non-charter schools offering the National School Lunch Program. Sample excludes 122 students with missing height or weight data.

Notes: Student weight status is based on BMI-for-age percentiles, using the following cutoffs: underweight: < 5th; healthy weight: ≥ 5th and < 85th; overweight: ≥ 85th and < 95th; and obese: ≥ 95th. BMI-for-age percentiles are based on age, gender, and measured height and weight per CDC guidelines (available at http://www.cdc.gov/healthyweight/assessing/bmi/childrens_bmi/about_childrens_bmi.html).

^aStudents who attended schools that operated under Provision 2 or 3 for lunch or under the Community Eligibility Provision were considered to be certified to receive free lunches.

^bLower income households had incomes less than or equal to 185 percent of the Federal poverty level; higher income households had incomes greater than 185 percent of the Federal poverty level.

^cData on race/ethnicity were missing for 183 students.

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

CDC = Centers for Disease Control and Prevention; BMI = body mass index; NSLP= National School Lunch Program.

Table B.3. Weight Status of SBP Participants and Nonparticipants

Student Characteristic	Percentage of SBP Participants				Percentage of Nonparticipants			
	Underweight	Healthy Weight	Overweight	Obese	Underweight	Healthy Weight	Overweight	Obese
All Students	0.4	52.8	14.2	22.7	2.7	60.3	15.4	16.9
School Type								
Elementary	--	51.4	12.7	25.7	1.4	59.0	17.4	16.6
Middle	--	56.3	22.3	14.8	4.3	58.2	16.4	15.7
High	--	53.8	11.4	21.5	3.3	63.0	12.7	17.8
Gender								
Male	--	51.5	14.2	24.8	2.9	58.7	14.2	19.0
Female	--	54.5	14.2	20.2	2.5	61.9	16.6	14.8
Certification Status ^a								
Certified for free or reduced-price breakfasts	--	52.4	12.5	24.1	2.4	56.1	13.1	21.9
Not certified for free or reduced-price breakfasts	--	--	--	--	2.8	64.5	16.8	12.4
Household Poverty Level ^b								
From lower income households	--	51.6	13.5	23.4	2.5	57.9	12.5	20.3
From higher income households	--	55.8	15.7	20.9	2.8	62.8	16.8	14.1
Missing	--	--	--	--	--	--	--	--
Race/Ethnicity ^c								
Hispanic	--	46.7	18.2	20.5	1.0	56.1	16.3	20.3
White, non-Hispanic	--	57.8	8.7	28.5	3.3	64.2	14.2	13.9
Black, non-Hispanic	--	51.0	15.3	20.1	0.5	54.4	13.0	26.6
Other (including multi-racial)	--	--	--	--	3.9	62.1	25.9	8.0
Number of Students	5	273	81	113	43	967	255	306

Sources: School Nutrition and Meal Cost Study, Reimbursable Meal Sale Form and Child/Youth Interview, school year 2014-15. Some data on student characteristics were obtained from the Parent Interview and student rosters. Tabulations are weighted to be representative of all students in public, non-charter schools offering the National School Lunch Program. Sample excludes 122 students with missing height or weight data.

Notes: Child weight status is based on BMI-for-age percentiles, using the following cutoffs: underweight: < 5th; healthy weight: ≥ 5th and < 85th; overweight: ≥ 85th and < 95th; and obese: ≥ 95th. BMI-for-age percentiles are based on age, gender, and measured height and weight per CDC guidelines (available at http://www.cdc.gov/healthyweight/assessing/bmi/childrens_bmi/about_childrens_bmi.html).

^aStudents who attended schools that operated under Provision 2 or 3 for lunch or under the Community Eligibility Provision were considered to be certified to receive free lunches.

^bLower income households had incomes less than or equal to 185 percent of the Federal poverty level; higher income households had incomes greater than 185 percent of the Federal poverty level.

^cData on race/ethnicity were missing for 183 students.

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

CDC = Centers for Disease Control and Prevention; BMI = body mass index; SBP = School Breakfast Program.

Table B.4. Student Awareness of Who Received Free or Reduced-Price Lunches, by School Type

	Percentage of Students			
	Elementary School Students	Middle School Students	High School Students	All Students
Students' Views of How Lunch Prices Vary				
Some pay less/some get lunch free	45.4	58.9	68.0	56.0
All pay same amount	31.6	27.0	19.8	26.6
Everyone gets lunch free	16.3	8.6	4.0	10.4
Missing	6.7	5.5	8.2	7.0
Number of Students	748	714	703	2,165
Among Students Who Report Some Students Pay Less or Some Get Lunch Free				
Students Can Tell Who Pays Less or Who Gets Lunch Free	18.0	24.0	17.7	19.2
Number of Students	321	411	503	1,235
Among Students Who Can Tell Who Pays Less or Gets Lunch Free, How They Can Tell:^a				
Personal Knowledge (Recipient Tells Student or Others, Self)	--	33.4	44.1	36.9
Form of Payment (Ticket, PIN)	--	18.6	15.8	17.2
Amount Paid to Cashier	--	16.9	9.0	16.4
Can See on Register/Screen	--	9.4	9.6	8.5
Appearance or Behavior	--	7.9	6.2	5.9
Cashier Checks List or Says Something to Student	--	3.3	5.9	5.7
Separate Line	--	1.4	3.9	3.5
Other	--	12.1	10.8	8.4
Type or Amount of Food Taken	--	10.6	10.8	7.3
Number of Students	61	100	97	258

Source: School Nutrition and Meal Cost Study, Child/Youth Interview, school year 2014-15. Tabulations are weighted to be representative of all students in public, non-charter schools offering the National School Lunch Program.

^aMultiple responses were allowed. Students were asked in an open-ended question how they could tell who pays less or who gets lunch free.

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

Table B.5. Student Awareness of Who Received Free or Reduced-Price Lunches, by NSLP Participation Status

	Percentage of Students		
	Participants	Nonparticipants	All Students
Students' Views of How Lunch Prices Vary***			
Some pay less/some get lunch free	57.3	54.3	56.0
All pay same amount	22.9	31.3	26.6
Everyone gets lunch free	14.6	5.2	10.4
Missing	5.2	9.2	7.0
Number of Students	1,254	911	2,165
Among Students Who Report Some Students Pay Less or Some Get Lunch Free			
Students Can Tell Who Pays Less or Who Gets Lunch Free	20.0	18.2	19.2
Number of Students	712	523	1,235
Among Students Who Can Tell Who Pays Less or Gets Lunch Free, How They Can Tell:^a			
Personal Knowledge (Recipient Tells Student or Others, Self)	39.1	33.7	36.9
Form of Payment (Ticket, PIN)	16.8	17.6	17.2
Amount Paid to Cashier	16.9	15.6	16.4
Can See on Register/Screen	7.8	9.5	8.5
Appearance or Behavior	4.0	8.7	5.9
Cashier Checks List or Says Something to Student	5.5	6.1	5.7
Separate Line	4.2	2.3	3.5
Other	5.1	13.2	8.4
Type or Amount of Food Taken	4.1	12.1	7.3
Number of Students	149	109	258

Source: School Nutrition and Meal Cost Study, Child/Youth Interview, school year 2014-15. Tabulations are weighted to be representative of all students in public, non-charter schools offering the National School Lunch Program.

Note: Target day participation is based primarily on whether the student was identified as having taken a reimbursable meal on the Reimbursable Meal Sale Form. See further discussion in the text.

^aMultiple responses were allowed. Students were asked in an open-ended question how they could tell who pays less or who gets lunch free.

Difference between participants and nonparticipants is significantly different from zero at the *** 0.001 level.

NSLP= National School Lunch Program.

Table B.6. Student Awareness of Who Received Free or Reduced-Price Lunches, by Household Poverty Level

	Percentage of Students		
	From Lower Income Households	From Higher Income Households	All Students
Students' Views of How Lunch Prices Vary			
Some pay less/some get lunch free	58.5	54.5	56.2
All pay same amount	18.7	32.9	26.7
Everyone gets lunch free	17.7	4.7	10.3
Missing	5.1	7.9	6.7
Number of Students	1,004	1,119	2,123
Among Students Who Report Some Students Pay Less or Some Get Lunch Free			
Students Can Tell Who Pays Less or Who Gets Lunch Free	20.8	17.2	18.8
Number of Students	593	624	1,217
Among Students Who Can Tell Who Pays Less or Gets Lunch Free, How They Can Tell:^a			
Personal Knowledge (Recipient Tells Student or Others, Self)	28.9	47.0	38.0
Form of Payment (Ticket, PIN)	25.0	10.5	17.7
Amount Paid to Cashier	17.5	16.2	16.8
Can See on Register/Screen	7.8	8.5	8.1
Appearance or Behavior	5.4	6.8	6.1
Cashier Checks List or Says Something to Student	6.3	3.7	5.0
Separate Line	3.3	3.9	3.6
Other	4.3	9.9	7.1
Type or Amount of Food Taken	3.1	9.0	6.0
Number of Students	136	115	251

Source: School Nutrition and Meal Cost Study, Child/Youth Interview, school year 2014-15. Tabulations are weighted to be representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Lower income households had incomes less than or equal to 185 percent of the Federal poverty level; higher income households had incomes greater than 185 percent of the Federal poverty level. Household poverty level came from the Parent Interview or, when missing, from the certification status on the Reimbursable Meal Sale Form, student roster data from schools, or the Parent Interview.

^aMultiple responses were allowed. Students were asked in an open-ended question how they could tell who pays less or who gets lunch free.

Table B.7. Students' Views on Food Served for Lunch: All Students

	Percentage of Students			
	Elementary School Students	Middle School Students	High School Students	All Students
Serving Line Has Milk They Like				
Always	58.3	54.7	46.8	53.6
Often	8.1	8.0	10.3	8.8
Sometimes	14.3	11.1	11.5	12.6
Never	17.0	22.3	23.7	20.4
Missing	2.3	4.0	7.7	4.5
Fruits in Serving Line Look Good				
Always	45.5	34.3	27.1	36.8
Often	15.3	22.0	23.6	19.6
Sometimes	26.7	33.0	32.6	30.1
Never	11.4	9.6	12.8	11.5
Missing	1.0	1.1	3.9	2.0
Like the Fruits in the Serving Line				
Always	40.3	29.4	21.5	31.6
Often	17.4	22.0	22.0	19.9
Sometimes	29.7	33.4	34.5	32.1
Never	11.5	12.4	16.6	13.4
Missing	1.2	2.8	5.4	3.0
Enough Food Choices				
Always	31.6	30.5	23.5	28.6
Often	14.0	20.3	18.0	16.7
Sometimes	34.9	34.5	37.8	35.8
Never	17.4	12.8	17.4	16.5
Missing	2.1	1.9	3.3	2.4
Vegetables in Serving Line Look Good^a				
Always	32.7	20.7	15.7	24.3
Often	15.7	19.0	18.5	17.3
Sometimes	32.2	40.3	40.3	36.7
Never	17.7	18.5	21.1	19.0
Missing	1.8	1.5	4.5	2.7
Like the Vegetables in the Serving Line^a				
Always	27.3	15.4	10.0	18.8
Often	16.4	14.9	19.0	16.9
Sometimes	33.1	39.7	35.6	35.3
Never	21.2	26.6	29.3	25.1
Missing	2.1	3.4	6.1	3.8
Lunch Menu Includes Foods They Like				
Always	18.7	15.8	16.6	17.4
Often	16.2	22.3	17.0	17.7
Sometimes	51.1	48.9	49.4	50.0
Never	12.9	12.0	13.5	12.9
Missing	1.2	1.0	3.5	1.9
Like the Way the Food Looks				
Always	24.2	12.6	11.4	17.4
Often	17.2	22.6	19.4	19.1
Sometimes	40.8	48.3	50.5	45.7
Never	16.1	15.3	15.6	15.7
Missing	1.6	1.2	3.1	2.1

	Percentage of Students			
	Elementary School Students	Middle School Students	High School Students	All Students
Like the Smell of the Food				
Always	24.4	15.5	13.2	18.7
Often	16.6	20.8	19.4	18.4
Sometimes	41.1	45.3	44.3	43.1
Never	16.2	15.1	17.7	16.5
Missing	1.7	3.3	5.3	3.3
Number of Students	748	714	703	2,165

Source: School Nutrition and Meal Cost Study, Child/Youth Interview, school year 2014–15. Tabulations are weighted to be representative of all students in public, non-charter schools offering the National School Lunch Program.

Note: Sample includes all students, including students who reported never having eaten a school lunch.

^aThis question was asked about vegetables on the serving line other than french fries.

Table B.8. Students' Views on Food Served for Lunch, by Household Poverty Level

	Percentage of Students		
	From Lower Income Households	From Higher Income Households	All Students
Serving Line Has Milk They Like			
Always	58.3	50.1	53.7
Often	9.0	8.9	9.0
Sometimes	14.7	10.9	12.6
Never	15.1	24.6	20.4
Missing	2.8	5.5	4.4
Fruits in Serving Line Look Good			
Always	44.5	31.0	36.9
Often	14.7	23.1	19.5
Sometimes	31.5	29.2	30.2
Never	8.4	13.7	11.4
Missing	0.9	3.0	2.1
Like the Fruits Available			
Always	40.0	25.4	31.7
Often	17.9	21.0	19.7
Sometimes	33.5	31.4	32.3
Never	7.6	17.7	13.3
Missing	1.0	4.5	3.0
Enough Food Choices			
Always	32.9	25.5	28.7
Often	14.7	18.4	16.8
Sometimes	36.2	35.4	35.8
Never	14.5	17.8	16.3
Missing	1.8	3.0	2.5
Vegetables in Serving Line Look Good^a			
Always	32.7	18.4	24.6
Often	17.2	17.2	17.2
Sometimes	35.1	38.0	36.7
Never	13.9	22.6	18.8
Missing	1.1	3.9	2.7
Like the Vegetables Available			
Always	25.9	13.5	18.9
Often	17.0	17.1	17.0
Sometimes	36.1	35.0	35.5
Never	19.5	29.2	25.0
Missing	1.6	5.2	3.6
Lunch Menu Includes Foods They Like			
Always	19.8	15.6	17.5
Often	15.8	19.1	17.6
Sometimes	53.3	47.8	50.2
Never	10.0	14.8	12.7
Missing	1.1	2.7	2.0
Like the Way the Food Looks			
Always	21.7	14.3	17.5
Often	17.8	20.0	19.1
Sometimes	48.7	43.6	45.8
Never	11.2	18.8	15.5
Missing	0.5	3.2	2.1

	Percentage of Students		
	From Lower Income Households	From Higher Income Households	All Students
Like the Smell of the Food			
Always	23.1	16.0	19.0
Often	16.0	20.1	18.4
Sometimes	47.1	39.8	43.0
Never	11.9	20.0	16.5
Missing	1.8	4.1	3.1
Number of Students	1,004	1,119	2,123

Source: School Nutrition and Meal Cost Study, Child/Youth Interview, school year 2014-15. Tabulations are weighted to be representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Sample includes all students, including students who reported never having eaten a school lunch. Lower income households had incomes less than or equal to 185 percent of the Federal poverty level; higher income households had incomes greater than 185 percent of the Federal poverty level. Household poverty level came from the Parent Interview or, when missing, from the certification status on the Reimbursable Meal Sale Form, student roster data from schools, or the Parent Interview.

^aThis question was asked about vegetables on the serving line other than french fries.

Table B.9. Students' General Satisfaction with the School Lunch

	Percentage of Students		
	Likes School Lunch	School Lunch is Only Okay	Doesn't Like School Lunch
Among Students Who Have Ever Eaten the School Lunch And Provided A General Opinion (n=1,732)			
All Students	36.0	52.2	11.8
Usual NSLP Participation Status			
Participant	39.3	51.0	9.7
Nonparticipant	25.2	56.2	18.6
Target Day NSLP Participation Status			
Participant	38.7	50.1	11.2
Nonparticipant	29.2	57.3	13.5
Gender			
Male	39.4	51.9	8.7
Female	32.2	52.5	15.3
Grade			
1	64.9	28.3	6.8
2	58.7	33.3	8.0
3	51.7	36.2	12.1
4	34.1	58.1	7.8
5	31.1	53.7	15.2
6	30.1	57.4	12.5
7	33.6	55.6	10.8
8	21.6	69.4	9.0
9	20.9	66.9	12.2
10	22.2	63.4	14.3
11	22.6	54.9	22.4
12	16.6	68.9	14.5
Race/Ethnicity ^a			
Hispanic	39.5	50.7	9.7
White, non-Hispanic	34.1	53.2	12.6
Black, non-Hispanic	39.1	48.0	12.9
Other (includes multi-racial)	35.4	51.4	13.2
Household Poverty Level ^b			
From lower income households	38.4	49.6	12.0
From higher income households	33.8	54.4	11.8
Type of School			
Elementary school	47.4	41.9	10.7
Middle school	30.9	59.1	10.0
High school	20.8	64.2	15.0
Physical Activity Relative to Other Students			
Less active	35.8	49.2	15.0
About as active	34.3	54.1	11.6
More active	35.2	54.7	10.1
Much more active	41.2	45.4	13.4
On a Diet ^c (Middle and High School Students Only)	24.2	63.6	12.2

	Percentage of Students		
	Likes School Lunch	School Lunch is Only Okay	Doesn't Like School Lunch
Among Students with Completed Parent Interviews (n = 1,486)			
Picky Eater			
Very	30.5	57.4	12.1
Somewhat	36.6	53.9	9.5
Not	36.8	48.0	15.2
Has Food Allergies or Special Dietary Needs	38.5	52.3	9.2
Number of Students	587	936	209

Source: School Nutrition and Meal Cost Study, Child/Youth Interview, school year 2014-15. Tabulations are weighted to be representative of all students in public, non-charter schools offering the National School Lunch Program.

Note: Target day participation is based primarily on whether the student was identified as having taken a reimbursable meal on the Reimbursable Meal Sale Form. See further discussion in the text.

^aRace/ethnicity data came from the Parent Interview or, when missing, from student roster data from schools. Data were missing from both sources for 142 students.

^bLower income households had incomes less than or equal to 185 percent of the Federal poverty level; higher income households had incomes greater than 185 percent of the Federal poverty level. Household poverty level came from the Parent Interview or, when missing, from the certification status on the Reimbursable Meal Sale Form, student roster data from schools, or the Parent Interview.

^cStudents were asked, "During the past 30 days, did you eat less food, fewer calories, or foods low in fat or carbohydrates to lose weight or to keep from gaining weight?"

NSLP = National School Lunch Program.

Table B.10. Students' General Satisfaction with School Breakfasts

	Percentage of Students		
	Like School Breakfast	School Breakfast is Only Okay	Don't Like School Breakfast
Among Students Who Have Ever Eaten the School Breakfast (n = 914)			
All Students	56.3	37.9	5.9
Usual SBP Participation Status			
Participant	60.8	34.0	5.3
Nonparticipant	49.2	44.3	6.5
Target Day SBP Participation Status			
Participant	54.5	37.0	8.5
Nonparticipant	57.8	38.6	3.6
Gender			
Male	56.1	37.4	6.5
Female	56.5	38.4	5.2
Grade			
1	77.1	19.0	4.0
2	76.3	18.1	5.6
3	73.2	19.3	7.6
4	59.1	39.3	1.6
5	--	--	--
6	46.1	48.4	5.5
7	44.2	49.8	6.0
8	47.9	49.4	2.8
9	38.8	48.1	13.1
10	--	--	--
11	--	--	--
12	--	--	--
Race/Ethnicity ^a			
Hispanic	62.3	31.5	6.2
White, non-Hispanic	56.5	38.8	4.8
Black, non-Hispanic	57.8	33.8	8.5
Other (includes multi-racial)	--	--	--
Household Poverty Level ^b			
From lower income households	57.3	36.0	6.6
From higher income households	55.1	40.8	4.2
Type of School			
Elementary school students	66.6	28.7	4.7
Middle school students	48.5	47.1	4.5
High school students	34.8	55.3	9.9
Physical Activity Relative to Other Students			
Less active	52.0	41.5	6.4
About as active	54.4	40.6	5.0
More active	58.7	36.1	5.2
Much more active	58.0	33.0	9.1
On a Diet ^c (Middle and High School Students Only)	47.4	47.9	4.7

	Percentage of Students		
	Like School Breakfast	School Breakfast is Only Okay	Don't Like School Breakfast
Among Students with Completed Parent Interviews (n = 798)			
Picky Eater			
Very	63.3	32.8	3.9
Somewhat	55.7	38.9	5.4
Not	54.0	37.9	8.1
Has Food Allergies or Special Dietary Needs	--	--	--
Number of Students	476	379	59

Source: School Nutrition and Meal Cost Study, Child/Youth Interview, school year 2014-15. Tabulations are weighted to be representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: The sample included only students who attended schools that offered the School Breakfast Program. Target day participation is based primarily on whether the student was identified as having taken a reimbursable meal on the Reimbursable Meal Sale Form. See further discussion in the text.

^aRace/ethnicity data came from the Parent Interview or, when missing, from the student roster data from schools. Data were missing from both sources for 65 students.

^bLower income households had incomes less than or equal to 185 percent of the Federal poverty level; higher income households had incomes greater than 185 percent of the Federal poverty level. Household poverty level came from the Parent Interview or, when missing, from the certification status on the Reimbursable Meal Sale Form, student roster data from schools, or the Parent Interview.

^cStudents were asked, "During the past 30 days, did you eat less food, fewer calories, or foods low in fat or carbohydrates to lose weight or to keep from gaining weight?"

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

SBP = School Breakfast Program.

APPENDIX C

METHODS USED FOR MULTIVARIATE MODELING OF FACTORS ASSOCIATED WITH STUDENT AND PARENT OUTCOMES

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TABLES

C.1 Variables Considered for Multivariate Regression Analyses but Ultimately ExcludedC.9

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This appendix describes the methods used for multivariate analyses that examined relationships between important student-level outcomes and key characteristics in four domains:

- Characteristics of school meals, including overall nutritional quality and compliance with updated nutrition standards
- Characteristics of school foodservice operations
- Characteristics of the school food environment
- Demographic and institutional characteristics of students and schools and SFAs

A. General Modeling Approach

The study team used multiple linear regressions to produce estimates of the relationships between dietary intakes and key characteristics in the four domains listed above and logistic regressions to produce estimates of the relationships between discrete program participation and satisfaction outcomes. The following description of the general analytic approach uses the overall nutritional quality of students' diets, measured using the total HEI-2010 scores, as an outcome. A similar approach was used to model logistic regressions for the participation and satisfaction outcomes.

Single-equation regression models were used to estimate relationships at the student level, taking the general form of:

$$(1) Y_{is} = X'_{is} \beta + Z'_s \gamma + Q'_s \delta + \varepsilon_{is}$$

where Y_{is} is the HEI-2010 total score for student i in school s , X_{is} is a vector of characteristics of student i with coefficient β , Z_s is a vector of characteristics of school s with coefficient γ , Q_s is a vector of key characteristics and factors within the domain of interest with δ as the corresponding coefficient, and ε_{is} is a random error term.

When estimating the relationships between the quality of students' diets and key characteristics of school meals, school foodservice operations, and the school food environment, it is important to control for other factors that may influence diet quality and also be correlated with the various characteristics of interest. For example, food purchasing behaviors, such as the use of food purchasing cooperatives, may vary by FNS region, but regional differences in the quality and types of foods available for purchase may partially explain differences between schools in the quality of students' dietary intake. In this case, not controlling for regional differences would overestimate the strength of the relationship between the use of food purchasing cooperatives and the quality of students' diets. For this reason, multivariate models that explored relationships between the students' diet quality and key characteristics in the above domains included institutional and demographic characteristics not controlled by the SFA in vectors X_s and Z_s of equation (1), respectively. When estimating relationships between the student outcomes and these particular characteristics, the form of the vector Q_s above was omitted.

Although key variables of interest were drawn from multiple instruments, the primary sample for these analyses included students who had a completed Child/Youth Interview and 24-hour dietary recall and attended schools where the SNM completed the SNM Survey and the Menu Survey. This included 2,139 students in 289 schools for analyses focused on the NSLP and a subset of 1,989 students in 268 schools for analyses focused on the SBP. The number of students and schools included in estimation samples varied by outcome and also depended on the proportion of students with valid data for each outcome analyzed.

Because of the large number of characteristics of interest across the four domains and the interest in separate results for students in each type of school, separate regression models were run for each of the four domains. This approach allowed the study team to maintain sufficient degrees of freedom to estimate standard errors. Multivariate estimates are nationally representative of all students in public, non-charter schools offering the NSLP. Analyses that focused only on school meal participants, were based on a subset of students from this nationally representative sample. Sample strata, clustering, and weighting were used to account for the study's complex sampling design in producing estimates, calculating standard errors, and testing for statistical significance.

Results are presented as regression-adjusted means that control for the institutional and demographic characteristics of each student and their school and SFA, as well as specific key characteristics within each domain. Summary tables in chapters and/or appendices report regression-adjusted means for each key characteristic, by subcategory for the characteristic (for example, regression-adjusted mean total HEI-2010 scores among students attending schools that offered NSLP lunches of lower and higher nutritional quality). These estimates include symbols that flag differences between subcategories that were tested using two-tailed t-tests and found to be statistically significant at the 0.05 level. In addition, appendices include tables that report full results for regression coefficient estimates for each model, along with their standard errors. These tables include coefficients and standard errors for control variables not included in the tables that report regression-adjusted means.

Current practice in rigorous policy analysis calls for attention to multiple comparison bias—the fact that when multiple hypotheses about associations between program features and outcomes are tested, the probability of finding significant associations by chance (known as false discovery) increases. Given the many relationships examined across the multivariate analyses, findings should be considered exploratory and interpreted with caution. In addition, it is important to understand that significant associations do not imply causality. Given the cross-sectional design of this study, it is not possible to conclusively attribute associations observed between key characteristics in the four domains and the outcome of interest to the characteristic's influence on the outcome.

B. Variable Selection and Exclusion

For each of the four domains identified above, the initial set of characteristics considered for inclusion in multivariate analyses consisted of relevant variables gathered from the Child/Youth Interview, Parent Interview, Menu Survey, Principal Survey, SNM Survey, SFA Director

Survey, Cafeteria Observation Guide, A la Carte Checklist, and Vending Machine and Other Sources of Foods and Beverages Checklist (see Chapter 1), as well as SFA and school characteristics from Common Core of Data (CCD) 2011-2012, 2011 U.S. Census Bureau's Small Area Income and Poverty Estimates school district file, and Food and Nutrition Service's SFA Verification Summary Report 2012-2013. For the first domain (characteristics of school meals), the study team collaborated with FNS to identify key measures of compliance with the updated nutrition standards to be included in the analyses. Potential characteristics related to school foodservice operations and the school food environment were selected if they had the potential to affect school meals in ways that were directly observable by students or affect students' perception of the meals.

Continuous and categorical variables were transformed to exhibit appropriate variation given the distribution of values across sample schools. For example, in 75 percent of sampled schools, all daily menus met the requirement that at least half of all grains must be whole grain-rich. For such cases, categorical variables were created to compare the large proportion of schools taking on one value (in this case, 100 percent of daily menus) with observations taking on lower or higher values. This produced category-specific samples large enough to detect meaningful differences in outcome variables between schools in different categories of independent variables.

Among the list of variables considered for the multivariate analyses, a subset were excluded from each analysis for exhibiting (1) a high proportion of missing values, (2) low within-sample variation, or (3) high correlation with another variable that better explained variation in the outcome of interest. The details of how the study team determined variable exclusion criteria is presented in the following three subsections. Table C.1 presents variables that were excluded altogether from each outcome's analyses. The variables retained are reported in main chapter and appendix tables, which also note if a variable was excluded from the analysis for one or two school types only. The final set of characteristics is shown in Table 4.1.

1. High Proportions of Missing Values

Multivariate analyses excluded variables originally missing values for at least 30 percent of the estimation sample. This includes both missing values stemming from non-response to a particular survey item and missing values reflecting partial overlap between students in the Student Interview sample and their corresponding schools in the Menu Survey sample, as well as schools sampled for other instruments from which variables were drawn. Missing values in variables retained for analyses were handled in one of two ways, depending on the type of variable. For binary and discrete categorical variables, missing values were replaced with a value of zero and an indicator specific to the particular variable was constructed to flag observations with originally missing values. These indicators were included as variables in relevant multivariate analyses to control for unobservable factors associated with missing values that may also be correlated with dietary intake quality. For continuous variables, missing values were imputed using the sample-weighted mean among students included in the analysis that were not originally missing values for the variable. This approach was used to minimize any influence of imputed values on results, while retaining students in the estimation sample if they were missing values for only a subset of variables.

2. No or Little Variation between Observations

Final models excluded dichotomous variables for which 95 percent or more of the sample was contained in one category. Similarly, categorical variables were excluded when 95 percent or more of the sample belonged to one category. When one or more categories contained 5 percent or less of the sample, the study team attempted to logically combine adjacent or similar categories to group more than 5 percent in each redefined category. For example, among the elementary school sample, less than 5 percent of elementary school students corresponded to schools in the “large” school size category, with over 95 percent in the “medium” and “small” categories. Therefore, we combined the large and medium schools as one category of school sizes and used the resulting two categories as control variables for elementary school-specific analyses.

3. Highly Correlated Variables

Simultaneously including characteristics that are highly correlated in a linear regression can lead to issues of multicollinearity, resulting in models that cannot properly identify how these characteristics are related to the quality of dietary intakes. To address this potential issue, we analyzed correlations for all pairwise combinations of independent variables originally considered for multivariate models. Beginning with pairs exhibiting the strongest correlations, we excluded the one variable from each having the weakest correlation with HEI-2010 total scores. This pairwise exclusion continued until no correlations greater than an absolute value of 0.7 remained among variables simultaneously included in a multivariate model.

Table C.1. Variables Considered for Multivariate Regression Analyses but Ultimately Excluded

	Meal Type	Outcome					
		Participation (Chapter 4)	Awareness of Free and Reduced- Price Meals (Chapter 4)	Student Satisfaction (Chapter 4)	Parent Satisfaction (Chapter 4)	Consumption of Competitive Foods (Chapter 13)	Nutritional Quality of Participants' Diets (Chapter 14)
Characteristics of School Meals							
School Offered Only Skim Fat-Free or Low-Fat Milk	Both	LV	†	LV	LV	LV	LV
At Least One Daily Menu Offered Meat or Meat Alternate (as Separate Choice or as Part of an Entrée)	SBP (<i>only</i>)	LV	†	LV	LV	†	LV
All Daily Menus Included Sweetened Cereal	SBP (<i>only</i>)	HC	†	HC	HC	†	HC
Characteristics of School Foodservice Operations							
School Participates in the School Breakfast Program	NSLP (<i>only</i>)	LV	LV	LV	LV	†	LV
School Is in SFA Certified for Additional 6-Cents Reimbursement	NSLP (<i>only</i>)	LV	LV	LV	LV	LV	LV
Items on which SFA Received Training or Technical Assistance	Both	HM	HM	HM	HM	HM	HM
Characteristics of the School Food Environment							
School Has an Open-campus Policy at Lunch (<i>high schools only</i>)	NSLP (<i>only</i>)	HM	HM	HM	HM	HM	HM
School Allows Students to Go out to Recess before the Official End of Their Lunch Period (<i>elementary schools only</i>)	NSLP (<i>only</i>)	HM	HM	HM	HM	HM	HM

	Meal Type	Outcome					
		Participation (Chapter 4)	Awareness of Free and Reduced- Price Meals (Chapter 4)	Student Satisfaction (Chapter 4)	Parent Satisfaction (Chapter 4)	Consumption of Competitive Foods (Chapter 13)	Nutritional Quality of Participants' Diets (Chapter 14)
Characteristics of Students, Schools, and SFAs							
Household Poverty Level	Both	HC	HC	HC	HC	HC	HC
Household Receives Benefits from at least One Assistance Program	Both	HM	HM	HM	HM	HM	HM
Household Is a Dual-earner Household	Both	HM	HM	HM	HM	HM	HM
Number of Nights per Week Student's Family Sits Down to Dinner Together	Both	HM	HM	HM	HM	HM	HM

Notes: Table presents variables that were initially considered for inclusion in each multivariate analysis, but were excluded due to low within-sample variation (LV), because they were highly correlated (HC) with another included variable that better explained variation in the outcome of interest, or because they had a high rate of missing values (HM), defined as 30 percent or more of observations in the estimation sample.

† = Variable was not considered for inclusion in the specific analysis.

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

APPENDIX D

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Table D.1. Relationships between Student NSLP Participation and Key Characteristics of NSLP Lunches: Regression-Adjusted Mean NSLP Participation Rates

	Yes/ No	Elementary Schools	Middle Schools	High Schools	All Schools
Mean NSLP Participation Rate		71.3	52.0	38.4	56.0
Overall Nutritional Quality of Prepared NSLP Lunches					
Total HEI-2010 Score of Average Lunch Prepared					
Lowest Quartile—64.9 to 79.5 points (<i>reference category</i>)		70.6	44.1	36.4	50.4
Second Quartile—79.6 to 83.0 points		58.5*	48.4	34.3	53.4
Third Quartile—83.1 to 85.7 points		77.4	60.9*	41.2	60.1*
Highest Quartile—85.8 to 92.8 points		76.4	56.3	40.7	60.9*
Compliance of Daily and Weekly Lunch Menus with NSLP Nutrition Standards					
Met Daily Quantity Requirement for Grains	Y	70.6	53.6	45.8	57.6
	N	72.5	50.7	36.0	54.6
Met Daily Quantity Requirement for Meats/Meat Alternates	Y	72.7***	52.5	39.8	58.7*
	N	37.6	44.7	37.5	48.6
Met Daily Quantity Requirement for Vegetables	Y	76.6**	50.6	†	56.5
	N	61.4	55.7		54.8
Met Weekly Quantity Requirement for Meats/Meat Alternates	Y	66.9**	51.9	†	54.3
	N	76.9	52.1		57.7
Met Weekly Quantity Requirement for Vegetables	Y	63.6***	54.3	40.1	56.6
	N	89.3	36.5	32.2	53.4
Met Requirement that at Least Half of Weekly Grains Are Whole Grain-Rich	Y	70.8	50.7	39.8	55.7
	N	81.0	65.6	27.7	59.7
Met Minimum Calorie Level	Y	71.0	53.6	42.9	55.7
	N	72.6	47.6	37.0	56.3
Met Maximum Calorie Level	Y	70.1	49.7	41.6**	56.4
	N	73.0	56.3	19.8	54.8
Met Target 1 Sodium Limit	Y	70.6	52.9	35.3	53.8*
	N	75.1	48.7	47.3	63.9
Types of Foods Offered in Lunch Menus					
All Daily Menus Offered Raw Vegetables	Y	71.9	52.0	44.8***	55.0
	N	70.7	52.0	25.7	57.4
Median Number of Vegetable Choices Offered per Day					
2 or fewer (<i>reference category</i>)		75.7	52.4	52.9	57.3
3 to 4		68.1	52.1	39.3*	55.9
5 or more		40.9**	51.1	30.3**	53.6
More than Half of Daily Menus Offered Dark Green Vegetables or Legumes	Y	65.2**	55.0	39.9	54.9
	N	75.4	47.4	35.1	57.3

	Yes/ No	Elementary Schools	Middle Schools	High Schools	All Schools
More than Half of Daily Menus Offered Red and Orange Vegetables	Y	75.7	51.7	46.0***	59.6*
	N	68.1	52.3	28.6	52.5
At Least One Daily Menu Offered Side Salad Bar	Y	66.4	36.6*	28.5	50.6
	N	72.1	54.0	40.4	56.9
No Daily Menus Offered French Fries or Similar Potato Products	Y	68.3	51.3	37.9	53.0
	N	73.2	52.2	38.5	57.1
Percentage of Daily Menus that Offered Pizza or Pizza Products					
Less than 20 percent (<i>reference category</i>)		73.3	44.5	29.6	56.7
Between 20 and 99 percent		66.5	46.4	40.4*	53.0
100 percent		87.5*	58.0	40.0	58.2
At Least One Daily Menu Offered Breaded Meat (as Separate Choice or as Part of a Sandwich)	Y	69.2	53.3	37.5	55.7
	N	77.6	35.7	43.8	57.4
Number of Students		741	702	696	2,139
Number of Schools		104	91	94	289

Source: School Nutrition and Meal Cost Study, Reimbursable Meal Sales Form, 24-Hour Dietary Recalls: Day 1, and Menu Survey, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression-adjusted mean NSLP participation rates (as percentages) that control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid lunch. Variables with rows labeled “Y” and “N” report adjusted mean NSLP participation rates within schools that do and do not meet the variable criteria, respectively. Otherwise, regression-adjusted means are reported for each category within a variable. See Appendix C for more details on characteristic descriptions and selection methods.

Difference in participation rates between schools with and without a dichotomous characteristic is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level. For variables containing multiple categories, the difference in participation rates between schools in the corresponding category and schools in the reference category is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

† Variable was excluded from the model due to low within-sample variation or high correlation with another variable that better explained variation in NSLP participation.

HEI = Healthy Eating Index; NSLP = National School Lunch Program; SFA = school food authority.

Table D.2. Regression Coefficient Estimates for the Relationships between Student NSLP Participation and Key Characteristics of NSLP Lunches

	Elementary Schools	Middle Schools	High Schools	All Schools
Overall Nutritional Quality of Prepared NSLP Lunches				
Total HEI-2010 Score of Average Lunch Prepared				
Lower Quartile—64.9 to 79.5 points (<i>reference category</i>)	--0--	--0--	--0--	--0--
Second Quartile—79.6 to 83.0 points	-85.8* (41.9)	23.1 (37.4)	-13.0 (40.7)	16.8 (22.1)
Third Quartile—83.1 to 85.7 points	54.4 (42.6)	89.7* (41.4)	28.0 (36.9)	55.8* (23.9)
Upper Quartile—85.8 to 92.8 points	46.6 (42.6)	64.6 (47.8)	25.1 (50.3)	60.7* (25.6)
Compliance of Daily and Weekly Lunch Menus with NSLP Nutrition Standards				
Met Daily Quantity Requirement for Grains	-14.7 (33.5)	15.6 (34.3)	56.6 (30.2)	17.3 (19.9)
Met Daily Quantity Requirement for Meats/Meat Alternates	256.4*** (65.5)	41.9 (48.1)	13.3 (23.2)	57.3* (25.5)
Met Daily Quantity Requirement for Vegetables	121.8** (42.9)	-27.9 (57.9)	†	9.8 (23.9)
Met Weekly Quantity Requirement for Meats/Meat Alternates	-82.2** (28.6)	-1.3 (30.1)	†	-19.5 (22.0)
Met Weekly Quantity Requirement for Vegetables	-235.1*** (58.3)	97.6 (51.2)	47.7 (26.2)	18.4 (25.5)
Met Requirement that at Least Half of Weekly Grains Are Whole Grain-Rich	-87.5 (67.8)	-82.0 (62.0)	76.1 (45.9)	-23.6 (34.9)
Met Minimum Calorie Level	-12.3 (44.6)	32.4 (48.6)	34.0 (43.1)	-3.8 (31.0)
Met Maximum Calorie Level	-22.6 (29.4)	-35.5 (38.4)	160.1** (56.9)	9.6 (25.4)
Met Target 1 Sodium Limit	-35.8 (52.2)	22.8 (38.7)	-69.1 (41.3)	-59.4* (27.6)
Types of Foods Offered in Lunch Menus				
All Daily Menus Offered Raw Vegetables	10.0 (37.5)	-0.4 (34.7)	124.1*** (32.6)	-14.1 (19.6)
Median Number of Vegetable Choices Offered per Day				
2 or fewer (<i>reference category</i>)	--0--	--0--	--0--	--0--
3 to 4	-60.5 (36.0)	-1.3 (53.2)	-78.3* (36.2)	-7.7 (22.1)
5 or more	-244.0** (78.1)	-6.6 (59.4)	-135.1** (50.7)	-20.9 (28.0)

	Elementary Schools	Middle Schools	High Schools	All Schools
More than Half of Daily Menus Offered Dark Green Vegetables or Legumes	-80.7** (30.4)	39.9 (39.8)	28.4 (22.9)	-13.7 (18.5)
More than Half of Daily Menus Offered Red and Orange Vegetables	62.1 (42.7)	-3.4 (31.6)	104.1*** (28.6)	41.7* (19.1)
At Least One Daily Menu Offered Side Salad Bar	-43.6 (40.7)	-95.7* (38.8)	-74.1 (44.2)	-36.7 (23.5)
No Daily Menus Offered French Fries or Similar Potato Products	-38.4 (46.8)	-4.9 (34.5)	-3.2 (31.5)	-24.2 (20.1)
Percentage of Daily Menus that Offered Pizza or Pizza Products				
Less than 20 percent (<i>reference category</i>)	--0--	--0--	--0--	--0--
Between 20 and 99 percent	-51.7 (36.4)	10.3 (39.1)	67.1* (31.8)	-21.4 (22.1)
100 percent	135.3* (57.9)	74.8 (49.2)	64.6 (37.3)	8.9 (23.2)
At Least One Daily Menu Offered Breaded Meat (as Separate Choice or as Part of a Sandwich)	-69.1 (53.8)	97.5 (67.0)	-36.6 (38.1)	-10.2 (21.5)
Student Characteristics				
Student Race and Ethnicity				
White, non-Hispanic (<i>reference category</i>)	--0--	--0--	--0--	--0--
Hispanic	66.8* (32.0)	83.7* (38.4)	2.0 (33.6)	50.9** (15.6)
Black, non-Hispanic	68.0 (46.5)	14.1 (36.2)	80.3* (32.2)	33.0 (21.6)
Other	29.6 (55.5)	31.4 (49.5)	29.7 (32.6)	7.2 (22.3)
Student Is Female	-25.2 (32.3)	-56.4* (22.2)	-44.0 (26.4)	-40.3* (16.7)
Student Is Certified for Free or Reduced-Price Meals	230.4*** (35.7)	159.1*** (28.2)	152.5*** (31.3)	175.9*** (17.4)
Student Is a Picky Eater [Parent-reported]				
Yes, very (<i>reference category</i>)	--0--	--0--	--0--	--0--
Somewhat	61.2 (36.2)	26.4 (38.2)	43.5 (32.8)	41.8* (16.8)
No	29.3 (38.7)	19.4 (33.2)	34.8 (34.7)	20.8 (17.0)

	Elementary Schools	Middle Schools	High Schools	All Schools
Amount Student Eats Compared to Students of the Same Age [Parent-reported]				
Larger amount (reference category)	--0--	--0--	--0--	--0--
Same amount	-38.9 (31.7)	-43.5 (29.7)	-7.3 (28.0)	-32.9* (15.8)
Smaller amount	-46.9 (49.3)	-87.9 (44.4)	-93.8* (45.1)	-60.5** (21.7)
School and SFA Characteristics				
Share of Students Approved for Free or Reduced- Price Meals				
Less than 40 percent (reference category)	--0--	--0--	--0--	--0--
40 percent or more	50.2 (34.5)	-0.7 (32.1)	35.5 (23.4)	28.1 (17.7)
Urbanicity				
Urban (reference category)	--0--	--0--	--0--	--0--
Suburban	23.7 (43.3)	45.4 (39.1)	136.5** (42.3)	66.5*** (17.7)
Rural	-15.0 (51.6)	69.0 (47.9)	43.2 (42.1)	48.1* (21.5)
School Size				
Fewer than 500 students (reference category)	--0--	--0--	--0--	--0--
500 to 999 students	-36.3 (33.7)	23.0 (44.2)	-53.3 (49.2)	23.2 (20.9)
1,000 or more students	‡	34.9 (46.6)	-92.3 (53.4)	34.0 (26.4)
FNS Region				
Mid-Atlantic (reference category)	--0--	--0--	--0--	--0--
Northeast	-40.0 (61.3)	55.3 (76.2)	150.7 (78.0)	-6.8 (51.1)
Southeast	25.3 (43.1)	6.0 (48.5)	72.1 (45.3)	-6.9 (38.7)
Midwest	-3.9 (41.2)	68.7 (53.3)	62.4 (44.4)	34.3 (39.8)
Southwest	120.1* (50.8)	61.2 (53.3)	91.8 (61.0)	11.2 (36.9)
Mountain Plains	311.1*** (88.8)	69.9 (67.3)	134.3* (63.6)	125.8** (44.2)
Western	95.9 (57.7)	33.0 (50.2)	-90.3 (51.6)	-35.3 (34.4)

	Elementary Schools	Middle Schools	High Schools	All Schools
Price Charged for Paid Lunches				
School Offered Free Lunch to All Students	-35.4 (51.2)	-9.8 (62.5)	170.1** (56.1)	36.9 (29.8)
\$2.25 or less (reference category)	--0--	--0--	--0--	--0--
\$2.26 to \$2.50	26.8 (52.1)	-87.5 (50.0)	14.0 (30.8)	-27.4 (21.1)
\$2.51 to \$2.75	-32.7 (53.2)	16.9 (41.5)	93.9 (39.2)	42.9 (22.8)
Number of Students	741	702	696	2,139
Number of Schools	104	91	94	289

Source: School Nutrition and Meal Cost Study, Reimbursable Meal Sales Form, 24-Hour Dietary Recalls: Day 1, and Menu Survey, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression coefficients (with standard errors in parentheses) from multivariate models that control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid lunch. See Appendix C for more details on characteristic descriptions and selection methods.

Relationship between characteristic and participation rate is significantly different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

--0-- = Reference category. Coefficient estimates for mutually exclusive categories are relative to the reference category's participation rate.

† Variable was excluded from the model due to low within-sample variation or high correlation with another variable that better explained variation in NSLP participation.

‡ Category was combined with the above category due to sparseness of observations.

HEI = Healthy Eating Index; FNS = Food and Nutrition Service; NSLP = National School Lunch Program; SFA = school food authority.

Table D.3. Relationships between Student NSLP Participation and Key Characteristics of School Foodservice Operations: Regression-Adjusted Mean Participation Rates

	Yes/ No	Elementary Schools	Middle Schools	High Schools	All Schools
Mean NSLP Participation Rate		71.3	52.0	38.4	56.0
Food Purchasing Characteristics					
SFA Uses Alliance for a Healthier Generation or Other Similar Tools for Selecting and Purchasing Healthy Foods	Y	72.7	49.9	41.8	57.5
	N	70.3	54.0	35.6	54.7
SFA Participates in a Food Purchasing Cooperative	Y	72.4	53.8	37.1	55.6
	N	69.8	49.9	39.6	56.3
SFA Is Engaged in a Pouring Rights Contract	Y	66.4	60.5*	39.8	57.1
	N	73.1	48.4	37.7	55.5
Schools in SFA Offer Brand-Name or Chain Restaurant Foods	Y	73.9	42.8	18.6**	41.4***
	N	71.2	53.0	40.8	57.1
School Participates in Farm to School Program	Y	63.7	66.7**	37.9	56.7
	N	72.4	48.6	38.5	55.8
Menu Planning and Meal Service Characteristics					
School Uses Cycle Menus	Y	72.0	56.0	33.2*	54.4
	N	69.0	43.5	51.7	60.1
School Participates in the Fresh Fruit and Vegetable Program	Y	73.9	n.a.	n.a.	n.a.
	N	70.4	n.a.	n.a.	n.a.
School Receives Fully or Partially Prepared Meals from a Separate Production or Central Kitchen	Y	70.6	54.0	†	58.6
	N	71.6	51.7		55.5
SFA Uses a Foodservice Management Company	Y	70.4	39.9	38.4	50.6
	N	71.6	55.8	38.3	57.6
School Uses Offer-Versus-Serve at Lunch	Y	70.3	49.9	n.a.	†
	N	75.8	68.7	n.a.	
School Accommodates Students with Food Allergies and Special Dietary Needs	Y	73.0*	54.1	38.6	56.5
	N	53.3	36.4	34.8	51.4
Number of HealthierUS School Challenge Smarter Lunchroom Techniques Used					
Zero (<i>reference category</i>)		66.4	35.7	28.4	47.5
1		77.5	55.2*	30.2	56.7
2 to 3		69.1	54.3**	42.7	57.2
4 to 7		73.3	58.6**	39.4	58.9*
Price Charged for Paid Lunches					
School Offered Free Lunch to All Students		77.0	54.1	50.7*	62.0
\$2.25 or less (<i>reference category</i>)		73.9	49.8	32.7	55.7
\$2.26 to \$2.50		67.0	47.8	35.7	52.1
\$2.51 to \$2.75		76.7	63.7*	48.9*	62.6
More than \$2.75		48.7**	49.4	41.7	51.9

	Yes/ No	Elementary Schools	Middle Schools	High Schools	All Schools
Number of Students		741	702	696	2,139
Number of Schools		104	91	94	289

Source: School Nutrition and Meal Cost Study, Reimbursable Meal Sales Form, 24-Hour Dietary Recalls: Day 1, School Food Authority Director Survey, School Nutrition Manager Survey, and Cafeteria Observation Guide, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression-adjusted mean NSLP participation rates (as percentages) that control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid lunch. Variables with rows labeled “Y” and “N” report adjusted mean NSLP participation rates within schools that do and do not meet the variable criteria, respectively. Otherwise, regression-adjusted means are reported for each category within a variable. See Appendix C for more details on characteristic descriptions and selection methods.

Difference in participation rates between schools with and without a dichotomous characteristic is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level. For variables containing multiple categories, the difference in participation rates between schools in the corresponding category and schools in the reference category is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

† Variable was excluded from the model due to low within-sample variation or high correlation with another variable that better explained variation in NSLP participation.

NSLP = National School Lunch Program; SFA = school food authority.

Table D.4. Regression Coefficient Estimates for the Relationships between Student NSLP Participation and Key Characteristics of School Foodservice Operations

	Elementary Schools	Middle Schools	High Schools	All Schools
Food Purchasing Characteristics				
SFA Uses Alliance for a Healthier Generation or Other Similar Tools for Selecting and Purchasing Healthy Foods	18.1 (30.6)	-22.5 (30.9)	36.7 (27.8)	16.3 (24.7)
SFA Participates in a Food Purchasing Cooperative	19.9 (42.2)	21.2 (27.8)	-14.6 (29.4)	-4.2 (21.4)
SFA Is Engaged in a Pouring Rights Contract	-50.0 (42.3)	65.5* (29.2)	11.7 (31.8)	9.4 (25.0)
Schools in SFA Offer Brand-Name or Chain Restaurant Foods	20.5 (50.0)	-55.0 (39.8)	-150.6** (46.6)	-90.1*** (23.6)
School Participates in Farm to School Program	-63.0 (45.8)	101.8** (35.9)	-3.3 (39.5)	5.0 (24.0)
Menu Planning and Meal Service Characteristics				
School Uses Cycle Menus	22.2 (34.5)	68.9 (35.2)	-104.0* (41.1)	-32.9 (27.5)
School Participates in the Fresh Fruit and Vegetable Program	26.4 (34.2)	n.a. n.a.	n.a. n.a.	n.a. n.a.
School Receives Fully or Partially Prepared Meals from a Separate Production or Central Kitchen	-7.2 (39.4)	12.8 (40.9)	†	17.8 (30.9)
SFA Uses a Foodservice Management Company	-8.5 (40.1)	-87.0 (47.3)	0.2 (41.4)	-39.9 (25.4)
School Uses Offer-Versus-Serve at Lunch	-42.8 (77.3)	-108.2 (67.0)	n.a. n.a.	†
School Accommodates Students with Food Allergies and Special Dietary Needs	135.3* (53.0)	99.1 (61.2)	22.8 (49.8)	29.3 (31.1)
Number of HealthierUS School Challenge Smarter Lunchroom Techniques Used				
Zero (<i>reference category</i>)	--0--	--0--	--0--	--0--
1	82.8 (46.9)	110.3* (44.5)	12.0 (58.5)	53.4 (27.4)
2 to 3	18.8 (50.9)	105.2** (37.2)	88.4 (57.5)	56.3 (28.7)
4 to 7	49.4 (61.6)	129.8** (40.6)	69.4 (65.3)	66.4* (29.2)

	Elementary Schools	Middle Schools	High Schools	All Schools
Price Charged for Paid Lunches				
School Offered Free Lunch to All Students	24.0 (71.5)	23.6 (54.4)	102.7* (51.6)	36.0 (34.1)
\$2.25 or less (<i>reference category</i>)	0.0	0.0	0.0	0.0
\$2.26 to \$2.50	-48.3 (48.2)	-11.1 (39.7)	18.1 (34.6)	-20.5 (23.7)
\$2.51 to \$2.75	21.2 (52.9)	77.6* (36.0)	93.0* (37.8)	39.7 (21.2)
More than \$2.75	-160.9** (47.8)	-2.4 (31.8)	53.4 (38.9)	-21.6 (31.6)
Student Characteristics				
Student Race and Ethnicity				
White, non-Hispanic (<i>reference category</i>)	--0--	--0--	--0--	--0--
Hispanic	57.8 (31.7)	91.8* (36.8)	-1.5 (34.8)	36.5* (17.5)
Black, non-Hispanic	51.6 (44.2)	52.7 (40.6)	70.9 (40.3)	36.2 (24.2)
Other	17.7 (52.0)	19.7 (50.2)	26.0 (32.5)	10.9 (22.2)
Student is Female	-19.0 (30.6)	-55.4* (21.4)	-42.9 (26.6)	-38.3* (15.7)
Student is Certified for Free or Reduced-Price Meals	215.0*** (33.6)	144.1*** (28.0)	157.4*** (33.3)	170.8*** (17.9)
Student Is a Picky Eater [Parent-reported]				
Yes, very (<i>reference category</i>)	--0--	--0--	--0--	--0--
Somewhat	72.0* (35.2)	44.1 (49.6)	29.1 (35.2)	42.7* (18.2)
No	32.2 (36.8)	46.3 (47.9)	9.9 (34.4)	20.5 (17.3)
Amount Student Eats Compared to Students of the Same Age [Parent-reported]				
Larger amount (<i>reference category</i>)	--0--	--0--	--0--	--0--
Same amount	-53.7 (28.6)	-16.9 (35.6)	-9.1 (30.9)	-30.5 (16.6)
Smaller amount	-57.7 (38.1)	-63.4 (47.0)	-99.4* (49.5)	-61.8* (23.9)
Student Has Food Allergies or Special Dietary Needs	17.5 (38.7)	-22.6 (41.0)	-83.7 (43.0)	-32.9 (20.8)

	Elementary Schools	Middle Schools	High Schools	All Schools
Student's Level of Activity Compared to Students of the Same Age [Parent-reported]				
Less active (reference category)	--0--	--0--	--0--	--0--
About as active	93.0* (38.3)	-46.9 (34.5)	-50.7 (30.7)	-7.7 (18.9)
More active	96.4* (45.7)	-51.2 (34.0)	50.1 (44.3)	23.5 (22.5)
Much more active	62.6 (44.8)	-77.3 (44.7)	-23.6 (51.8)	-10.3 (24.8)
School and SFA Characteristics				
Share of Students Approved for Free or Reduced- Price Meals				
Less than 40 percent (reference category)	--0--	--0--	--0--	--0--
40 percent or more	61.9 (40.6)	36.5 (29.0)	15.0 (30.9)	43.1* (18.4)
Urbanicity				
Urban (reference category)	--0--	--0--	--0--	--0--
Suburban	57.4 (40.8)	141.9** (50.0)	100.5* (46.7)	72.9** (23.1)
Rural	54.9 (45.1)	111.6* (47.4)	87.2 (49.4)	94.5** (28.9)
School Size				
Fewer than 500 students (reference category)	--0--	--0--	--0--	--0--
500 to 999 students	-8.2 (36.1)	25.0 (45.5)	-162.1** (52.0)	13.5 (23.6)
1,000 or more students	‡	6.9 (49.3)	-135.4** (51.2)	42.6 (27.9)
FNS Region				
Mid-Atlantic (reference category)	--0--	--0--	--0--	--0--
Northeast	-19.2 (79.1)	244.4** (86.1)	162.9* (66.3)	62.2 (57.1)
Southeast	-18.2 (59.9)	-18.1 (46.3)	-4.3 (50.2)	-2.8 (32.5)
Midwest	-49.9 (51.6)	97.6* (45.1)	26.3 (54.5)	25.0 (39.2)
Southwest	-45.0 (58.4)	100.9* (43.6)	26.0 (63.9)	10.3 (39.2)
Mountain Plains	171.0* (65.8)	86.1 (56.7)	119.4 (69.5)	129.4** (39.6)
Western	-71.0 (62.8)	19.2 (46.2)	-19.6 (57.5)	-35.5 (38.1)

	Elementary Schools	Middle Schools	High Schools	All Schools
Number of Students	741	702	696	2,139
Number of Schools	104	91	94	289

Source: School Nutrition and Meal Cost Study, Reimbursable Meal Sales Form, 24-Hour Dietary Recalls: Day 1, School Food Authority Director Survey, School Nutrition Manager Survey, and Cafeteria Observation Guide, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression coefficients (with standard errors in parentheses) from multivariate models that control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid lunch. See Appendix C for more details on characteristic descriptions and selection methods.

Relationship between characteristic and participation rate is significantly different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

--0-- = Reference category. Coefficient estimates for mutually exclusive categories are relative to the reference category's participation rate.

† Variable was excluded from the model due to low within-sample variation or high correlation with another variable that better explained variation in NSLP participation.

‡ Category was combined with the above category due to sparseness of observations.

FNS = Food and Nutrition Service; NSLP = National School Lunch Program; SFA = school food authority.

Table D.5. Relationships between Student NSLP Participation and Key Characteristics of the School Food Environment: Regression-Adjusted Mean Participation Rates

	Yes/ No	Elementary Schools	Middle Schools	High Schools	All Schools
Mean NSLP Participation Rate		71.3	52.0	38.4	56.0
Wellness Policies and Practices					
SFA Has Nutrition Standards for School Meals that Exceed Federal Standards	Y	77.5**	57.2	47.6*	60.4*
	N	66.5	49.4	34.2	53.4
School Conducted a Nutrition Education Activity in the Classroom or Foodservice Area	Y	72.2	49.5	34.9	54.9
	N	69.9	54.4	42.3	57.2
School Operates a School Garden	Y	54.9*	†	†	†
	N	72.5			
Competitive Foods					
School Sells Foods Other than Milk on an A la Carte Basis	Y	72.4	51.8	†	55.7
	N	68.8	55.1		57.6
School Sells Foods and Beverages in Vending Machine	Y	65.6	45.7*	37.7	55.7
	N	72.0	58.9	42.3	56.2
School Sells Foods and/or Beverages via a School Store or Snack Bar	Y	75.0	47.8	38.2	55.5
	N	69.7	53.0	38.4	56.2
SFA Has Standards for Competitive Foods that Exceed Smart Snacks in Schools Standards	Y	70.3	51.3	28.1*	50.4*
	N	71.5	52.2	42.8	57.6
Meal Service Practices					
Length of Lunch Period					
Less than 30 minutes (<i>reference category</i>)		72.0	59.4	49.9	61.9
30 to 44 minutes		73.8	43.5**	37.6	54.9
45 minutes or more		69.5	57.8	39.2	55.5
School Has Other Activities Scheduled during Lunch Period	Y	65.9	51.0	39.0	55.2
	N	72.5	52.6	37.8	56.4
School Has More than One Line or Station that Offers Reimbursable Lunches or Components of Reimbursable Lunches	Y	70.0	57.8***	36.8*	55.3
	N	72.2	34.9	49.7	57.1
Number of Students		741	702	696	2,139
Number of Schools		104	91	94	289

Source: School Nutrition and Meal Cost Study, Reimbursable Meal Sales Form, 24-Hour Dietary Recalls: Day 1, School Food Authority Director Survey, School Nutrition Manager Survey, Principal Survey, Vending Machine and Other Sources of Foods and Beverages Checklist, A la Carte Checklist, and Cafeteria Observation Guide, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression-adjusted mean NSLP participation rates (as percentages) that control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid lunch. Variables with rows labeled “Y” and “N” report adjusted mean NSLP participation rates within schools that do and do not meet the variable criteria, respectively. Otherwise, regression-adjusted means are reported for each category within a variable. See Appendix C for more details on characteristic descriptions and selection methods.

Difference in participation rates between schools with and without a dichotomous characteristic is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level. For variables containing multiple categories, the difference in participation rates between schools in the corresponding category and schools in the reference category is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

† Variable was excluded from the model due to low within-sample variation or high correlation with another variable that better explained variation in NSLP participation.

n.a. = Characteristic did not apply to any schools within the specific school type. Such characteristics were also not reported for models including all schools if they were only specific to one school type.

NSLP = National School Lunch Program; SFA = school food authority.

Table D.6. Regression Coefficient Estimates for the Relationships between Student NSLP Participation and Key Characteristics of the School Food Environment

	Elementary Schools	Middle Schools	High Schools	All Schools
Wellness Policies and Practices				
SFA Has Nutrition Standards for School Meals that Exceed Federal Standards	83.4** (25.6)	42.4 (29.6)	78.4* (32.7)	40.3* (18.1)
School Conducted a Nutrition Education Activity in the Classroom or Foodservice Area	17.3 (25.1)	-26.8 (30.1)	-42.9 (22.2)	-13.1 (15.0)
School Operates a School Garden	-118.0* (47.4)	†	†	†
Competitive Foods				
School Sells Foods Other than Milk on an A la Carte Basis	26.2 (28.5)	-17.9 (45.8)	†	-10.7 (24.7)
School Sells Foods and Beverages in Vending Machine	-46.1 (47.6)	-72.7* (29.3)	-27.1 (45.5)	-2.6 (24.2)
School Sells Foods and/or Beverages via a School Store or Snack Bar	40.3 (36.6)	-27.6 (32.1)	-1.6 (36.4)	-3.8 (19.5)
SFA Has Standards for Competitive Foods that Exceed Smart Snacks in Schools Standards	-9.1 (37.4)	-4.8 (38.7)	-89.7* (36.8)	-41.0* (20.1)
Meal Service Practices				
Length of Lunch Period				
Less than 30 minutes (<i>reference category</i>)	--0--	--0--	--0--	--0--
30 to 44 minutes	14.0 (34.5)	-87.6** (32.1)	-66.7 (44.6)	-40.2 (18.5)
45 minutes or more	-19.0 (35.6)	-9.0 (41.6)	-58.1 (49.9)	-36.8 (22.4)
School Has Other Activities Scheduled during Lunch Period	-47.3 (40.7)	-8.8 (29.3)	7.1 (27.1)	-7.1 (19.6)
School Has More than One Line or Station that Offers Reimbursable Lunches or Components of Reimbursable Lunches	-16.2 (34.0)	129.9*** (37.8)	-73.1* (29.9)	-10.6 (20.0)
Student Characteristics				
Student Race and Ethnicity				
White, non-Hispanic (<i>reference category</i>)	--0--	--0--	--0--	--0--
Hispanic	63.3* (28.2)	80.9* (38.1)	-9.6 (33.9)	37.6* (17.1)
Black, non-Hispanic	11.0 (51.8)	37.1 (42.9)	67.9 (39.0)	30.9 (25.0)
Other	6.7 (53.8)	24.8 (49.4)	26.4 (34.2)	8.3 (21.8)

	Elementary Schools	Middle Schools	High Schools	All Schools
Student Is Female	-20.7 (28.5)	-53.5* (22.2)	-42.3 (26.2)	-39.5* (16.1)
Student Is Certified for Free or Reduced-Price Meals	221.3*** (35.5)	154.8*** (27.6)	158.3*** (34.3)	175.7*** (17.6)
Student Is a Picky Eater [Parent-reported]				
Yes, very (reference category)	--0--	--0--	--0--	--0--
Somewhat	64.7 (32.7)	41.9 (49.9)	36.4 (40.8)	40.0* (18.6)
No	18.5 (36.3)	33.7 (48.0)	19.9 (40.3)	19.3 (17.6)
Amount Student Eats Compared to Students of the Same Age [Parent-reported]				
Larger amount (<i>reference category</i>)	--0--	--0--	--0--	--0--
Same amount	-69.9* (29.6)	-25.2 (34.4)	-13.3 (32.1)	-35.8* (15.9)
Smaller amount	-78.1* (38.4)	-66.4 (44.0)	-94.2 (49.9)	-64.9** (22.4)
Student Has Food Allergies or Special Dietary Needs	10.4 (39.1)	-23.4 (38.0)	-77.7 (47.6)	-31.0 (19.6)
Student's Level of Activity Compared to Students of the Same Age [Parent-reported]				
Less active (reference category)	--0--	--0--	--0--	--0--
About as active	116.0** (37.8)	-31.8 (33.6)	-50.8 (31.9)	-6.6 (18.9)
More active	102.2* (43.4)	-33.7 (33.6)	40.9 (44.0)	22.3 (22.3)
Much more active	74.8 (41.8)	-58.2 (41.1)	-29.6 (53.7)	-9.8 (23.4)
School and SFA Characteristics				
Share of Students Approved for Free or Reduced-Price Meals				
Less than 40 percent (reference category)	--0--	--0--	--0--	--0--
40 percent or more	100.4* (42.5)	58.9 (31.9)	53.5* (26.4)	49.3** (16.8)

	Elementary Schools	Middle Schools	High Schools	All Schools
Urbanicity				
Urban (reference category)	--0--	--0--	--0--	--0--
Suburban	80.3 (42.3)	106.2** (36.3)	108.2 (55.7)	69.2** (23.5)
Rural	80.9 (56.4)	92.6* (39.7)	86.2 (54.3)	71.8** (26.0)
School Size				
Fewer than 500 students (reference category)	--0--	--0--	--0--	--0--
500 to 999 students	-19.0 (29.7)	57.8 (47.1)	-124.5* (56.9)	-2.8 (21.5)
1,000 or more students	‡	111.2 (59.9)	-92.4 (58.0)	33.2 (24.4)
FNS Region				
Mid-Atlantic (reference category)	--0--	--0--	--0--	--0--
Northeast	6.3 (72.0)	45.2 (50.1)	63.9 (88.9)	25.4 (37.5)
Southeast	1.4 (72.9)	-6.1 (48.6)	-62.4 (44.7)	-0.2 (34.3)
Midwest	-23.4 (54.3)	48.2 (51.1)	15.6 (38.0)	36.3 (38.8)
Southwest	5.9 (58.4)	107.4 (65.2)	-32.6 (52.0)	7.9 (36.9)
Mountain Plains	105.5 (56.2)	74.6 (55.2)	15.7 (52.0)	90.6* (38.7)
Western	-77.3 (64.7)	-50.2 (48.6)	-47.3 (54.8)	-27.8 (36.4)
Price Charged for Paid Lunches				
School Offered Free Lunch to All Students	-10.6 (65.4)	60.6 (62.4)	74.4 (52.7)	16.2 (33.2)
\$2.25 or less (reference category)	--0--	--0--	--0--	--0--
\$2.26 to \$2.50	-97.6 (42.0)	-16.1 (54.7)	51.6 (24.1)	-46.7 (22.2)
\$2.51 to \$2.75	40.7 (42.7)	7.7 (37.9)	17.6 (44.8)	-3.9 (20.2)
Number of Students	741	702	696	2,139
Number of Schools	104	91	94	289

Source: School Nutrition and Meal Cost Study, Reimbursable Meal Sales Form, 24-Hour Dietary Recalls: Day 1, School Food Authority Director Survey, School Nutrition Manager Survey, Principal Survey, Vending Machine and Other Sources of Foods and Beverages Checklist, A la Carte Checklist, and Cafeteria Observation Guide, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program

Notes: Estimates are regression coefficients with standard errors in parentheses, from multivariate models that control for demographic characteristics of each student, institutional characteristics of schools, and the price charged by each school for a paid lunch. See Appendix C for more details on characteristic descriptions and selection methods.

Relationship between characteristic and participation rate is significantly different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

--0-- = Reference category. Coefficient estimates for mutually exclusive categories are relative to the reference category's participation rate.

† Variable was excluded from the model due to low within-sample variation or high correlation with another variable that better explained variation in NSLP participation.

‡ Category was combined with the above category due to sparseness of observations.

FNS = Food and Nutrition Service; NSLP = National School Lunch Program; SFA = school food authority.

Table D.7. Relationships between Student NSLP Participation and Characteristics of the Students, Schools, and SFAs: Regression-Adjusted Mean Participation Rates

	Yes/ No	Elementary Schools	Middle Schools	High Schools	All Schools
Mean NSLP Participation Rate		71.3	52.0	38.4	56.0
Student Characteristics					
Student Race and Ethnicity					
White, non-Hispanic (<i>reference category</i>)		68.4	47.6	36.9	53.7
Hispanic		77.0*	62.9*	35.3	60.3*
Black, non-Hispanic		70.0	54.8	49.0	59.1
Other		69.4	52.4	41.5	55.1
Student Is Female	Y	70.0	46.8*	34.7	52.5*
	N	72.8	56.8	41.9	59.4
Student Is Certified for Free or Reduced-Price Meals	Y	86.8***	68.9***	58.2***	74.4***
	N	50.5	37.8	28.5	39.5
Student Is a Picky Eater [Parent-reported]					
Yes, very (<i>reference category</i>)		66.5	46.7	35.1	52.0
Somewhat		75.2	54.5	41.3	59.0*
No		69.1	53.0	38.4	55.4
Amount Student Eats Compared to Students of the Same Age [Parent-reported]					
Larger amount (<i>reference category</i>)		78.3	56.0	40.9	60.7
Same amount		69.3*	51.2	38.6	54.6*
Smaller amount		68.1*	43.5	26.0	49.5**
Student Has Food Allergies or Special Dietary Needs	Y	72.6	48.0	27.4	51.1
	N	71.2	52.3	39.6	56.5
Student's Level of Activity Compared to Students of the Same Age [Parent-reported]					
Less active (<i>reference category</i>)		58.1	57.6	40.6	55.5
About as active		74.6**	51.7	32.1	54.4
More active		72.9*	51.3	47.9	59.4
Much more active		69.1	46.7	35.5	53.8
School and SFA Characteristics					
Share of Students Approved for Free or Reduced-Price Meals					
Less than 40 percent (<i>reference category</i>)		61.5	45.5	35.1	51.2
40 percent or more		76.3*	56.9	44.4*	60.1**
Urbanicity					
Urban (<i>reference category</i>)		62.4	38.8	26.1	46.7
Suburban		73.3	57.8**	43.3	58.5**
Rural		73.4	55.4*	39.5	58.9**

	Yes/ No	Elementary Schools	Middle Schools	High Schools	All Schools
School Size					
Fewer than 500 students (<i>reference category</i>)		73.0	41.0	55.2	54.3
500 to 999 students		70.5	51.2	33.2*	53.8
1,000 or more students		‡	60.6	38.5	59.9
FNS Region					
Mid-Atlantic (<i>reference category</i>)		73.0	46.5	41.2	54.2
Northeast		73.8	55.1	52.7	58.7
Southeast		73.2	45.3	31.0	54.2
Midwest		69.8	55.6	44.0	60.5
Southwest		73.7	66.4	35.7	55.6
Mountain Plains		84.9	60.5	44.0	69.5*
Western		62.0	37.2	33.3	49.3
Number of Students		741	702	696	2,139
Number of Schools		104	91	94	289

Source: School Nutrition and Meal Cost Study, Reimbursable Meal Sales Form, 24-Hour Dietary Recalls: Day 1, Child/Youth Interview, Parent Interview, School Food Authority Director Survey, Common Core of Data (CCD) 2011-2012, 2011 U.S. Census Bureau's Small Area Income and Poverty Estimates school district file, and Food and Nutrition Service's SFA Verification Summary Report 2012-2013, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression-adjusted mean NSLP participation rates (as percentages) that control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid lunch. Variables with rows labeled "Y" and "N" report adjusted mean NSLP participation rates within schools that do and do not meet the variable criteria, respectively. Otherwise, regression-adjusted means are reported for each category within a variable. See Appendix C for more details on characteristic descriptions and selection methods.

Difference in participation rates between schools with and without a dichotomous characteristic is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level. For variables containing multiple categories, the difference in participation rates between schools in the corresponding category and schools in the reference category is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

FNS = Food and Nutrition Service; NSLP = National School Lunch Program; SFA = school food authority.

Table D.8. Regression Coefficient Estimates for the Relationships between Student NSLP Participation and Characteristics of the Students, Schools, and SFAs

	Elementary Schools	Middle Schools	High Schools	All Schools
Student Characteristics				
Student Race and Ethnicity				
White, non-Hispanic (<i>reference category</i>)	--0--	--0--	--0--	--0--
Hispanic	63.3* (28.2)	80.9* (38.1)	-9.6 (33.9)	37.6* (17.1)
Black, non-Hispanic	11.0 (51.8)	37.1 (42.9)	67.9 (39.0)	30.9 (25.0)
Other	6.7 (53.8)	24.8 (49.4)	26.4 (34.2)	8.3 (21.8)
Student Is Female	-20.7 (28.5)	-53.5* (22.2)	-42.3 (26.2)	-39.5* (16.1)
Student Is Certified for Free or Reduced-Price Meals	221.3*** (35.5)	154.8*** (27.6)	158.3*** (34.3)	175.7*** (17.6)
Student Is a Picky Eater [Parent-reported]				
Yes, very (<i>reference category</i>)	--0--	--0--	--0--	--0--
Somewhat	64.7 (32.7)	41.9 (49.9)	36.4 (40.8)	40.0* (18.6)
No	18.5 (36.3)	33.7 (48.0)	19.9 (40.3)	19.3 (17.6)
Amount Student Eats Compared to Students of the Same Age [Parent-reported]				
Larger amount (<i>reference category</i>)	--0--	--0--	--0--	--0--
Same amount	-69.9* (29.6)	-25.2 (34.4)	-13.3 (32.1)	-35.8* (15.9)
Smaller amount	-78.1* (38.4)	-66.4 (44.0)	-94.2 (49.9)	-64.9** (22.4)
Student Has Food Allergies or Special Dietary Needs	10.4 (39.1)	-23.4 (38.0)	-77.7 (47.6)	-31.0 (19.6)
Student's Level of Activity Compared to Students of the Same Age [Parent-reported]				
Less active (<i>reference category</i>)	--0--	--0--	--0--	--0--
About as active	116.0** (37.8)	-31.8 (33.6)	-50.8 (31.9)	-6.6 (18.9)
More active	102.2* (43.4)	-33.7 (33.6)	40.9 (44.0)	22.3 (22.3)
Much more active	74.8 (41.8)	-58.2 (41.1)	-29.6 (53.7)	-9.8 (23.4)

	Elementary Schools	Middle Schools	High Schools	All Schools
School and SFA Characteristics				
Share of Students Approved for Free or Reduced-Price Meals				
Less than 40 percent (<i>reference category</i>)	--0--	--0--	--0--	--0--
40 percent or more	100.4* (42.5)	58.9 (31.9)	53.5* (26.4)	49.3** (16.8)
Urbanicity				
Urban (<i>reference category</i>)	--0--	--0--	--0--	--0--
Suburban	80.3 (42.3)	106.2** (36.3)	108.2 (55.7)	69.2** (23.5)
Rural	80.9 (56.4)	92.6* (39.7)	86.2 (54.3)	71.8** (26.0)
School Size				
Fewer than 500 students (<i>reference category</i>)	--0--	--0--	--0--	--0--
500 to 999 students	-19.0 (29.7)	57.8 (47.1)	-124.5* (56.9)	-2.8 (21.5)
1,000 or more students	‡	111.2 (59.9)	-92.4 (58.0)	33.2 (24.4)
FNS Region				
Mid-Atlantic (<i>reference category</i>)	--0--	--0--	--0--	--0--
Northeast	6.3 (72.0)	45.2 (50.1)	63.9 (88.9)	25.4 (37.5)
Southeast	1.4 (72.9)	-6.1 (48.6)	-62.4 (44.7)	-0.2 (34.3)
Midwest	-23.4 (54.3)	48.2 (51.1)	15.6 (38.0)	36.3 (38.8)
Southwest	5.9 (58.4)	107.4 (65.2)	-32.6 (52.0)	7.9 (36.9)
Mountain Plains	105.5 (56.2)	74.6 (55.2)	15.7 (52.0)	90.6* (38.7)
Western	-77.3 (64.7)	-50.2 (48.6)	-47.3 (54.8)	-27.8 (36.4)
Price Charged for Paid Lunches				
School Offered Free Lunch to All Students	-10.6 (65.4)	60.6 (62.4)	74.4 (52.7)	16.2 (33.2)
\$2.25 or less (<i>reference category</i>)	--0--	--0--	--0--	--0--
\$2.26 to \$2.50	-97.6 (42.0)	-16.1 (54.7)	51.6 (24.1)	-46.7 (22.2)
\$2.51 to \$2.75	40.7 (42.7)	7.7 (37.9)	17.6 (44.8)	-3.9 (20.2)
Number of Students	741	702	696	2,139
Number of Schools	104	91	94	289

Source: School Nutrition and Meal Cost Study, Reimbursable Meal Sales Form, 24-Hour Dietary Recalls: Day 1, Child/Youth Interview, Parent Interview, School Food Authority Director Survey, Common Core of Data (CCD) 2011-2012, 2011 U.S. Census Bureau's Small Area Income and Poverty Estimates school district file, and Food and Nutrition Service's SFA Verification Summary Report 2012-2013, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression coefficients (with standard errors in parentheses) from multivariate models that control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid lunch. See Appendix C for more details on characteristic descriptions and selection methods.

Relationship between characteristic and participation rate is significantly different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

--0-- = Reference category. Coefficient estimates for mutually exclusive categories are relative to the reference category's participation rate.

‡ Category was combined with the above category due to sparseness of observations.

FNS = Food and Nutrition Service; NSLP = National School Lunch Program; SFA = school food authority.

Table D.9. Relationships between Student SBP Participation and Key Characteristics of SBP Breakfasts: Regression-Adjusted Mean SBP Participation Rates

	Yes/ No	Elementary Schools	Middle Schools	High Schools	All Schools
Mean SBP Participation Rate		30.2	21.3	14.6	22.9
Overall Nutritional Quality of Prepared SBP Breakfasts					
Total HEI-2010 Score of Average Breakfast Prepared					
Lowest Quartile—55.2 to 68.5 points (<i>reference category</i>)		26.7	18.8	15.5	22.9
Second Quartile—68.6 to 71.6 points		41.2**	23.0	9.3*	26.0
Third Quartile—71.7 to 74.9 points		24.7	24.8	19.1	22.0
Highest Quartile—75.0 to 87.4 points		28.8	19.6	12.0	21.0
Compliance of Daily and Weekly Breakfast Menus with SBP Nutrition Standards					
Met Daily Quantity Requirement for Grains	Y	32.7	22.1	13.5	23.8
	N	25.3	19.3	15.6	21.4
Met Requirement that at Least Half of Weekly Grains Are Whole Grain-Rich	Y	30.6	20.5	†	23.1
	N	24.6	56.8		19.4
Met Minimum Calorie Level	Y	†	21.4	17.2*	23.3
	N		15.8	8.7	18.6
Met Maximum Calorie Level	Y	28.8	23.3	15.0	22.5
	N	33.0	18.0	13.0	24.1
Met Target 1 Sodium Limit	Y	34.0*	23.1	15.0	24.7*
	N	20.4	17.2	13.6	18.3
Types of Foods Offered in Breakfast Menus					
All Daily Menus Offered Cold Cereal	Y	30.4	23.8*	12.5	22.9
	N	29.9	13.2	20.3	23.0
More than Half of Daily Menus Offered Breakfast Pastries or Muffins	Y	31.1	19.6	16.8	23.0
	N	29.9	23.3	11.0	22.9
At Least One Daily Menu Offered Pizza or Pizza Products	Y	30.7	20.4	11.9	21.6
	N	29.9	22.0	16.6	23.8
No Daily Menus Offered French Fries or Similar Potato Products	Y	31.3	24.3	15.3	24.1
	N	29.5	20.5	14.3	22.3
Number of Students		692	633	664	1,989
Number of Schools		97	82	89	268

Source: School Nutrition and Meal Cost Study, Reimbursable Meal Sales Form, 24-Hour Dietary Recalls: Day 1, and Menu Survey, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression-adjusted mean SBP participation rates (as percentages) that control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid breakfast. Variables with rows labeled “Y” and “N” report adjusted mean SBP participation rates within schools that do and do not meet the variable criteria, respectively. Otherwise, regression-adjusted means are reported for each category within a variable. See Appendix C for more details on characteristic descriptions and selection methods.

Difference in participation rates between schools with and without a dichotomous characteristic is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level. For variables containing multiple categories, the difference in participation rates between schools in the corresponding category and schools in the reference category is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

† Variable was excluded from the model due to low within-sample variation or high correlation with another variable that better explained variation in SBP participation.

HEI = Healthy Eating Index; SBP = School Breakfast Program; SFA = school food authority.

Table D.10. Regression Coefficient Estimates for the Relationships between Student SBP Participation and Key Characteristics of SBP Breakfasts

	Elementary Schools	Middle Schools	High Schools	All Schools
Overall Nutritional Quality of Prepared SBP Breakfasts				
Total HEI-2010 Score of Average Breakfast Prepared				
Lower Quartile (<i>reference category</i>)	--0--	--0--	--0--	--0--
Second Quartile	89.8** (33.5)	33.6 (49.8)	-91.6* (45.2)	22.6 (24.9)
Third Quartile	-14.4 (31.9)	47.1 (53.2)	39.7 (50.0)	-7.2 (23.6)
Upper Quartile	14.2 (30.4)	7.2 (56.6)	-46.9 (63.6)	-14.9 (22.2)
Compliance of Daily and Weekly Breakfast Menus with SBP Nutrition Standards				
Met Daily Quantity Requirement for Grains	49.8 (27.6)	22.5 (29.4)	-26.4 (39.2)	18.5 (18.0)
Met Requirement that at Least Half of Weekly Grains Are Whole Grain-Rich	41.3 (55.8)	-242.2 (123.0)	†	28.8 (47.8)
Met Minimum Calorie Level	†	48.7 (100.7)	134.3* (54.4)	36.6 (31.9)
Met Maximum Calorie Level	-27.6 (36.8)	42.7 (48.3)	26.9 (54.0)	-12.1 (24.4)
Met Target 1 Sodium Limit	92.9* (36.7)	48.7 (50.1)	18.4 (55.8)	49.9* (24.0)
Types of Foods Offered in Breakfast Menus				
All Daily Menus Offered Cold Cereal	3.5 (28.7)	94.3* (44.3)	-91.2 (55.9)	-0.6 (20.8)
More than Half of Daily Menus Offered Breakfast Pastries or Muffins	7.9 (29.2)	-29.4 (35.5)	81.4 (43.6)	1.1 (22.7)
At Least One Daily Menu Offered Pizza or Pizza Products	5.4 (28.2)	-12.6 (25.9)	-60.7 (36.5)	-16.6 (17.7)
No Daily Menus Offered French Fries or Similar Potato Products	11.7 (23.6)	29.6 (41.5)	12.8 (50.1)	13.5 (20.8)
Student Characteristics				
Student Race and Ethnicity				
White, non-Hispanic (<i>reference category</i>)	--0--	--0--	--0--	--0--
Hispanic	26.1 (28.6)	44.3 (49.8)	-41.9 (45.4)	25.1 (19.4)
Black, non-Hispanic	7.0 (44.6)	132.6** (50.1)	150.3** (45.0)	53.7* (26.5)
Other	25.9 (49.8)	59.0 (71.5)	-71.0 (53.7)	31.5 (32.6)

	Elementary Schools	Middle Schools	High Schools	All Schools
Student Is Female	-27.8 (20.0)	-49.3 (31.1)	-31.7 (32.2)	-31.8* (15.5)
Student Is Certified for Free or Reduced-Price Meals	151.9*** (43.1)	227.9*** (48.8)	127.6* (64.2)	175.1*** (29.2)
Student Is a Picky Eater [Parent-reported]				
Yes, very (reference category)	--0--	--0--	--0--	--0--
Somewhat	22.9 (29.3)	25.9 (38.1)	3.1 (44.0)	29.8 (19.8)
No	14.0 (29.6)	49.0 (46.9)	59.0 (38.8)	45.7* (17.9)
Amount Student Eats Compared to Students of the Same Age [Parent-reported]				
Larger amount (reference category)	--0--	--0--	--0--	--0--
Same amount	-87.2*** (25.0)	-93.6* (37.9)	24.0 (39.8)	-66.6*** (17.3)
Smaller amount	-140.0*** (39.7)	-47.7 (60.0)	-22.8 (75.9)	-89.4** (30.5)
School and SFA Characteristics				
Share of Students Approved for Free or Reduced-Price Meals				
Less than 40 percent (reference category)	--0--	--0--	--0--	--0--
40 percent or more	46.4 (29.4)	19.3 (48.6)	7.4 (38.3)	16.5 (18.5)
Urbanicity				
Urban (reference category)	--0--	--0--	--0--	--0--
Suburban	-1.0 (33.5)	-23.7 (42.5)	89.3 (54.9)	-4.8 (23.0)
Rural	41.0 (38.3)	-9.4 (45.6)	11.4 (73.2)	32.2 (25.0)
School Size				
Fewer than 500 students (reference category)	--0--	--0--	--0--	--0--
500 to 999 students	-41.6 (32.0)	-70.2 (40.9)	-92.3 (62.3)	-33.2 (18.4)
1,000 or more students	‡	-59.3 (49.3)	-210.8** (70.4)	-79.4* (31.9)

	Elementary Schools	Middle Schools	High Schools	All Schools
FNS Region				
Mid-Atlantic (reference category)	--0--	--0--	--0--	--0--
Northeast	-89.9 (63.2)	-75.5 (81.4)	193.1** (66.5)	-14.4 (39.0)
Southeast	-93.6 (57.0)	17.1 (69.6)	70.2 (70.2)	-55.6 (32.0)
Midwest	-109.4* (47.8)	-26.8 (54.7)	118.8 (84.5)	-59.2 (33.6)
Southwest	-3.4 (52.3)	-14.9 (65.9)	250.8*** (69.9)	-12.1 (31.4)
Mountain Plains	62.0 (59.0)	19.2 (106.1)	219.1* (103.6)	84.7* (40.0)
Western	-75.5 (50.3)	-17.9 (56.8)	132.5 (79.4)	-31.6 (34.9)
Price Charged for Paid Breakfasts				
School Offered Free Breakfast to All Students	111.8** (37.2)	-52.9 (40.4)	209.6* (80.7)	58.1 (31.0)
Less than \$1.25 (<i>reference category</i>)	--0--	--0--	--0--	--0--
\$1.25 to \$1.49	6.9 (45.5)	-20.6 (43.0)	-160.6 (96.2)	-27.7 (31.9)
\$1.50 to \$1.99	18.5 (49.1)	5.4 (50.0)	32.0 (82.3)	8.8 (34.6)
Number of Students	692	633	664	1,989
Number of Schools	97	82	89	268

Source: School Nutrition and Meal Cost Study, Reimbursable Meal Sales Form, 24-Hour Dietary Recalls: Day 1, and Menu Survey, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression coefficients (with standard errors in parentheses) from multivariate models that control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid breakfast. See Appendix C for more details on characteristic descriptions and selection methods.

Relationship between characteristic and participation rate is significantly different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

--0-- = Reference category. Coefficient estimates for mutually exclusive categories are relative to the reference category's participation rate.

† Variable was excluded from the model due to low within-sample variation or high correlation with another variable that better explained variation in SBP participation.

‡ Category was combined with the above category due to sparseness of observations.

HEI = Healthy Eating Index; FNS = Food and Nutrition Service; SBP = School Breakfast Program; SFA = school food authority.

Table D.11. Relationships between Student SBP Participation and Key Characteristics of School Foodservice Operations: Regression-Adjusted Mean Participation Rates

	Yes/ No	Elementary Schools	Middle Schools	High Schools	All Schools
Mean SBP Participation Rate		30.2	21.3	14.6	22.9
Food Purchasing Characteristics					
SFA Uses Alliance for a Healthier Generation or Other Similar Tools for Selecting and Purchasing Healthy Foods	Y	36.2*	25.1*	15.1	25.9*
	N	26.4	18.1	14.2	20.9
SFA Participates in a Food Purchasing Cooperative	Y	28.7	24.7	16.2	22.7
	N	32.1	17.5	12.9	23.2
Schools in SFA Offer Brand-Name or Chain Restaurant Foods	Y	20.1	20.4	12.6	25.4
	N	30.4	21.5	14.9	22.8
School Participates in Farm to School Program	Y	33.9	13.1	18.8	22.9
	N	29.4	23.1	14.0	22.9
Menu Planning and Meal Service Characteristics					
School Uses Cycle Menus	Y	31.6	19.8	12.5*	22.2
	N	26.4	24.0	21.3	24.8
School Participates in the Fresh Fruit and Vegetable Program	Y	25.2	n.a.	n.a.	n.a.
	N	32.3	n.a.	n.a.	n.a.
School Receives Fully or Partially Prepared Meals from a Separate Production or Central Kitchen	Y	32.1	19.0	†	25.1
	N	29.6	21.6		22.5
SFA Uses a Foodservice Management Company	Y	28.1	15.5	11.6	19.1
	N	30.8	23.5	15.5	24.1
School Uses Offer-Versus-Serve at Breakfast	Y	29.2	22.9	13.4*	22.1
	N	35.8	13.9	26.6	27.7
School Accommodates Students with Food Allergies and Special Dietary Needs	Y	31.2	20.5	16.0	23.7
	N	22.0	27.6	8.8	17.7
School Offers Grab-and-Go Option at Breakfast	Y	†	25.9	27.7**	28.2
	N		20.8	12.4	22.4
Students Have Option of Eating Breakfast in the Classroom	Y	42.9*	36.4**	9.1	34.9***
	N	24.2	19.8	15.4	19.7
Price Charged for Paid Breakfast					
School Offered Free Breakfast to All Students		37.6***	15.7	22.7	28.1**
Less than \$1.25 (<i>reference category</i>)		19.9	29.5	18.6	18.5
\$1.25 to \$1.49		29.1	23.0	4.6**	17.6
\$1.50 to \$1.99		23.5	23.2	18.0	23.2
\$2.00 or more		17.3	13.6	16.9	13.9
Number of Students		692	633	664	1,989
Number of Schools		97	82	89	268

Source: School Nutrition and Meal Cost Study, Reimbursable Meal Sales Form, 24-Hour Dietary Recalls: Day 1, School Food Authority Director Survey, School Nutrition Manager Survey, and Cafeteria Observation

Guide, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression-adjusted mean SBP participation rates (as percentages) that control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid breakfast. Variables with rows labeled “Y” and “N” report adjusted mean SBP participation rates within schools that do and do not meet the variable criteria, respectively. Otherwise, regression-adjusted means are reported for each category within a variable. See Appendix C for more details on characteristic descriptions and selection methods.

Difference in participation rates between schools with and without a dichotomous characteristic is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level. For variables containing multiple categories, the difference in participation rates between schools in the corresponding category and schools in the reference category is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

† Variable was excluded from the model due to low within-sample variation or high correlation with another variable that better explained variation in SBP participation.

SBP = School Breakfast Program; SFA = school food authority.

Table D.12. Regression Coefficient Estimates for the Relationships between Student SBP Participation and Key Characteristics of School Foodservice Operations

	Elementary Schools	Middle Schools	High Schools	All Schools
Food Purchasing Characteristics				
SFA Uses Alliance for a Healthier Generation or Other Similar Tools for Selecting and Purchasing Healthy Foods	66.5* (29.6)	58.8* (28.4)	12.1 (45.8)	39.0* (17.7)
SFA Participates in a Food Purchasing Cooperative	-23.0 (24.7)	61.2 (39.8)	43.5 (41.3)	-3.8 (20.0)
Schools in SFA Offer Brand-Name or Chain Restaurant Foods	-76.8 (61.5)	-8.8 (47.6)	-32.4 (52.6)	19.6 (28.6)
School Participates in Farm to School Program	29.7 (43.7)	-95.5 (64.4)	57.3 (46.9)	0.1 (26.1)
Menu Planning and Meal Service Characteristics				
School Uses Cycle Menus	35.5 (35.6)	-35.3 (47.5)	-104.4* (40.3)	-19.5 (24.7)
School Participates in the Fresh Fruit and Vegetable Program	-49.7 (36.7)	n.a. n.a.	n.a. n.a.	n.a. n.a.
School Receives Fully or Partially Prepared Meals from a Separate Production or Central Kitchen	16.9 (31.3)	-22.7 (53.2)	†	19.8 (21.4)
SFA Uses a Foodservice Management Company	-18.3 (35.5)	-72.0 (43.4)	-54.9 (53.7)	-40.6 (22.1)
School Uses Offer-Versus-Serve at Breakfast	-43.1 (32.3)	84.9 (54.2)	-140.7* (56.9)	-41.5 (23.3)
School Accommodates Students with Food Allergies and Special Dietary Needs	66.2 (51.2)	-57.0 (58.7)	110.5 (63.7)	50.0 (31.3)
School Offers Grab-and-Go Option at Breakfast	†	40.9 (47.5)	163.1** (54.8)	43.4 (23.1)
Students Have Option of Eating Breakfast in the Classroom	113.7* (45.9)	125.5** (37.0)	-97.8 (66.2)	105.8*** (26.2)
Price Charged for Paid Breakfast				
School Offered Free Breakfast to All Students	117.5*** (34.2)	-117.2 (63.9)	38.6 (56.1)	72.1** (26.5)
Less than \$1.25 (<i>reference category</i>)	--0--	--0--	--0--	--0--
\$1.25 to \$1.49	65.9 (45.6)	-50.6 (61.9)	-227.4** (70.0)	-7.4 (32.7)
\$1.50 to \$1.99	27.1 (45.3)	-48.8 (62.2)	-6.5 (57.0)	37.2 (31.7)
\$2.00 or more	-22.3 (102.7)	-140.4 (143.6)	-18.2 (66.1)	-42.8 (58.5)

	Elementary Schools	Middle Schools	High Schools	All Schools
Student Characteristics				
Student Race and Ethnicity				
White, non-Hispanic (reference category)	--0--	--0--	--0--	--0--
Hispanic	45.6 (28.0)	64.8 (54.2)	-57.7 (40.3)	29.8 (19.6)
Black, non-Hispanic	7.2 (45.1)	159.6** (52.7)	116.7** (39.5)	59.7* (25.7)
Other	17.4 (56.1)	71.1 (66.5)	-89.0 (55.9)	30.3 (35.5)
Student Is Female	-29.4 (20.9)	-50.1 (33.8)	-19.4 (34.5)	-26.0 (16.6)
Student Is Certified for Free or Reduced-Price Meals	156.9*** (42.0)	235.0*** (46.7)	134.7* (55.5)	179.8*** (30.5)
Student Is a Picky Eater [Parent-reported]				
Yes, very (reference category)	--0--	--0--	--0--	--0--
Somewhat	42.1 (29.9)	31.6 (46.8)	-18.7 (46.4)	28.8 (21.5)
No	37.4 (30.6)	59.9 (55.5)	38.1 (44.2)	46.6* (20.5)
Amount Student Eats Compared to Students of the Same Age [Parent-reported]				
Larger amount (reference category)	--0--	--0--	--0--	--0--
Same amount	-88.9** (26.5)	-99.9* (42.2)	9.3 (44.6)	-65.3** (19.7)
Smaller amount	-143.3*** (36.8)	-74.0 (75.3)	-47.8 (84.4)	-106.1*** (30.6)
Student Has Food Allergies or Special Dietary Needs	-24.8 (50.5)	-109.1 (60.7)	-71.8 (46.3)	-40.8 (29.5)
Student's Level of Activity Compared to Students of the Same Age [Parent-reported]				
Less active (reference category)	--0--	--0--	--0--	--0--
About as active	59.8 (45.9)	27.2 (48.8)	-29.0 (49.0)	12.5 (26.3)
More active	76.1 (42.3)	58.1 (50.1)	-14.8 (48.8)	40.2 (24.3)
Much more active	47.4 (44.4)	39.6 (58.7)	60.7 (58.4)	47.1 (25.7)

	Elementary Schools	Middle Schools	High Schools	All Schools
School and SFA Characteristics				
Share of Students Approved for Free or Reduced-Price Meals				
Less than 40 percent (reference category)	--0--	--0--	--0--	--0--
40 percent or more	46.7 (37.6)	59.9 (39.5)	-9.2 (37.5)	40.4 (21.5)
Urbanicity				
Urban (reference category)	--0--	--0--	--0--	--0--
Suburban	7.0 (29.4)	1.4 (40.9)	-79.7 (50.0)	8.2 (18.1)
Rural	56.0 (41.2)	-37.3 (45.6)	-113.6 (60.1)	40.2 (23.9)
School Size				
Fewer than 500 students (reference category)	--0--	--0--	--0--	--0--
500 to 999 students	-65.7* (25.4)	-62.6 (34.8)	-154.0* (73.4)	-39.4* (17.8)
1,000 or more students	‡	-105.1 (53.2)	-281.5*** (73.5)	-93.1** (34.1)
FNS Region				
Mid-Atlantic (reference category)	--0--	--0--	--0--	--0--
Northeast	20.4 (59.8)	84.0 (69.4)	284.7** (93.8)	72.6 (40.4)
Southeast	-31.9 (46.9)	-29.9 (55.2)	63.2 (71.7)	-7.4 (31.8)
Midwest	-38.6 (54.0)	-71.8 (59.6)	179.3* (70.5)	-9.2 (34.1)
Southwest	54.1 (55.8)	-17.4 (50.5)	212.0* (88.2)	50.4 (37.6)
Mountain Plains	32.3 (58.4)	-49.0 (99.2)	204.7* (81.3)	58.4 (39.8)
Western	27.8 (48.5)	-34.4 (66.0)	99.7 (79.1)	14.8 (39.8)
Number of Students	692	633	664	1,989
Number of Schools	97	82	89	268

Source: School Nutrition and Meal Cost Study, Reimbursable Meal Sales Form, 24-Hour Dietary Recalls: Day 1, School Food Authority Director Survey, School Nutrition Manager Survey, and Cafeteria Observation Guide, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression coefficients (with standard errors in parentheses) from multivariate models that control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid breakfast. See Appendix C for more details on characteristic descriptions and selection methods.

Relationship between characteristic and participation rate is significantly different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

--0-- = Reference category. Coefficient estimates for mutually exclusive categories are relative to the reference category's participation rate.

† Variable was excluded from the model due to low within-sample variation or high correlation with another variable that better explained variation in SBP participation.

‡ Category was combined with the above category due to sparseness of observations.

FNS = Food and Nutrition Service; SBP = School Breakfast Program; SFA = school food authority.

Table D.13. Relationships between Student SBP Participation and Key Characteristics of the School Food Environment: Regression-Adjusted Mean SBP Participation Rates

	Yes/ No	Elementary Schools	Middle Schools	High Schools	All Schools
Mean SBP Participation Rate		30.2	21.3	14.6	22.9
Wellness Policies and Practices					
SFA Has Nutrition Standards for School Meals that Exceed Federal Standards	Y	41.5***	22.9	13.5	26.9
	N	24.3	20.6	15.2	20.9
School Conducted a Nutrition Education Activity in the Classroom or Foodservice Area	Y	32.0	18.9	11.7	22.2
	N	27.6	24.9	18.6	23.9
Competitive Foods					
School Sells Foods Other than Milk on an A la Carte Basis	Y	29.7	22.1	†	22.2
	N	31.5	15.3		26.1
School Sells Foods and Beverages in Vending Machine	Y	26.2	24.0	14.2	22.4
	N	30.8	18.8	17.3	23.3
School Sells Foods and/or Beverages via a School Store or Snack Bar	Y	29.8	23.7	18.5	24.5
	N	30.3	20.6	12.9	22.4
SFA Has Standards for Competitive Foods that Exceed Smart Snacks in Schools Standards	Y	29.4	25.3	15.2	23.0
	N	30.4	20.1	14.2	22.9
Meal Service Practices					
Length of Breakfast Period					
Less than 25 minutes (<i>reference category</i>)		35.3	24.5	18.9	26.1
25 to 39 minutes		28.7	25.8	14.7	22.9
40 minutes or more		26.2	17.0	10.0	20.6
First Bus Arrives Before or at Same Time as Breakfast	Y	32.6	20.1	14.2	23.9
	N	26.7	24.4	15.4	21.3
Last Bus Arrives Before or at Same Time as Breakfast	Y	28.0	21.2	13.2	22.5
	N	30.7	21.4	14.7	23.0
Number of Students		692	633	664	1,989
Number of Schools		97	82	89	268

Source: School Nutrition and Meal Cost Study, Reimbursable Meal Sales Form, 24-Hour Dietary Recalls: Day 1, School Food Authority Director Survey, School Nutrition Manager Survey, Principal Survey, Vending Machine and Other Sources of Foods and Beverages Checklist, A la Carte Checklist, and Cafeteria Observation Guide, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression-adjusted mean SBP participation rates (as percentages) that control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid breakfast. Variables with rows labeled “Y” and “N” report adjusted mean SBP participation rates within schools that do and do not meet the variable criteria, respectively. Otherwise, regression-adjusted means are reported for each category within a variable. See Appendix C for more details on characteristic descriptions and selection methods.

Difference in participation rates between schools with and without a dichotomous characteristic is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level. For variables containing multiple categories, the difference in participation rates between schools in the corresponding category and schools in the reference category is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

† Variable was excluded from the model due to low within-sample variation or high correlation with another variable that better explained variation in SBP participation.

SBP = School Breakfast Program; SFA = school food authority.

Table D.14. Regression Coefficient Estimates for the Relationships between Student SBP Participation and Key Characteristics of the School Food Environment

	Elementary Schools	Middle Schools	High Schools	All Schools
Wellness Policies and Practices				
SFA Has Nutrition Standards for School Meals that Exceed Federal Standards	114.2*** (32.5)	18.7 (35.4)	-22.3 (46.5)	45.1 (22.8)
School Conducted a Nutrition Education Activity in the Classroom or Foodservice Area	29.7 (25.3)	-49.4 (31.0)	-90.2 (50.6)	-12.5 (19.0)
Competitive Foods				
School Sells Foods Other than Milk on an A la Carte Basis	-12.3 (26.5)	60.6 (39.5)	†	-28.9 (26.3)
School Sells Foods and Beverages in Vending Machine	-31.8 (39.9)	43.1 (33.6)	-38.8 (55.7)	-6.6 (23.2)
School Sells Foods and/or Beverages via a School Store or Snack Bar	-3.9 (38.1)	24.9 (35.3)	67.9 (39.8)	16.0 (20.0)
SFA Has Standards for Competitive Foods that Exceed Smart Snacks in Schools Standards	-7.3 (39.2)	41.8 (38.3)	13.5 (43.8)	1.0 (24.0)
Meal Service Practices				
Length of Breakfast Period				
Less than 25 minutes (<i>reference category</i>)	--0--	--0--	--0--	--0--
25 to 39 minutes	-42.6 (29.5)	9.7 (38.0)	-51.9 (56.4)	-23.1 (23.5)
40 minutes or more	-59.6 (38.4)	-64.9 (39.7)	-122.3 (68.9)	-41.6 (26.5)
First Bus Arrives Before or at Same Time as Breakfast	40.1 (44.3)	-34.7 (40.8)	-15.8 (43.8)	19.8 (21.9)
Last Bus Arrives Before or at Same Time as Breakfast	-18.4 (44.9)	-1.6 (42.4)	-19.9 (102.4)	-4.3 (29.9)
Student Characteristics				
Student Race and Ethnicity				
White, non-Hispanic (<i>reference category</i>)	--0--	--0--	--0--	--0--
Hispanic	55.9* (26.7)	73.6 (52.2)	-54.6 (43.9)	32.0 (19.9)
Black, non-Hispanic	-21.1 (43.5)	129.5* (50.8)	121.6** (42.9)	46.3 (26.6)
Other	18.0 (56.0)	93.5 (69.8)	-54.1 (45.7)	36.0 (36.0)
Student Is Female	-26.9 (21.1)	-54.0 (32.8)	-16.1 (34.4)	-25.3 (16.2)
Student Is Certified for Free or Reduced-Price Meals	158.5*** (41.0)	237.4*** (48.3)	129.6* (59.2)	173.8*** (28.2)

	Elementary Schools	Middle Schools	High Schools	All Schools
Student Is a Picky Eater [Parent-reported]				
Yes, very (reference category)	--0--	--0--	--0--	--0--
Somewhat	26.8 (29.4)	17.2 (45.8)	-23.4 (45.2)	19.9 (20.7)
No	17.5 (31.6)	46.7 (54.4)	23.4 (40.0)	34.3 (20.3)
Amount Student Eats Compared to Students of the Same Age [Parent-reported]				
Larger amount (reference category)	--0--	--0--	--0--	--0--
Same amount	-89.7*** (26.2)	-92.0* (41.9)	13.7 (44.6)	-66.3*** (19.4)
Smaller amount	-154.7*** (38.0)	-46.5 (76.2)	-45.0 (79.4)	-104.1** (31.1)
Student Has Food Allergies or Special Dietary Needs	-33.3 (45.4)	-94.5 (52.9)	-83.3 (44.4)	-39.9 (28.5)
Student's Level of Activity Compared to Students of the Same Age [Parent-reported]				
Less active (reference category)	--0--	--0--	--0--	--0--
About as active	65.6 (48.1)	32.6 (48.4)	-25.2 (51.0)	14.2 (27.6)
More active	89.0* (43.1)	71.5 (49.0)	-20.1 (49.4)	46.9 (25.1)
Much more active	61.9 (49.0)	46.2 (58.9)	69.5 (57.9)	46.3 (27.0)
School and SFA Characteristics				
Share of Students Approved for Free or Reduced-Price Meals				
Less than 40 percent (reference category)	--0--	--0--	--0--	--0--
40 percent or more	74.2* (36.0)	60.3 (38.3)	17.8 (45.5)	44.4 (23.0)
Urbanicity				
Urban (reference category)	--0--	--0--	--0--	--0--
Suburban	51.6 (34.5)	-29.1 (35.0)	14.8 (46.5)	11.8 (19.4)
Rural	64.2 (39.0)	-25.4 (41.9)	-4.7 (50.2)	36.6 (24.7)
School Size				
Fewer than 500 students (reference category)	--0--	--0--	--0--	--0--
500 to 999 students	-46.1 (24.6)	-46.5 (40.8)	-70.2 (64.9)	-42.8* (17.5)
1,000 or more students	‡	-131.1*	-162.3*	-73.7*

	Elementary Schools	Middle Schools	High Schools	All Schools
FNS Region		(55.7)	(66.4)	(31.3)
Mid-Atlantic (reference category)				
Northeast	--0--	--0--	--0--	--0--
	-97.4	21.5	298.5**	-34.0
Southeast	(82.5)	(65.4)	(92.3)	(43.8)
	-108.6*	31.8	128.8	-50.3
Midwest	(52.8)	(55.9)	(77.2)	(33.9)
	-118.5*	-47.9	121.2	-55.8
Southwest	(57.4)	(66.4)	(72.6)	(32.7)
	-47.2	39.3	177.3*	-18.6
Mountain Plains	(54.2)	(62.4)	(69.4)	(31.8)
	-30.5	2.2	234.1*	57.8
Western	(68.6)	(95.9)	(101.8)	(48.7)
	-114.8*	21.9	155.2*	-42.4
Price Charged for Paid Lunches				
School Offered Free Breakfast to All Students	133.4***	-111.8**	151.7*	72.3**
	(34.0)	(39.9)	(63.8)	(27.1)
Less than \$1.25 (reference category)	--0--	--0--	--0--	--0--
\$1.25 to \$1.49	20.5	-13.9	-78.9	-23.5
	(47.5)	(41.5)	(70.7)	(28.5)
\$1.50 to \$1.99	31.4	2.1	41.5	24.2
	(44.6)	(43.4)	(76.7)	(32.5)
Number of Students	692	633	664	1,989
Number of Schools	97	82	89	268

Source: School Nutrition and Meal Cost Study, Reimbursable Meal Sales Form, 24-Hour Dietary Recalls: Day 1, School Food Authority Director Survey, School Nutrition Manager Survey, Principal Survey, Vending Machine and Other Sources of Foods and Beverages Checklist, A la Carte Checklist, and Cafeteria Observation Guide, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression coefficients (with standard errors in parentheses) from multivariate models that control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid breakfast. See Appendix C for more details on characteristic descriptions and selection methods.

Relationship between characteristic and participation rate is significantly different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

--0-- = Reference category. Coefficient estimates for mutually exclusive categories are relative to the reference category's participation rate.

† Variable was excluded from the model due to low within-sample variation or high correlation with another variable that better explained variation in SBP participation.

‡ Category was combined with the above category due to sparseness of observations.

FNS = Food and Nutrition Service; SBP = School Breakfast Program; SFA = school food authority.

Table D.15. Relationships between Student SBP Participation and Characteristics of the Students, Schools, and SFAs: Regression-Adjusted Mean SBP Participation Rates

	Yes/ No	Elementary Schools	Middle Schools	High Schools	All Schools
Mean SBP Participation Rate		30.2	21.3	14.6	22.9
Student Characteristics					
Student Race and Ethnicity					
White, non-Hispanic (<i>reference category</i>)		27.3	15.1	14.4	20.2
Hispanic		35.9*	24.0	10.6	24.4
Black, non-Hispanic		24.4	32.2*	26.3**	26.4
Other		30.0	26.8	10.6	25.0
Student Is Female	Y N	28.1 32.2	18.1 24.7	13.9 15.2	21.2 24.6
Student Is Certified for Free or Reduced-Price Meals	Y N	35.9*** 13.5	32.3*** 5.9	19.2* 8.6	30.6*** 8.8
Student Is a Picky Eater [Parent-reported]					
Yes, very (<i>reference category</i>)		27.6	19.0	14.6	20.5
Somewhat		31.5	21.1	12.9	23.0
No		30.1	24.8	16.6	25.0
Amount Student Eats Compared to Students of the Same Age [Parent-reported]					
Larger amount (<i>reference category</i>)		42.5	28.3	14.3	29.8
Same amount		27.9***	16.8*	15.4	20.6***
Smaller amount		19.0***	22.1	11.2	16.1**
Student Has Food Allergies or Special Dietary Needs	Y N	25.8 30.7	12.1 22.0	9.5 15.1	18.4 23.3
Student's Level of Activity Compared to Students of the Same Age [Parent-reported]					
Less active (<i>reference category</i>)		21.3	16.7	15.0	19.6
About as active		30.5	20.4	13.1	21.4
More active		34.1*	25.3	13.5	25.7
Much more active		29.9	22.0	21.5	25.6
School and SFA Characteristics					
Share of Students Approved for Free or Reduced-Price Meals					
Less than 40 percent (<i>reference category</i>)		21.7	16.2	13.9	18.8
40 percent or more		32.4*	23.2	15.3	24.6
Urbanicity					
Urban (<i>reference category</i>)		24.9	23.6	14.2	21.2
Suburban		32.1	20.0	15.4	22.7
Rural		34.0	20.4	13.9	26.0

	Yes/ No	Elementary Schools	Middle Schools	High Schools	All Schools
School Size					
Fewer than 500 students (<i>reference category</i>)		34.7	27.9	27.0	28.2
500 to 999 students		27.7	21.7	19.1	22.2*
1,000 or more students		‡	12.7*	11.3*	18.3*
FNS Region					
Mid-Atlantic (<i>reference category</i>)		43.6	19.9	5.8	27.1
Northeast		27.9	22.6	30.9**	22.4
Southeast		26.2*	23.9	13.1	20.3
Midwest		24.8*	14.7	12.5	19.6
Southwest		35.7	24.9	17.1*	24.4
Mountain Plains		38.5	20.2	22.9*	36.0
Western		25.3*	22.6	15.2*	21.3
Price Charged for Paid Breakfast					
School Offered Free Breakfast to All Students		42.4***	13.6**	28.6*	29.8**
Less than \$1.25 (<i>reference category</i>)		20.6	25.9	12.3	19.5
\$1.25 to \$1.49		23.5	24.2	7.3	16.6
\$1.50 to \$1.99		25.1	26.2	15.8	22.6
\$2.00 or more		5.9	20.3	9.2	8.6
Number of Students		692	633	664	1,989
Number of Schools		97	82	89	268

Source: School Nutrition and Meal Cost Study, Reimbursable Meal Sales Form, 24-Hour Dietary Recalls: Day 1, Child/Youth Interview, Parent Interview, School Food Authority Director Survey, Common Core of Data (CCD) 2011-2012, 2011 U.S. Census Bureau's Small Area Income and Poverty Estimates school district file, and Food and Nutrition Service's SFA Verification Summary Report 2012-2013, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression-adjusted mean SBP participation rates (as percentages) that control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid breakfast. Variables with rows labeled "Y" and "N" report adjusted mean SBP participation rates within schools that do and do not meet the variable criteria, respectively. Otherwise, regression-adjusted means are reported for each category within a variable. See Appendix C for more details on characteristic descriptions and selection methods.

Difference in participation rates between schools with and without a dichotomous characteristic is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level. For variables containing multiple categories, the difference in participation rates between schools in the corresponding category and schools in the reference category is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

‡ Category was combined with the above category due to sparseness of observations.

FNS = Food and Nutrition Service; SBP = School Breakfast Program; SFA = school food authority.

Table D.16. Regression Coefficient Estimates for the Relationships between Student SBP Participation and Characteristics of the Students, Schools, and SFAs

	Elementary Schools	Middle Schools	High Schools	All Schools
Student Characteristics				
Student Race and Ethnicity				
White, non-Hispanic (reference category)	--0--	--0--	--0--	--0--
Hispanic	55.9* (26.7)	73.6 (52.2)	-54.6 (43.9)	32.0 (19.9)
Black, non-Hispanic	-21.1 (43.5)	129.5* (50.8)	121.6** (42.9)	46.3 (26.6)
Other	18.0 (56.0)	93.5 (69.8)	-54.1 (45.7)	36.0 (36.0)
Student Is Female	-26.9 (21.1)	-54.0 (32.8)	-16.1 (34.4)	-25.3 (16.2)
Student Is Certified for Free or Reduced-Price Meals	158.5*** (41.0)	237.4*** (48.3)	129.6* (59.2)	173.8*** (28.2)
Student Is a Picky Eater [Parent-reported]				
Yes, very (<i>reference category</i>)	--0--	--0--	--0--	--0--
Somewhat	26.8 (29.4)	17.2 (45.8)	-23.4 (45.2)	19.9 (20.7)
No	17.5 (31.6)	46.7 (54.4)	23.4 (40.0)	34.3 (20.3)
Amount Student Eats Compared to Students of the Same Age [Parent-reported]				
Larger amount (<i>reference category</i>)	--0--	--0--	--0--	--0--
Same amount	-89.7*** (26.2)	-92.0* (41.9)	13.7 (44.6)	-66.3*** (19.4)
Smaller amount	-154.7*** (38.0)	-46.5 (76.2)	-45.0 (79.4)	-104.1** (31.1)
Student Has Food Allergies or Special Dietary Needs	-33.3 (45.4)	-94.5 (52.9)	-83.3 (44.4)	-39.9 (28.5)
Student's Level of Activity Compared to Students of the Same Age [Parent-reported]				
Less active (<i>reference category</i>)	--0--	--0--	--0--	--0--
About as active	65.6 (48.1)	32.6 (48.4)	-25.2 (51.0)	14.2 (27.6)
More active	89.0* (43.1)	71.5 (49.0)	-20.1 (49.4)	46.9 (25.1)
Much more active	61.9 (49.0)	46.2 (58.9)	69.5 (57.9)	46.3 (27.0)

	Elementary Schools	Middle Schools	High Schools	All Schools
School and SFA Characteristics				
Share of Students Approved for Free or Reduced-Price Meals				
Less than 40 percent (<i>reference category</i>)	--0--	--0--	--0--	--0--
40 percent or more	74.2* (36.0)	60.3 (38.3)	17.8 (45.5)	44.4 (23.0)
Urbanicity				
Urban (<i>reference category</i>)	--0--	--0--	--0--	--0--
Suburban	51.6 (34.5)	-29.1 (35.0)	14.8 (46.5)	11.8 (19.4)
Rural	64.2 (39.0)	-25.4 (41.9)	-4.7 (50.2)	36.6 (24.7)
School Size				
Fewer than 500 students (<i>reference category</i>)	--0--	--0--	--0--	--0--
500 to 999 students	-46.1 (24.6)	-46.5 (40.8)	-70.2 (64.9)	-42.8* (17.5)
1,000 or more students	‡	-131.1* (55.7)	-162.3* (66.4)	-73.7* (31.3)
FNS Region				
Mid-Atlantic (<i>reference category</i>)	--0--	--0--	--0--	--0--
Northeast	-97.4 (82.5)	21.5 (65.4)	298.5** (92.3)	-34.0 (43.8)
Southeast	-108.6* (52.8)	31.8 (55.9)	128.8 (77.2)	-50.3 (33.9)
Midwest	-118.5* (57.4)	-47.9 (66.4)	121.2 (72.6)	-55.8 (32.7)
Southwest	-47.2 (54.2)	39.3 (62.4)	177.3* (69.4)	-18.6 (31.8)
Mountain Plains	-30.5 (68.6)	2.2 (95.9)	234.1* (101.8)	57.8 (48.7)
Western	-114.8* (52.7)	21.9 (56.4)	155.2* (76.3)	-42.4 (35.7)
Price Charged for Paid Breakfast				
School Offered Free Breakfast to All Students	133.4*** (34.0)	-111.8** (39.9)	151.7* (63.8)	72.3** (27.1)
Less than \$1.25 (<i>reference category</i>)	--0--	--0--	--0--	--0--
\$1.25 to \$1.49	20.5 (47.5)	-13.9 (41.5)	-78.9 (70.7)	-23.5 (28.5)
\$1.50 to \$1.99	31.4 (44.6)	2.1 (43.4)	41.5 (76.7)	24.2 (32.5)
\$2.00 or more	-165.3 (108.3)	-46.4 (93.5)	-44.1 (58.2)	-112.6 (60.6)

	Elementary Schools	Middle Schools	High Schools	All Schools
Number of Students	692	633	664	1,989
Number of Schools	97	82	89	268

Source: School Nutrition and Meal Cost Study, Reimbursable Meal Sales Form, 24-Hour Dietary Recalls: Day 1, Child/Youth Interview, Parent Interview, School Food Authority Director Survey, School Food Authority Director Survey, School Nutrition Manager Survey, Principal Survey, Vending Machine and Other Sources of Foods and Beverages Checklist, A la Carte Checklist, and Cafeteria Observation Guide, Common Core of Data (CCD) 2011-2012, 2011 U.S. Census Bureau's Small Area Income and Poverty Estimates school district file, and Food and Nutrition Service's SFA Verification Summary Report 2012-2013, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression coefficients (with standard errors in parentheses) from multivariate models that control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid breakfast. See Appendix C for more details on characteristic descriptions and selection methods.

Relationship between characteristic and participation rate is significantly different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

--0-- = Reference category. Coefficient estimates for mutually exclusive categories are relative to the reference category's participation rate.

‡ Category was combined with the above category due to sparseness of observations.

FNS = Food and Nutrition Service; SBP = School Breakfast Program; SFA = school food authority.

Table D.17. Relationships between Student Awareness of Which Students Receive Free or Reduced-Price Meals and Key Characteristics of Students, Schools, and SFAs: Regression-Adjusted Percentage

	Elementary Schools	Middle Schools	High Schools	All Schools
Percentage of Students Who Are Aware of Which Students Receive Free or Reduced-Price Meals	17.8	24.1	18.2	19.4
Student Characteristics				
Student Race and Ethnicity				
White, non-Hispanic (<i>reference category</i>)	15.6	22.6	17.9	18.3
Hispanic	18.6	19.8	20.4	18.6
Black, non-Hispanic	22.9	28.1	21.0	22.4
Other	37.1*	42.6	11.3	24.4
Student Is Female	19.1	25.6	14.1*	17.9
	19.5	22.6	22.7	20.9
Student Is Certified for Free or Reduced-Price Meals	17.0	24.3	23.0*	20.2
	23.7	23.8	15.4	18.6
School and SFA Characteristics				
Share of Students Approved for Free or Reduced-Price Meals				
Less than 40 percent (<i>reference category</i>)	13.6	13.2	13.9	14.6
40 percent or more	21.5	30.3**	24.8*	22.9**
Urbanicity				
Urban (<i>reference category</i>)	24.9	25.6	14.3	20.3
Suburban	19.7	20.7	22.6	20.0
Rural	13.6	28.0	13.4	17.5
School Size				
Fewer than 500 students (<i>reference category</i>)	19.5	34.2	19.5	20.8
500 to 999 students	19.2	21.4	19.7	19.2
1,000 or more students		23.5	17.5	19.0
FNS Region				
Mid-Atlantic (<i>reference category</i>)	19.5	42.6	15.4	24.0
Northeast	†	25.4	11.8	8.0*
Southeast	12.0	19.4*	20.6	19.9
Midwest	28.7	16.2*	19.8	18.3
Southwest	19.3	28.5	20.4	21.8
Mountain Plains	22.4	39.7	13.0	18.3
Western	19.9	16.7	17.3	18.6
Meal Service Characteristics				
Price Charged for Paid Lunches				
\$2.25 or less (<i>reference category</i>)	21.4	28.0	17.6	20.7
\$2.26 to \$2.50	7.0	22.6	24.4	17.4
\$2.51 to \$2.75	19.2	29.4	16.1	21.2
More than \$2.75	36.3	13.5	16.6	15.9

	Elementary Schools	Middle Schools	High Schools	All Schools
School Uses Offer-Versus-Serve at Lunch	19.9 16.5	24.7 18.1	†	†
Competitive Foods				
School Sells Foods Other than Milk on an A la Carte Basis	22.0* 9.2	24.7 18.4	†	20.7* 10.3
School Sells Foods and Beverages in Vending Machine	13.6 20.2	19.2 28.5	16.4 28.5	16.9 22.2
School Sells Foods and/or Beverages via a School Store or Snack Bar	15.3 21.1	25.8 23.7	21.7 16.9	19.3 19.4
Schools in SFA Offer Brand-Name or Chain Restaurant Foods	10.3 19.5	48.5* 21.3	23.8 17.6	26.0 18.8
Number of Students	290	393	483	1,166
Number of Schools	83	75	80	238

Source: School Nutrition and Meal Cost Study, Child/Youth Interview, Parent Interview, School Food Authority Director Survey, School Nutrition Manager Survey, Vending Machine and Other Sources of Foods and Beverages Checklist, A la Carte Checklist, Common Core of Data (CCD) 2011-2012, 2011 U.S. Census Bureau's Small Area Income and Poverty Estimates school district file, and Food and Nutrition Service's SFA Verification Summary Report 2012-2013, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression-adjusted mean percentages of students who are aware of which students receive free or reduced-price meals. Estimates control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid lunch. Variables with rows labeled "Y" and "N" report adjusted mean percentages within schools that do and do not meet the variable criteria, respectively. Otherwise, regression-adjusted mean percentages are reported for each category within a variable. See Appendix C for more details on characteristic descriptions and selection methods.

Difference in student awareness between schools with and without a dichotomous characteristic is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level. For variables containing multiple categories, the difference in student awareness between schools in the corresponding category and schools in the reference category is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

† Variable was excluded from the model due to low within-sample variation or high correlation with another variable that better explained variation in awareness of which students receive free or reduced-price meals.

FNS = Food and Nutrition Service; SFA = school food authority.

Table D.18. Regression Coefficient Estimates for the Relationships between Student Awareness of Which Students Receive Free or Reduced-Price Meals and Key Characteristics of Students, Schools, and SFAs

	Elementary Schools	Middle Schools	High Schools	All Schools
Student Characteristics				
Student Race and Ethnicity				
White, non-Hispanic (<i>reference category</i>)	--0--	--0--	--0--	--0--
Hispanic	23.3 (37.5)	-18.8 (46.9)	17.1 (51.9)	2.6 (22.2)
Black, non-Hispanic	51.9 (62.1)	32.8 (52.9)	20.8 (60.9)	26.4 (28.8)
Other	131.5* (61.2)	107.6 (77.9)	-56.9 (52.7)	38.5 (32.5)
Student Is Female	-2.9 (53.7)	18.8 (41.3)	-62.2* (30.6)	-19.8 (20.6)
Student Is Certified for Free or Reduced-Price Meals	-47.3 (53.4)	3.3 (34.2)	53.1* (24.1)	11.1 (21.4)
School and SFA Characteristics				
Share of Students Approved for Free or Reduced-Price Meals				
Less than 40 percent (<i>reference category</i>)	--0--	--0--	--0--	--0--
40 percent or more	62.7 (47.8)	119.1** (37.9)	75.5* (30.2)	56.7** (20.1)
Urbanicity				
Urban (<i>reference category</i>)	--0--	--0--	--0--	--0--
Suburban	-34.8 (47.0)	-31.6 (38.0)	60.5 (59.2)	-1.8 (25.4)
Rural	-84.6 (57.8)	14.7 (40.6)	-8.2 (65.7)	-18.7 (26.9)
School Size				
Fewer than 500 students (<i>reference category</i>)	--0--	--0--	--0--	--0--
500 to 999 students	-1.8 (46.8)	-75.6 (53.3)	1.1 (59.9)	-10.9 (22.9)
1,000 or more students	‡	-61.9 (65.7)	-14.0 (50.7)	-12.3 (31.2)

	Elementary Schools	Middle Schools	High Schools	All Schools
FNS Region				
Mid-Atlantic (<i>reference category</i>)	--0--	--0--	--0--	--0--
Northeast	‡	-92.9 (68.9)	-32.4 (97.2)	-132.3* (62.3)
Southeast	-64.6 (106.4)	-132.7* (60.0)	37.9 (58.2)	-25.0 (38.6)
Midwest	58.5 (70.8)	-157.9* (60.9)	33.0 (56.2)	-35.3 (36.2)
Southwest	-2.0 (74.0)	-74.7 (52.4)	36.7 (74.1)	-13.1 (39.6)
Mountain Plains	19.8 (80.1)	-14.5 (58.2)	-20.7 (80.6)	-35.9 (49.1)
Western	2.3 (75.5)	-153.8 (88.6)	15.0 (67.3)	-33.3 (43.1)
Meal Service Characteristics				
Price Charged for Paid Lunches				
\$2.25 or less (<i>reference category</i>)	--0--	--0--	--0--	--0--
\$2.26 to \$2.50	-137.7* (56.8)	-32.4 (40.5)	44.2 (45.0)	-21.8 (23.5)
\$2.51 to \$2.75	-15.0 (46.6)	7.5 (37.5)	-11.9 (46.1)	3.5 (25.9)
More than \$2.75	82.6 (73.9)	-101.0 (56.5)	-7.5 (46.4)	-33.6 (30.4)
School Uses Offer-Versus-Serve at Lunch	25.7 (52.3)	44.6 (57.7)	†	†
Competitive Foods				
School Sells Foods Other than Milk on an A la Carte Basis	111.2* (46.0)	42.6 (55.9)	†	84.0* (39.9)
School Sells Foods and Beverages in Vending Machine	-52.9 (75.7)	-60.2 (33.2)	-76.2 (39.6)	-35.4 (20.7)
School Sells Foods and/or Beverages via a School Store or Snack Bar	-43.6 (42.3)	13.4 (46.7)	33.2 (42.4)	-0.7 (22.5)
Schools in SFA Offer Brand-Name or Chain Restaurant Foods	-81.9 (79.3)	146.4* (66.9)	41.7 (49.1)	43.7 (26.3)
Number of Students	290	393	483	1,166
Number of Schools	83	75	80	238

Source: School Nutrition and Meal Cost Study, Child/Youth Interview, Parent Interview, School Food Authority Director Survey, School Nutrition Manager Survey, Vending Machine and Other Sources of Foods and Beverages Checklist, A la Carte Checklist, Common Core of Data (CCD) 2011-2012, 2011 U.S. Census Bureau's Small Area Income and Poverty Estimates school district file, and Food and Nutrition Service's SFA Verification Summary Report 2012-2013, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression coefficients (with standard errors in parentheses) from multivariate models that control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid lunch. See Appendix C for more details on characteristic descriptions and selection methods.

Relationship between characteristic and student awareness rate is significantly different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

--0-- = Reference category. Coefficient estimates for mutually exclusive categories are relative to the reference category's awareness rate.

† Variable was excluded from the model due to low within-sample variation or high correlation with another variable that better explained variation in awareness of which students receive free or reduced-price meals.

‡ Category was combined with the above category due to sparseness of observations.

FNS = Food and Nutrition Service; SFA = school food authority.

Table D.19 Relationships between Student Satisfaction with NSLP Lunches and Key Characteristics of the Lunches: Regression-Adjusted Mean Satisfaction Rates

	Yes/ No	Elementary Schools	Middle Schools	High Schools	All Schools
Mean Percentage of Students Satisfied with School Lunch		46.9	31.0	21.3	35.9
Nutritional Quality of Prepared NSLP Lunches					
Total HEI-2010 Score of Average Lunch Prepared					
Lowest Quartile—64.9 to 79.5 points (<i>reference category</i>)		48.5	20.0	27.6	35.4
Second Quartile—79.6 to 83.0 points		49.9	37.4**	16.9	39.9
Third Quartile—83.1 to 85.7 points		47.5	34.9*	20.0	35.9
Highest Quartile—85.8 to 92.8 points		42.0	37.6*	21.2	32.9
Compliance of Daily and Weekly Lunch Menus with NSLP Nutrition Standards					
Met Daily Quantity Requirement for Grains	Y	47.7	36.2	10.2	35.7
	N	45.6	27.0	25.7	36.2
Met Daily Quantity Requirement for Meats/Meat Alternates	Y	46.2	31.9*	†	34.9
	N	54.9	14.0		40.2
Met Daily Quantity Requirement for Vegetables	Y	42.7	32.3	†	35.2
	N	52.9	27.3		37.4
Met Weekly Quantity Requirement for Meats/Meat Alternates	Y	50.2	26.8*	19.0	35.5
	N	42.0	37.0	22.7	36.4
Met Weekly Quantity Requirement for Vegetables	Y	50.9	31.6	27.2***	37.3
	N	36.2	26.6	8.8	31.4
Met Requirement that at Least Half of Weekly Grains Are Whole Grain-Rich	Y	47.4	29.7	21.9	36.2
	N	37.7	46.1	15.9	32.6
Met Minimum Calorie Level	Y	48.0	28.5	18.4	36.1
	N	42.5	40.2	22.3	35.6
Met Maximum Calorie Level	Y	50.1	31.8	21.6	36.9
	N	42.3	29.4	19.6	34.0
Met Target 1 Sodium Limit	Y	43.1**	27.4*	19.9	34.4
	N	63.7	48.7	26.1	41.7
Types of Foods Offered in Lunch Menus					
All Daily Menus Offered Raw Vegetables	Y	45.8	31.6	24.1	35.4
	N	47.8	30.0	15.9	36.5
Median Number of Vegetable Choices Offered per Day					
2 or fewer (<i>reference category</i>)		42.2	33.0	30.9	33.2
3 to 4		50.4	32.4	20.6	35.6
5 or more		79.4**	27.3	17.4	45.0
More than Half of Daily Menus Offered Dark Green Vegetables or Legumes	Y	43.0	27.3	21.0	34.1
	N	49.5	39.4	21.8	37.8

	Yes/ No	Elementary Schools	Middle Schools	High Schools	All Schools
More than Half of Daily Menus Offered Red and Orange Vegetables	Y	47.5	39.7**	24.6	39.5
	N	46.6	20.0	17.6	32.9
At Least One Daily Menu Offered Side Salad Bar	Y	50.9	23.2	12.3	35.4
	N	46.3	31.9	23.7	36.0
No Daily Menus Offered French Fries or Similar Potato Products	Y	40.9	28.9	18.0	29.4**
	N	50.9	31.5	22.3	39.1
Percentage of Daily Menus that Offered Pizza or Pizza Products					
Less than 20 percent (<i>reference category</i>)		46.7	33.0	11.6	36.6
Between 20 and 99 percent		52.8	36.3	18.4	40.1
100 percent		7.1*	27.9	30.2**	29.7
At Least One Daily Menu Offered Breaded Meat (as Separate Choice or as Part of a Sandwich)	Y	44.0	31.5	17.8**	34.3*
	N	55.8	24.1	48.2	43.2
Number of Students		635	576	500	1,711
Number of Schools		104	90	93	287

Source: School Nutrition and Meal Cost Study, Child/Youth Interview, and Menu Survey, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression-adjusted mean percentages of students who (1) ever ate a school lunch and (2) reported that they “liked” the school lunch (as opposed to not liking the school lunch or considering it to be “only okay”). Estimates control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid lunch. Variables with rows labeled “Y” and “N” report adjusted mean NSLP satisfaction rates within schools that do and do not meet the variable criteria, respectively. Otherwise, regression-adjusted means are reported for each category within a variable. See Appendix C for more details on characteristic descriptions and selection methods.

Difference in satisfaction rates between schools with and without a dichotomous characteristic is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level. For variables containing multiple categories, the difference in satisfaction rates between schools in the corresponding category and schools in the reference category is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

† Variable was excluded from the model due to low within-sample variation or high correlation with another variable that better explained variation in student satisfaction with NSLP lunches.

HEI = Healthy Eating Index; NSLP = National School Lunch Program; SFA = school food authority.

Table D.20. Regression Coefficient Estimates for the Relationships between Student Satisfaction with NSLP Lunches and Key Characteristics of the Lunches

	Elementary Schools	Middle Schools	High Schools	All Schools
Nutritional Quality of Prepared NSLP Lunches				
Total HEI-2010 Score of Average Lunch Prepared				
Lower Quartile (<i>reference category</i>)	--0--	--0--	--0--	--0--
Second Quartile	6.3 (36.3)	111.1** (36.4)	-75.3 (58.3)	21.4 (23.6)
Third Quartile	-4.7 (27.3)	96.7* (42.4)	-51.0 (55.1)	2.5 (26.1)
Upper Quartile	-29.4 (27.0)	111.7* (51.2)	-42.1 (55.0)	-12.8 (26.5)
Compliance of Daily and Weekly Lunch Menus with NSLP Nutrition Standards				
Met Daily Quantity Requirement for Grains	9.4 (23.0)	55.1 (35.8)	-133.1 (79.4)	-2.5 (15.7)
Met Daily Quantity Requirement for Meats/Meat Alternates	-39.1 (39.5)	130.0* (64.9)	†	-25.6 (22.8)
Met Daily Quantity Requirement for Vegetables	-46.6 (34.1)	30.3 (71.2)	†	-11.0 (20.6)
Met Weekly Quantity Requirement for Meats/Meat Alternates	37.3 (28.7)	-60.6* (27.5)	-26.0 (31.8)	-4.5 (18.6)
Met Weekly Quantity Requirement for Vegetables	68.4 (38.5)	31.0 (79.4)	156.4*** (43.6)	29.3 (22.9)
Met Requirement that at Least Half of Weekly Grains Are Whole Grain-Rich	44.7 (45.3)	-91.5 (48.6)	45.5 (74.8)	17.6 (32.8)
Met Minimum Calorie Level	25.0 (35.6)	-68.1 (40.1)	-28.3 (40.9)	2.2 (20.0)
Met Maximum Calorie Level	35.5 (24.7)	14.4 (48.9)	14.3 (97.6)	14.5 (16.3)
Met Target 1 Sodium Limit	-95.2** (33.1)	-123.1* (54.8)	-42.1 (44.4)	-35.1 (18.5)
Types of Foods Offered in Lunch Menus				
All Daily Menus Offered Raw Vegetables	-9.0 (29.4)	9.3 (32.5)	61.1 (45.9)	-5.3 (18.3)
Median Number of Vegetable Choices Offered per Day				
2 or fewer (<i>reference category</i>)	--0--	--0--	--0--	--0--
3 to 4	36.8 (28.9)	-3.3 (49.9)	-66.9 (52.4)	12.1 (22.1)
5 or more	184.8** (70.1)	-35.1 (57.3)	-91.9 (65.0)	56.9 (33.2)

	Elementary Schools	Middle Schools	High Schools	All Schools
More than Half of Daily Menus Offered Dark Green Vegetables or Legumes	-29.4 (24.4)	-71.5 (40.6)	-5.6 (33.4)	-18.2 (14.6)
More than Half of Daily Menus Offered Red and Orange Vegetables	3.8 (27.9)	118.5** (37.9)	50.8 (31.1)	32.3 (17.9)
At Least One Daily Menu Offered Side Salad Bar	20.8 (32.9)	-54.8 (59.2)	-95.7 (67.9)	-2.8 (20.7)
No Daily Menus Offered French Fries or Similar Potato Products	-45.2 (27.0)	-15.8 (34.4)	-31.7 (38.9)	-48.9** (15.7)
Percentage of Daily Menus that Offered Pizza or Pizza Products				
Less than 20 percent (<i>reference category</i>)	--0--	--0--	--0--	--0--
Between 20 and 99 percent	27.1 (27.1)	18.9 (18.9)	64.2 (64.2)	16.8 (16.8)
100 percent	-265.5* (104.0)	-30.4 (54.8)	145.4** (53.7)	-34.5 (28.9)
At Least One Daily Menu Offered Breaded Meat (as Separate Choice or as Part of a Sandwich)	-52.9 (28.2)	46.4 (69.8)	-181.0** (63.3)	-42.6* (19.0)
Student Characteristics				
Student Race and Ethnicity				
White, non-Hispanic (<i>reference category</i>)	--0--	--0--	--0--	--0--
Hispanic	17.6 (31.2)	51.7 (50.6)	-53.2 (44.0)	13.3 (17.2)
Black, non-Hispanic	10.3 (35.1)	3.1 (42.6)	94.2 (48.9)	18.5 (23.5)
Other	-31.1 (36.0)	65.7 (55.6)	-42.8 (47.3)	-4.3 (20.4)
Student Is Female	-35.2 (18.8)	-58.5* (23.2)	-63.8 (36.9)	-43.8*** (12.4)
Student Is Certified for Free or Reduced-Price Meals	29.7 (24.3)	70.7* (32.2)	2.0 (42.9)	24.5 (17.2)
Student Is a Picky Eater [Parent-reported]				
Yes, very (<i>reference category</i>)	--0--	--0--	--0--	--0--
Somewhat	15.9 (26.1)	44.1 (35.6)	9.3 (43.6)	19.3 (17.9)
No	28.8 (32.0)	35.2 (34.1)	25.9 (52.6)	27.0 (20.7)
Amount Student Eats Compared to Students of the Same Age [Parent-reported]				
Larger amount (<i>reference category</i>)	--0--	--0--	--0--	--0--
Same amount	0.8 (23.4)	-57.3 (39.0)	3.2 (37.0)	-11.9 (17.1)
Smaller amount	-39.7 (43.6)	-53.9 (58.5)	-51.3 (54.1)	-45.0 (29.5)

	Elementary Schools	Middle Schools	High Schools	All Schools
Student Has Food Allergies or Special Dietary Needs	14.5 (36.2)	51.9 (43.6)	61.8 (50.2)	29.1 (22.8)
Student's Level of Activity Compared to Students of the Same Age [Parent-reported]				
Less active (<i>reference category</i>)	--0--	--0--	--0--	--0--
About as active	-31.0 (42.0)	-43.8 (30.0)	10.6 (39.9)	-27.7 (21.1)
More active	-25.6 (45.3)	-78.6 (42.4)	-56.7 (52.9)	-39.3 (23.7)
Much more active	-43.2 (46.3)	41.3 (49.0)	35.3 (52.6)	-14.1 (25.4)
School and SFA Characteristics				
Share of Students Approved for Free or Reduced-Price Meals				
Less than 40 percent (<i>reference category</i>)	--0--	--0--	--0--	--0--
40 percent or more	-61.5* (23.9)	12.8 (34.9)	22.9 (32.2)	-11.0 (17.5)
Urbanicity				
Urban (<i>reference category</i>)	--0--	--0--	--0--	--0--
Suburban	-48.5 (33.1)	59.5 (41.9)	34.1 (43.7)	-22.2 (17.7)
Rural	-42.2 (33.5)	49.3 (49.3)	-89.4 (54.2)	-29.9 (17.0)
School Size				
Fewer than 500 students (<i>reference category</i>)	--0--	--0--	--0--	--0--
500 to 999 students	13.6 (25.8)	46.1 (35.4)	112.1 (126.7)	8.7 (19.6)
1,000 or more students	‡	32.0 (41.3)	173.3 (149.3)	10.9 (23.0)
FNS Region				
Mid-Atlantic (<i>reference category</i>)	--0--	--0--	--0--	--0--
Northeast	20.9 (45.6)	118.8* (56.8)	50.0 (66.1)	51.4 (30.3)
Southeast	-61.4 (47.0)	79.5 (49.3)	68.5 (62.7)	-9.7 (29.5)
Midwest	-53.3 (35.6)	147.0** (50.0)	80.0 (72.6)	-0.2 (24.4)
Southwest	-136.4** (41.3)	98.0 (60.7)	175.1* (75.2)	-24.3 (27.7)
Mountain Plains	-73.3 (50.8)	42.8 (65.5)	60.3 (81.7)	-17.4 (37.2)
Western	-55.7 (45.5)	14.6 (47.3)	74.9 (64.5)	-9.8 (30.6)

	Elementary Schools	Middle Schools	High Schools	All Schools
Price Charged for Paid Lunches				
School Offered Free Lunch to All Students	-34.7 (38.1)	-49.8 (44.4)	-88.7 (71.8)	-42.2 (22.2)
\$2.25 or less (<i>reference category</i>)	--0--	--0--	--0--	--0--
\$2.26 to \$2.50	11.2 (36.1)	2.7 (51.8)	56.6 (39.8)	27.6 (21.7)
\$2.51 to \$2.75	-39.2 (40.7)	-10.9 (38.9)	9.7 (57.7)	-8.2 (26.5)
More than \$2.75	15.5 (51.1)	60.3 (38.4)	-31.5 (50.5)	37.9 (30.3)
Number of Students	635	576	500	1,711
Number of Schools	104	90	93	287

Source: School Nutrition and Meal Cost Study, Child/Youth Interview, and Menu Survey, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression coefficients (with standard errors in parentheses) from multivariate models that control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid lunch. See Appendix C for more details on characteristic descriptions and selection methods.

Relationship between characteristic and satisfaction rate is significantly different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

--0-- = Reference category. Coefficient estimates for mutually exclusive categories are relative to the reference category's satisfaction rate.

† Variable was excluded from the model due to low within-sample variation or high correlation with another variable that better explained variation in student satisfaction with NSLP lunches.

‡ Category was combined with the above category due to sparseness of observations.

HEI = Healthy Eating Index; FNS = Food and Nutrition Service; NSLP = National School Lunch Program; SFA = school food authority.

Table D.21. Relationships between Student Satisfaction with NSLP Lunches and School Foodservice Operations: Regression-Adjusted Mean Student Satisfaction Rates

	Yes/ No	Elementary Schools	Middle Schools	High Schools	All Schools
Mean Percentage of Students Satisfied with School Lunch		46.9	31.0	21.3	35.9
Food Purchasing Characteristics					
SFA Uses Alliance for a Healthier Generation or Other Similar Tools for Selecting and Purchasing Healthy Foods	Y	49.5	33.7	22.2	37.7
	N	45.1	28.3	20.3	34.5
SFA Participates in a Food Purchasing Cooperative	Y	47.6	36.4*	18.7	35.5
	N	46.0	24.1	23.7	36.5
SFA Is Engaged in a Pouring Rights Contract	Y	46.1	36.1	28.5	38.8
	N	47.3	28.5	18.5	34.6
Schools in SFA Offer Brand-Name or Chain Restaurant Foods	Y	44.1	25.7	45.4**	42.7
	N	47.0	31.5	20.1	35.6
School Participates in Farm to School Program	Y	48.5	35.6	25.0	37.7
	N	46.6	30.1	20.7	35.6
Menu Planning and Meal Service Characteristics					
School Uses Cycle Menus	Y	46.8	30.9	18.3*	35.3
	N	47.3	31.2	31.5	37.6
School Participates in the Fresh Fruit and Vegetable Program	Y	48.8	n.a.	n.a.	38.4
	N	46.2	n.a.	n.a.	35.5
School Receives Fully or Partially Prepared Meals from a Separate Production or Central Kitchen	Y	39.7	26.4	†	31.1
	N	49.2	31.7		36.9
SFA Uses a Foodservice Management Company	Y	55.2	44.7**	28.4	41.6
	N	45.2	26.4	18.7	34.4
School Uses Offer-Versus-Serve at Lunch	Y	45.3	30.2	†	36.5
	N	53.2	39.1		34.9
School Accommodates Students with Food Allergies and Special Dietary Needs	Y	45.6	30.5	20.4	35.1
	N	57.4	34.4	38.4	42.8
Number of HealthierUS School Challenge Smarter Lunchroom Techniques Used					
Zero (<i>reference category</i>)		59.4	47.4	32.2	44.0
1		48.4	28.8	9.2*	35.3
2 to 3		45.9	28.8*	26.2	34.3*
4 to 7		38.0*	26.6*	25.8	34.8
Price Charged for Paid Lunches					
School Offered Free Lunch to All Students		39.5	14.6*	6.4*	26.2**
\$2.25 or less (<i>reference category</i>)		51.5	30.0	26.8	37.9
\$2.26 to \$2.50		43.9	31.4	26.4	36.5
\$2.51 to \$2.75		33.1	28.9	18.8	30.9
More than \$2.75		63.6	46.0	14.3	45.3

	Yes/ No	Elementary Schools	Middle Schools	High Schools	All Schools
Number of Students		635	576	500	1,711
Number of Schools		104	90	93	287

Source: School Nutrition and Meal Cost Study, Child/Youth Interview, School Food Authority Director Survey, School Nutrition Manager Survey, and Cafeteria Observation Guide, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression-adjusted mean percentages of students who (1) ever ate a school lunch and (2) reported that they “liked” the school lunch (as opposed to not liking the school lunch or considering it to be “only okay”). Estimates control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid lunch. Variables with rows labeled “Y” and “N” report adjusted mean NSLP satisfaction rates within schools that do and do not meet the variable criteria, respectively. Otherwise, regression-adjusted means are reported for each category within a variable. See Appendix C for more details on characteristic descriptions and selection methods.

Difference in satisfaction rates between schools with and without a dichotomous characteristic is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level. For variables containing multiple categories, the difference in satisfaction rates between schools in the corresponding category and schools in the reference category is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

† Variable was excluded from the model due to low within-sample variation or high correlation with another variable that better explained variation in student satisfaction with NSLP lunches.

FNS = Food and Nutrition Service; NSLP = National School Lunch Program; SFA = school food authority.

Table D.22. Regression Coefficient Estimates for the Relationships between Student Satisfaction with NSLP Lunches and School Foodservice Operations

	Elementary Schools	Middle Schools	High Schools	All Schools
Food Purchasing Characteristics				
SFA Uses Alliance for a Healthier Generation or Other Similar Tools for Selecting and Purchasing Healthy Foods	19.0 (22.8)	30.3 (36.8)	13.2 (32.6)	15.2 (16.5)
SFA Participates in a Food Purchasing Cooperative	7.2 (34.8)	70.2* (30.4)	-32.9 (36.8)	-5.0 (21.6)
SFA Is Engaged in a Pouring Rights Contract	-5.0 (30.4)	41.9 (25.9)	63.4 (36.3)	19.9 (18.4)
Schools in SFA Offer Brand-Name or Chain Restaurant Foods	-12.7 (53.3)	-34.3 (46.8)	138.2** (45.0)	33.1 (27.2)
School Participates in Farm to School Program	7.9 (32.3)	30.0 (34.6)	27.9 (32.0)	10.0 (21.9)
Menu Planning and Meal Service Characteristics				
School Uses Cycle Menus	-2.4 (29.9)	-1.7 (23.7)	-82.7* (38.3)	-11.2 (19.3)
School Participates in the Fresh Fruit and Vegetable Program	11.1 (26.5)	n.a. n.a.	n.a. n.a.	n.a. n.a.
School Receives Fully or Partially Prepared Meals from a Separate Production or Central Kitchen	-41.8 (26.7)	-31.2 (40.3)	†	-28.7 (18.2)
SFA Uses a Foodservice Management Company	43.0 (36.7)	99.8** (37.6)	61.3 (41.8)	33.8 (23.4)
School Uses Offer-Versus-Serve at Lunch	-34.1 (46.5)	-47.7 (61.2)	†	7.6 (29.5)
School Accommodates Students with Food Allergies and Special Dietary Needs	-50.8 (30.5)	-21.8 (55.1)	-103.5 (64.2)	-35.8 (24.5)
Number of HealthierUS School Challenge Smarter Lunchroom Techniques Used				
Zero (<i>reference category</i>)	--0--	--0--	--0--	--0--
1	-47.7 (29.2)	-95.9 (52.4)	-175.5* (71.7)	-40.4 (22.8)
2 to 3	-58.6 (43.2)	-96.3* (45.2)	-34.1 (53.2)	-45.3* (22.6)
4 to 7	-93.7* (46.0)	-108.7* (51.1)	-36.7 (53.3)	-42.7 (25.8)

	Elementary Schools	Middle Schools	High Schools	All Schools
Price Charged for Paid Lunches				
School Offered Free Lunch to All Students	-51.7 (28.6)	-106.2* (46.6)	-184.6* (71.2)	-60.4** (21.2)
\$2.25 or less (<i>reference category</i>)	--0--	--0--	--0--	--0--
\$2.26 to \$2.50	-32.7 (37.0)	7.9 (34.3)	-2.8 (31.9)	-7.0 (21.6)
\$2.51 to \$2.75	-81.4 (44.8)	-6.2 (36.6)	-51.7 (54.6)	-35.0 (27.1)
More than \$2.75	52.9 (54.3)	82.4 (42.2)	-88.6 (54.2)	34.2 (30.3)
Student Characteristics				
Student Race and Ethnicity				
White, non-Hispanic (<i>reference category</i>)	--0--	--0--	--0--	--0--
Hispanic	18.1 (31.1)	42.4 (46.5)	-57.8 (44.4)	16.2 (16.6)
Black, non-Hispanic	-0.4 (34.6)	9.8 (48.0)	41.5 (42.1)	9.4 (24.0)
Other	-22.5 (33.1)	74.5 (52.4)	-33.4 (48.3)	6.8 (20.2)
Student Is Female	-26.8 (17.7)	-62.1* (25.3)	-63.4 (35.7)	-41.6*** (12.2)
Student Is Certified for Free or Reduced-Price Meals	17.4 (26.9)	65.9* (31.6)	-0.6 (43.8)	14.3 (17.1)
School and SFA Characteristics				
Share of Students Approved for Free or Reduced-Price Meals				
Less than 40 percent (<i>reference category</i>)	--0--	--0--	--0--	--0--
40 percent or more	-13.5 (41.5)	-11.9 (31.9)	19.4 (35.7)	-11.6 (19.3)
Urbanicity				
Urban (<i>reference category</i>)	--0--	--0--	--0--	--0--
Suburban	-18.3 (32.0)	34.2 (37.8)	39.3 (39.8)	-18.2 (17.2)
Rural	-33.4 (32.9)	52.8 (34.9)	-41.3 (50.4)	-34.6 (19.0)
School Size				
Fewer than 500 students (<i>reference category</i>)	--0--	--0--	--0--	--0--
500 to 999 students	-42.1 (26.1)	67.8 (36.3)	-57.7 (68.1)	-17.6 (19.1)
1,000 or more students	‡	26.1 (42.9)	-1.2 (64.1)	-11.1 (23.4)

	Elementary Schools	Middle Schools	High Schools	All Schools
FNS Region				
Mid-Atlantic (<i>reference category</i>)	--0--	--0--	--0--	--0--
Northeast	77.7 (49.8)	157.0* (69.1)	51.8 (61.2)	79.6** (29.6)
Southeast	-18.4 (48.0)	125.0* (49.4)	68.9 (45.2)	22.5 (24.9)
Midwest	-30.0 (35.1)	111.5** (40.1)	26.4 (43.9)	24.2 (18.6)
Southwest	-104.8* (46.8)	48.5 (37.1)	109.6 (55.6)	-13.6 (24.1)
Mountain Plains	-47.3 (62.3)	51.0 (60.8)	-161.9* (78.0)	-31.1 (33.8)
Western	9.4 (45.7)	102.4* (50.9)	-3.1 (61.8)	20.6 (28.3)
Number of Students	635	576	500	1,711
Number of Schools	104	90	93	287

Source: School Nutrition and Meal Cost Study, Child/Youth Interview, School Food Authority Director Survey, School Nutrition Manager Survey, and Cafeteria Observation Guide, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression coefficients (with standard errors in parentheses) from multivariate models that control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid lunch. See Appendix C for more details on characteristic descriptions and selection methods.

Relationship between characteristic and satisfaction rate is significantly different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

--0-- = Reference category. Coefficient estimates for mutually exclusive categories are relative to the reference category's satisfaction rate.

† Variable was excluded from the model due to low within-sample variation or high correlation with another variable that better explained variation in student satisfaction with NSLP lunches.

‡ Category was combined with the above category due to sparseness of observations.

FNS = Food and Nutrition Service; NSLP = National School Lunch Program; SFA = school food authority.

Table D.23 Relationships between Student Satisfaction with NSLP Lunches and the School Food Environment: Regression-Adjusted Mean Student Satisfaction Rates

	Yes/ No	Elementary Schools	Middle Schools	High Schools	All Schools
Mean Percentage of Students Satisfied with School Lunch		46.9	31.0	21.3	35.9
Wellness Policies and Practices					
SFA Has Nutrition Standards for School Meals that Exceed Federal Standards	Y	52.4	23.3*	33.4	38.3
	N	43.3	34.6	17.7	34.7
School Conducted a Nutrition Education Activity in the Classroom or Foodservice Area	Y	48.2	28.9	22.6	35.7
	N	45.2	33.7	20.0	36.2
School Operates a School Garden	Y	28.4	†	†	†
	N	48.0			
Competitive Foods					
School Sells Foods Other than Milk on an A la Carte Basis	Y	46.3	32.1	21.3	35.2
	N	48.5	22.0	20.5	39.4
School Sells Foods and Beverages in Vending Machine	Y	33.0	31.1	21.8	34.1
	N	48.9	30.8	17.6	37.1
School Sells Foods and/or Beverages via a School Store or Snack Bar	Y	45.5	32.5	18.8	33.8
	N	47.4	30.6	22.7	36.7
SFA Has Standards for Competitive Foods that Exceed Smart Snacks in Schools Standards	Y	50.4	31.9	16.7	36.0
	N	46.0	30.7	23.1	35.9
Meal Service Practices					
Length of Lunch Period					
Less than 30 minutes (<i>reference category</i>)		40.3	31.4	24.2	35.3
30 to 44 minutes		53.9	30.6	20.8	38.2
45 minutes or more		48.4	25.1	26.7	37.8
School Has Other Activities Scheduled during Lunch Period	Y	55.7	29.0	18.4	39.8
	N	45.3	32.5	24.5	34.4
School Has More than One Line or Station that Offers Reimbursable Lunches or Components of Reimbursable Lunches	Y	44.2	29.8	20.7	36.0
	N	48.7	35.9	24.3	35.9
Number of Students		635	576	500	1,711
Number of Schools		104	90	93	287

Source: School Nutrition and Meal Cost Study, Child/Youth Interview, School Food Authority Director Survey, School Nutrition Manager Survey, Principal Survey, Vending Machine and Other Sources of Foods and Beverages Checklist, A la Carte Checklist, and Cafeteria Observation Guide, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression-adjusted mean percentages of students who (1) ever ate a school lunch and (2) reported that they “liked” the school lunch (as opposed to not liking the school lunch or considering it to be “only okay”). Estimates control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid lunch. Variables with rows labeled “Y” and “N” report adjusted mean NSLP satisfaction rates within schools that do and do not meet the variable criteria, respectively. Otherwise, regression-adjusted means are reported for each category within a variable. See Appendix C for more details on characteristic descriptions and selection methods.

Difference in satisfaction rates between schools with and without a dichotomous characteristic is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level. For variables containing multiple categories, the difference in satisfaction rates between schools in the corresponding category and schools in the reference category is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

† Variable was excluded from the model due to low within-sample variation or high correlation with another variable that better explained variation in student satisfaction with NSLP lunches.

NSLP = National School Lunch Program; SFA = school food authority.

Table D.24. Regression Coefficient Estimates for the Relationships between Student Satisfaction with NSLP Lunches and the School Food Environment

	Elementary Schools	Middle Schools	High Schools	All Schools
Wellness Policies and Practices				
SFA Has Nutrition Standards for School Meals that Exceed Federal Standards	40.0 (25.3)	-67.2* (26.2)	97.2 (49.3)	16.9 (16.1)
School Conducted a Nutrition Education Activity in the Classroom or Foodservice Area	13.2 (19.6)	-27.9 (35.2)	18.1 (29.9)	-2.5 (14.7)
School Operates a School Garden	-92.6 (56.4)	n.a. n.a.	n.a. n.a.	n.a. n.a.
Competitive Foods				
School Sells Foods Other than Milk on an A la Carte Basis	-9.5 (19.0)	64.9 (39.4)	5.9 (52.2)	-19.6 (16.7)
School Sells Foods and Beverages in Vending Machine	-73.2 (41.2)	1.8 (32.4)	29.7 (49.1)	-14.6 (26.9)
School Sells Foods and/or Beverages via a School Store or Snack Bar	-8.3 (30.1)	10.9 (32.4)	-26.9 (29.1)	-14.0 (15.4)
SFA Has Standards for Competitive Foods that Exceed Smart Snacks in Schools Standards	19.2 (30.8)	6.5 (29.8)	-45.1 (53.0)	0.6 (18.3)
Meal Service Practices				
Length of Lunch Period				
Less than 30 minutes (<i>reference category</i>)	--0--	--0--	--0--	--0--
30 to 44 minutes	60.6 (31.7)	-4.4 (34.8)	-22.0 (39.6)	14.1 (19.1)
45 minutes or more	36.1 (29.4)	-37.9 (47.5)	15.1 (53.2)	12.2 (23.9)
School Has Other Activities Scheduled during Lunch Period	45.8 (26.1)	-21.0 (26.3)	-41.4 (41.6)	25.7 (19.4)
School Has More than One Line or Station that Offers Reimbursable Lunches or Components of Reimbursable Lunches	-20.2 (30.1)	-34.6 (42.7)	-23.6 (41.6)	0.2 (19.4)
Student Characteristics				
Student Race and Ethnicity				
White, non-Hispanic (<i>reference category</i>)	--0--	--0--	--0--	--0--
Hispanic	7.0 (30.0)	51.5 (49.7)	-39.8 (46.7)	13.2 (17.0)
Black, non-Hispanic	-0.7 (37.9)	-18.7 (46.9)	60.7 (42.2)	12.7 (25.0)
Other	-27.0 (36.0)	60.6 (51.3)	-22.3 (45.8)	-1.3 (21.7)

	Elementary Schools	Middle Schools	High Schools	All Schools
Student Is Female	-29.0 (18.5)	-63.6** (23.3)	-50.8 (34.7)	-42.6*** (12.0)
Student Is Certified for Free or Reduced-Price Meals	26.7 (24.4)	59.1 (32.2)	4.3 (40.7)	19.7 (16.9)
Student Is a Picky Eater [Parent-reported]				
Yes, very (reference category)	--0--	--0--	--0--	--0--
Somewhat	18.4 (25.7)	44.7 (34.4)	11.0 (43.5)	15.4 (18.1)
No	28.7 (30.5)	34.3 (33.1)	43.1 (50.1)	24.9 (20.7)
Amount Student Eats Compared to Students of the Same Age [Parent-reported]				
Larger amount (reference category)	--0--	--0--	--0--	--0--
Same amount	-2.3 (22.9)	-60.1 (35.7)	-9.4 (38.6)	-14.3 (16.4)
Smaller amount	-27.6 (43.7)	-32.6 (51.9)	-31.5 (52.9)	-38.3 (29.1)
Student Has Food Allergies or Special Dietary Needs	23.8 (34.4)	69.0 (44.6)	51.9 (48.6)	32.6 (23.3)
Student's Level of Activity Compared to Students of the Same Age [Parent-reported]				
Less active (reference category)	--0--	--0--	--0--	--0--
About as active	-41.7 (40.3)	-46.2 (28.8)	0.8 (40.2)	-35.0 (21.2)
More active	-37.6 (43.2)	-63.5 (38.6)	-49.7 (52.6)	-43.1 (23.1)
Much more active	-53.4 (43.2)	11.8 (45.0)	32.8 (47.6)	-26.2 (25.0)
School and SFA Characteristics				
Share of Students Approved for Free or Reduced-Price Meals				
Less than 40 percent (reference category)	--0--	--0--	--0--	--0--
40 percent or more	-12.7 (36.7)	-14.7 (38.5)	-9.1 (38.8)	-16.5 (18.3)
Urbanicity				
Urban (reference category)	--0--	--0--	--0--	--0--
Suburban	35.6 (27.5)	-17.9 (34.7)	-26.8 (46.3)	-3.1 (18.3)
Rural	34.3 (29.7)	-4.8 (41.3)	-80.2 (52.1)	-23.4 (18.8)

	Elementary Schools	Middle Schools	High Schools	All Schools
School Size				
Fewer than 500 students (reference category)	--0--	--0--	--0--	--0--
500 to 999 students	-18.2 (25.7)	2.5 (40.6)	47.9 (52.4)	-13.2 (23.1)
1,000 or more students	‡	-14.0 (54.6)	95.7 (63.6)	-0.1 (23.5)
FNS Region				
Mid-Atlantic (reference category)	--0--	--0--	--0--	--0--
Northeast	118.0* (54.5)	180.8** (58.7)	5.5 (117.9)	95.1** (34.7)
Southeast	-3.2 (58.6)	169.4** (50.2)	61.7 (65.0)	23.4 (33.0)
Midwest	-7.6 (42.5)	187.3*** (46.6)	71.2 (57.0)	31.6 (28.3)
Southwest	-60.2 (44.2)	115.7* (51.2)	110.1 (59.3)	-11.1 (28.0)
Mountain Plains	11.0 (61.1)	94.0 (53.8)	-23.3 (79.7)	8.2 (38.6)
Western	3.2 (46.2)	122.3* (56.1)	119.8 (72.8)	0.2 (30.0)
Price Charged for Paid Lunches				
School Offered Free Lunch to All Students	-14.5 (35.2)	-139.1** (49.7)	-93.1 (65.2)	-45.4 (23.5)
\$2.25 or less (reference category)	--0--	--0--	--0--	--0--
\$2.26 to \$2.50	-2.6 (29.0)	-24.4 (45.7)	28.4 (27.9)	5.6 (22.1)
\$2.51 to \$2.75	-82.5* (38.6)	4.8 (36.3)	-106.1 (70.3)	-41.0 (24.0)
More than \$2.75	77.0 (58.4)	79.9** (29.5)	-45.2 (53.6)	35.1 (31.1)
Number of Students	635	576	500	1,711
Number of Schools	104	90	93	287

Source: School Nutrition and Meal Cost Study, Child/Youth Interview, School Food Authority Director Survey, School Nutrition Manager Survey, Principal Survey, Vending Machine and Other Sources of Foods and Beverages Checklist, A la Carte Checklist, and Cafeteria Observation Guide, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression coefficients (with standard errors in parentheses) from multivariate models that control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid lunch. See Appendix C for more details on characteristic descriptions and selection methods.

Relationship between characteristic and satisfaction rate is significantly different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

--0-- = Reference category. Coefficient estimates for mutually exclusive categories are relative to the reference category's satisfaction rate.

‡ Category was combined with the above category due to sparseness of observations.

FNS = Food and Nutrition Service; NSLP = National School Lunch Program; SFA = school food authority.

Table D.25. Relationships between Student Satisfaction with NSLP Lunches and Key Characteristics of Students, Schools, and SFAs: Regression-Adjusted Mean Satisfaction Rates

	Yes/ No	Elementary Schools	Middle Schools	High Schools	All Schools
Mean Percentage of Students Satisfied with School Lunch		46.9	31.0	21.3	35.9
Student Characteristics					
Student Race and Ethnicity					
White, non-Hispanic (<i>reference category</i>)		46.8	28.1	21.3	34.8
Hispanic		48.4	37.2	16.0	37.5
Black, non-Hispanic		46.6	25.1	31.5	37.4
Other		40.8	38.9	18.2	34.5
Student Is Female	Y	43.6	25.1**	17.1	31.3***
	N	50.1	36.0	24.6	40.1
Student Is Certified for Free or Reduced-Price Meals	Y	48.9	35.8	21.7	37.6
	N	42.9	25.6	21.0	33.5
Student Is a Picky Eater [Parent-reported]					
Yes, very (<i>reference category</i>)		42.9	26.4	18.9	33.0
Somewhat		47.0	33.9	20.4	36.1
No		49.3	32.1	25.4	38.1
Amount Student Eats Compared to Students of the Same Age [Parent-reported]					
Larger amount (<i>reference category</i>)		48.2	37.4	22.4	38.6
Same amount		47.7	26.9	20.9	35.6
Smaller amount		42.0	31.5	17.9	30.8
Student Has Food Allergies or Special Dietary Needs	Y	51.9	43.0	28.9	42.3
	N	46.5	30.2	20.5	35.4
Student's Level of Activity Compared to Students of the Same Age [Parent-reported]					
Less active (<i>reference category</i>)		55.4	37.6	22.7	42.7
About as active		45.9	29.3	22.9	35.2
More active		46.8	26.4	15.9	33.5
Much more active		43.3	39.9	28.2	37.0
School and SFA Characteristics					
Share of Students Approved for Free or Reduced-Price Meals					
Less than 40 percent (<i>reference category</i>)		49.0	32.7	21.8	38.1
40 percent or more		46.1	30.2	20.5	34.7
Urbanicity					
Urban (<i>reference category</i>)		41.2	32.6	26.2	37.5
Suburban		49.1	29.5	21.9	36.8
Rural		48.8	31.7	14.7	32.7

	Yes/ No	Elementary Schools	Middle Schools	High Schools	All Schools
School Size					
Fewer than 500 students (<i>reference category</i>)		49.5	31.4	11.9	37.3
500 to 999 students		45.4	31.8	17.2	34.5
1,000 or more students		‡	29.0	24.0	37.2
FNS Region					
Mid-Atlantic (<i>reference category</i>)		47.6	12.5	13.7	33.0
Northeast		73.1*	40.0**	14.3	53.7**
Southeast		46.8	37.7**	21.7	37.9
Midwest		45.8	41.3***	23.1	39.6
Southwest		34.2	27.9*	29.7	30.8
Mountain Plains		50.1	24.3	11.4	34.7
Western		48.3	29.0*	31.5	33.1
Number of Students		635	576	500	1,711
Number of Schools		104	90	93	287

Source: School Nutrition and Meal Cost Study, Child/Youth Interview, Parent Interview, School Food Authority Director Survey, Common Core of Data (CCD) 2011-2012, 2011 U.S. Census Bureau's Small Area Income and Poverty Estimates school district file, and Food and Nutrition Service's SFA Verification Summary Report 2012-2013, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression-adjusted mean percentages of students who (1) ever ate a school lunch and (2) reported that they "liked" the school lunch (as opposed to not liking the school lunch or considering it to be "only okay"). Estimates control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid lunch. Variables with rows labeled "Y" and "N" report adjusted mean NSLP satisfaction rates within schools that do and do not meet the variable criteria, respectively. Otherwise, regression-adjusted means are reported for each category within a variable. See Appendix C for more details on characteristic descriptions and selection methods.

Difference in satisfaction rates between schools with and without a dichotomous characteristic is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level. For variables containing multiple categories, the difference in satisfaction rates between schools in the corresponding category and schools in the reference category is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

‡ Category was combined with the above category due to sparseness of observations.

FNS = Food and Nutrition Service; NSLP = National School Lunch Program; SFA = school food authority.

Table D.26. Regression Coefficient Estimates for the Relationships between NSLP Participant Satisfaction Lunches and Key Characteristics of Students, Schools, and SFAs

	Elementary Schools	Middle Schools	High Schools	All Schools
Student Characteristics				
Student Race and Ethnicity				
White, non-Hispanic (<i>reference category</i>)	--0--	--0--	--0--	--0--
Hispanic	7.0 (30.0)	51.5 (49.7)	-39.8 (46.7)	13.2 (17.0)
Black, non-Hispanic	-0.7 (37.9)	-18.7 (46.9)	60.7 (42.2)	12.7 (25.0)
Other	-27.0 (36.0)	60.6 (51.3)	-22.3 (45.8)	-1.3 (21.7)
Student Is Female	-29.0 (18.5)	-63.6** (23.3)	-50.8 (34.7)	-42.6*** (12.0)
Student Is Certified for Free or Reduced-Price Meals	26.7 (24.4)	59.1 (32.2)	4.3 (40.7)	19.7 (16.9)
Student Is a Picky Eater [Parent-reported]				
Yes, very (<i>reference category</i>)	--0--	--0--	--0--	--0--
Somewhat	18.4 (25.7)	44.7 (34.4)	11.0 (43.5)	15.4 (18.1)
No	28.7 (30.5)	34.3 (33.1)	43.1 (50.1)	24.9 (20.7)
Amount Student Eats Compared to Students of the Same Age [Parent-reported]				
Larger amount (<i>reference category</i>)	--0--	--0--	--0--	--0--
Same amount	-2.3 (22.9)	-60.1 (35.7)	-9.4 (38.6)	-14.3 (16.4)
Smaller amount	-27.6 (43.7)	-32.6 (51.9)	-31.5 (52.9)	-38.3 (29.1)
Student Has Food Allergies or Special Dietary Needs	23.8 (34.4)	69.0 (44.6)	51.9 (48.6)	32.6 (23.3)
Student's Level of Activity Compared to Students of the Same Age [Parent-reported]				
Less active (<i>reference category</i>)	--0--	--0--	--0--	--0--
About as active	-41.7 (40.3)	-46.2 (28.8)	0.8 (40.2)	-35.0 (21.2)
More active	-37.6 (43.2)	-63.5 (38.6)	-49.7 (52.6)	-43.1 (23.1)
Much more active	-53.4 (43.2)	11.8 (45.0)	32.8 (47.6)	-26.2 (25.0)

	Elementary Schools	Middle Schools	High Schools	All Schools
School and SFA Characteristics				
Share of Students Approved for Free or Reduced-Price Meals				
Less than 40 percent (<i>reference category</i>)	--0--	--0--	--0--	--0--
40 percent or more	-12.7 (36.7)	-14.7 (38.5)	-9.1 (38.8)	-16.5 (18.3)
Urbanicity				
Urban (<i>reference category</i>)	--0--	--0--	--0--	--0--
Suburban	35.6 (27.5)	-17.9 (34.7)	-26.8 (46.3)	-3.1 (18.3)
Rural	34.3 (29.7)	-4.8 (41.3)	-80.2 (52.1)	-23.4 (18.8)
School Size				
Fewer than 500 students (<i>reference category</i>)	--0--	--0--	--0--	--0--
500 to 999 students	-18.2 (25.7)	2.5 (40.6)	47.9 (52.4)	-13.2 (23.1)
1,000 or more students	‡	-14.0 (54.6)	95.7 (63.6)	-0.1 (23.5)
FNS Region				
Mid-Atlantic (<i>reference category</i>)	--0--	--0--	--0--	--0--
Northeast	118.0* (54.5)	180.8** (58.7)	5.5 (117.9)	95.1** (34.7)
Southeast	-3.2 (58.6)	169.4** (50.2)	61.7 (65.0)	23.4 (33.0)
Midwest	-7.6 (42.5)	187.3*** (46.6)	71.2 (57.0)	31.6 (28.3)
Southwest	-60.2 (44.2)	115.7* (51.2)	110.1 (59.3)	-11.1 (28.0)
Mountain Plains	11.0 (61.1)	94.0 (53.8)	-23.3 (79.7)	8.2 (38.6)
Western	3.2 (46.2)	122.3* (56.1)	119.8 (72.8)	0.2 (30.0)
Price Charged for Paid Lunches				
School Offered Free Lunch to All Students	-14.5 (35.2)	-139.1** (49.7)	-93.1 (65.2)	-45.4 (23.5)
\$2.25 or less (<i>reference category</i>)	--0--	--0--	--0--	--0--
\$2.26 to \$2.50	-2.6 (29.0)	-24.4 (45.7)	28.4 (27.9)	5.6 (22.1)
\$2.51 to \$2.75	-82.5* (38.6)	4.8 (36.3)	-106.1 (70.3)	-41.0 (24.0)
More than \$2.75	77.0 (58.4)	79.9** (29.5)	-45.2 (53.6)	35.1 (31.1)

	Elementary Schools	Middle Schools	High Schools	All Schools
Number of Students	635	576	500	1,711
Number of Schools	104	90	93	287

Source: School Nutrition and Meal Cost Study, Child/Youth Interview, Parent Interview, School Food Authority Director Survey, Common Core of Data (CCD) 2011-2012, 2011 U.S. Census Bureau's Small Area Income and Poverty Estimates school district file, and Food and Nutrition Service's SFA Verification Summary Report 2012-2013, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression coefficients (with standard errors in parentheses) from multivariate models that control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid lunch. See Appendix C for more details on characteristic descriptions and selection methods.

Relationship between characteristic and satisfaction rate is significantly different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

--0-- = Reference category. Coefficient estimates for mutually exclusive categories are relative to the reference category's satisfaction rate.

‡ Category was combined with the above category due to sparseness of observations.

FNS = Food and Nutrition Service; NSLP = National School Lunch Program; SFA = school food authority.

Table D.27. Relationships between Student Satisfaction with SBP Breakfasts and Key Characteristics of the Breakfasts: Regression-Adjusted Mean Satisfaction Rates

	Yes/ No	Elementary Schools	Middle Schools	High Schools	All Schools
Mean Percentage of Students Satisfied with School Breakfasts		66.2	48.7	34.1	55.9
Nutritional Quality of Prepared SBP Breakfasts					
Total HEI-2010 Score of Average Breakfast Prepared					
Lowest Quartile—55.2 to 68.5 points (<i>reference category</i>)		69.6	42.8	31.2	58.8
Second Quartile—68.6 to 71.6 points		62.9	44.8	32.8	52.4
Third Quartile—71.7 to 74.9 points		68.0	42.7	37.8	52.8
Highest Quartile—75.0 to 87.4 points		65.0	58.7	36.9	58.6
Compliance of Daily and Weekly Breakfast Menus with SBP Nutrition Standards					
Met Daily Quantity Requirement for Grains	Y	68.1	42.7**	42.7	56.5
	N	62.3	62.4	25.6	54.9
Met Requirement that at Least Half of Weekly Grains Are Whole Grain-Rich	Y	66.6	48.4	†	56.7
	N	60.5	36.8		40.6
Met Minimum Calorie Level	Y	†	48.0	36.3	55.9
	N		59.2	25.9	55.0
Met Maximum Calorie Level	Y	66.3	58.6*	47.9***	58.0
	N	66.0	29.8	7.5	50.8
Met Target 1 Sodium Limit	Y	58.4***	47.2	28.7*	53.2*
	N	83.3	51.6	53.7	63.2
Types of Foods Offered in Breakfast Menus					
All Daily Menus Offered Cold Cereal	Y	73.5**	49.7	33.7	56.7
	N	59.1	44.3	34.9	54.8
More than Half of Daily Menus Offered Breakfast Pastries or Muffins	Y	78.4***	40.6**	32.4	59.5
	N	60.9	59.7	36.6	53.4
At Least One Daily Menu Offered Pizza or Pizza Products	Y	59.7	49.3	35.3	51.1*
	N	69.7	47.0	33.3	59.0
No Daily Menus Offered French Fries or Similar Potato Products	Y	68.8	63.9	32.8	55.5
	N	64.6	44.5	34.7	56.1
Number of Students		418	244	237	899
Number of Schools		93	76	76	245

Source: School Nutrition and Meal Cost Study, Child/Youth Interview, and Menu Survey, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression-adjusted mean percentages of students who (1) attended a school that offered the SBP; (2) ever ate a school breakfast; and (3) reported that they “liked” the school breakfast (as opposed to not liking the school breakfast or considering it to be “only okay”). Estimates control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid breakfast. Variables with rows labeled “Y” and “N” report adjusted mean SBP satisfaction rates within schools that do and do not meet the variable criteria, respectively. Otherwise,

regression-adjusted means are reported for each category within a variable. See Appendix C for more details on characteristic descriptions and selection methods.

Difference in satisfaction rates between schools with and without a dichotomous characteristic is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level. For variables containing multiple categories, the difference in satisfaction rates between schools in the corresponding category and schools in the reference category is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

† Variable was excluded from the model due to low within-sample variation or high correlation with another variable that better explained variation in student satisfaction with NSLP lunches.

HEI = Healthy Eating Index; SBP = School Breakfast Program; SFA = school food authority.

Table D.28. Regression Coefficient Estimates for the Relationships between Student Satisfaction with SBP Breakfasts and Key Characteristics of the Breakfasts

	Elementary Schools	Middle Schools	High Schools	All Schools
Nutritional Quality of Prepared SBP Breakfasts				
Total HEI-2010 Score of Average Breakfast Prepared				
Lower Quartile (<i>reference category</i>)	--0--	--0--	--0--	--0--
Second Quartile	-35.0 (33.3)	12.5 (67.1)	10.5 (75.9)	-30.6 (23.2)
Third Quartile	-8.4 (31.3)	-0.1 (86.4)	41.8 (65.2)	-28.9 (24.2)
Upper Quartile	-24.3 (37.9)	95.7 (79.6)	36.3 (60.4)	-0.9 (26.6)
Compliance of Daily and Weekly Breakfast Menus with SBP Nutrition Standards				
Met Daily Quantity Requirement for Grains	30.2 (28.4)	-120.3** (45.5)	113.7 (59.4)	7.5 (17.6)
Met Requirement that at Least Half of Weekly Grains Are Whole Grain-Rich	31.5 (60.1)	74.6 (213.1)	†	76.0 (45.1)
Met Minimum Calorie Level	†	-68.0 (88.1)	67.1 (79.7)	4.4 (32.0)
Met Maximum Calorie Level	1.4 (33.6)	194.9* (86.3)	338.1*** (91.2)	33.9 (23.7)
Met Target 1 Sodium Limit	-151.6*** (35.8)	-27.2 (85.9)	-164.9* (71.0)	-48.8* (22.0)
Types of Foods Offered in Breakfast Menus				
All Daily Menus Offered Cold Cereal	74.8** (25.1)	34.2 (64.7)	-7.3 (53.6)	9.0 (17.5)
More than Half of Daily Menus Offered Breakfast Pastries or Muffins	99.0*** (28.5)	-123.8** (43.7)	-26.1 (62.8)	29.3 (17.6)
At Least One Daily Menu Offered Pizza or Pizza Products	-51.8 (29.0)	14.3 (46.5)	12.6 (48.1)	-37.6* (16.9)
No Daily Menus Offered French Fries or Similar Potato Products	22.1 (31.3)	125.0 (72.6)	-12.4 (53.4)	-2.9 (19.7)
Student Characteristics				
Student Race and Ethnicity				
White, non-Hispanic (<i>reference category</i>)	--0--	--0--	--0--	--0--
Hispanic	27.5 (36.7)	20.9 (75.6)	-16.1 (63.9)	12.1 (20.9)
Black, non-Hispanic	8.7 (37.3)	227.3* (90.4)	-2.5 (82.0)	14.0 (25.6)
Other	-169.5** (61.1)	-115.2 (73.8)	-98.7 (108.0)	-94.4* (37.0)

	Elementary Schools	Middle Schools	High Schools	All Schools
Student Is Female	3.0 (29.3)	21.1 (45.9)	-42.1 (58.5)	-10.3 (21.6)
Student Is Certified for Free or Reduced- Price Meals	-125.8* (58.4)	59.7 (56.9)	0.6 (66.3)	-12.9 (25.5)
Student Is a Picky Eater [Parent-reported]				
Yes, very (<i>reference category</i>)	--0--	--0--	--0--	--0--
Somewhat	-11.5 (37.3)	-43.3 (53.4)	-65.3 (94.8)	-28.7 (29.5)
No	-10.1 (42.4)	-75.9 (72.2)	-40.3 (94.5)	-27.2 (27.2)
Amount Student Eats Compared to Students of the Same Age [Parent-reported]				
Larger amount (<i>reference category</i>)	--0--	--0--	--0--	--0--
Same amount	1.1 (36.1)	107.7 (59.2)	100.8 (64.5)	13.4 (21.3)
Smaller amount	-9.8 (55.1)	3.8 (72.6)	-60.6 (123.8)	-10.9 (41.6)
Student Has Food Allergies or Special Dietary Needs	48.5 (48.3)	4.6 (105.0)	49.2 (59.4)	13.2 (28.3)
Student's Level of Activity Compared to Students of the Same Age [Parent- reported]				
Less active (<i>reference category</i>)	--0--	--0--	--0--	--0--
About as active	-52.5 (42.3)	-78.1 (67.8)	-11.5 (66.2)	-30.6 (26.7)
More active	-67.6 (43.9)	-73.6 (59.3)	54.1 (71.9)	-21.9 (30.5)
Much more active	-30.3 (48.8)	-17.3 (77.9)	-81.6 (84.0)	-27.4 (32.8)
Student's Health Status [Parent-reported]				
Fair or poor (<i>reference category</i>)	--0--	--0--	--0--	--0--
Good	88.8 (65.9)	141.0 (99.2)	-10.9 (112.2)	64.5 (34.8)
Very good	19.7 (72.7)	59.6 (85.1)	-13.4 (109.7)	15.8 (36.3)
Excellent	55.9 (69.6)	-0.5 (78.0)	38.1 (115.1)	40.8 (37.7)
School and SFA Characteristics				
Share of Students Approved for Free or Reduced-Price Meals				
Less than 40 percent (<i>reference category</i>)	--0--	--0--	--0--	--0--
40 percent or more	85.0* (37.8)	-140.1 (84.6)	-119.6 (60.3)	-14.2 (24.0)

	Elementary Schools	Middle Schools	High Schools	All Schools
Urbanicity				
Urban (<i>reference category</i>)	--0--	--0--	--0--	--0--
Suburban	98.2* (39.7)	314.2*** (73.0)	-88.3 (63.2)	46.3 (26.3)
Rural	103.1* (40.4)	187.4** (66.3)	-172.4* (68.0)	2.2 (23.8)
School Size				
Fewer than 500 students (<i>reference category</i>)	--0--	--0--	--0--	--0--
500 to 999 students	-0.9 (33.9)	60.2 (57.4)	-158.9 (102.2)	9.5 (23.0)
1,000 or more students	‡	266.2* (114.1)	-290.5** (105.5)	52.0 (38.6)
FNS Region				
Mid-Atlantic (<i>reference category</i>)	--0--	--0--	--0--	--0--
Northeast	23.6 (64.3)	343.9** (110.5)	96.1 (133.5)	106.6* (42.9)
Southeast	-92.7 (59.2)	126.7 (107.0)	-114.4 (78.6)	18.7 (35.0)
Midwest	61.3 (57.3)	152.5 (101.4)	127.8 (83.2)	78.8* (35.8)
Southwest	-33.5 (52.1)	159.3 (91.3)	-95.5 (101.9)	61.8 (41.4)
Mountain Plains	-82.8 (50.8)	450.8* (197.6)	1.1 (84.2)	75.8 (49.2)
Western	-23.6 (45.6)	4.5 (84.1)	-70.1 (132.4)	47.4 (37.6)
Price Charged for Paid Breakfast				
School Offered Free Breakfast to All Students	66.9* (30.7)	120.7 (72.3)	-45.0 (76.3)	-45.1 (28.0)
Less than \$1.25 (<i>reference category</i>)	--0--	--0--	--0--	--0--
\$1.25 to \$1.49	-35.1 (43.8)	56.6 (53.9)	-127.6 (77.7)	-66.0* (29.2)
\$1.50 to \$1.99	61.0 (46.9)	81.4 (69.3)	-44.1 (71.9)	3.6 (31.7)
\$2.00 or more	48.6 (70.8)	‡	-155.8 (103.7)	2.0 (50.7)
Number of Students	418	244	237	899
Number of Schools	93	76	76	245

Source: School Nutrition and Meal Cost Study, Child/Youth Interview, and Menu Survey, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression coefficients (with standard errors in parentheses) from multivariate models that control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid breakfast. See Appendix C for more details on characteristic descriptions and selection methods.

Relationship between characteristic and satisfaction rate is significantly different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

--0-- = Reference category. Coefficient estimates for mutually exclusive categories are relative to the reference category's satisfaction rate.

† Variable was excluded from the model due to low within-sample variation or high correlation with another variable that better explained variation in student satisfaction with SBP breakfasts.

‡ Category was combined with the above category due to sparseness of observations.

HEI = Healthy Eating Index; FNS = Food and Nutrition Service; SBP = School Breakfast Program; SFA = school food authority.

Table D.29. Relationships between Student Satisfaction with SBP Breakfasts and School Foodservice Operations: Regression-Adjusted Mean Student Satisfaction Rates

	Yes/ No	Elementary Schools	Middle Schools	High Schools	All Schools
Mean Percentage of Students Satisfied with School Breakfast		66.2	48.7	34.1	55.9
Food Purchasing Characteristics					
SFA Uses Alliance for a Healthier Generation or Other Similar Tools for Selecting and Purchasing Healthy Foods	Y	72.2	50.9	32.9	58.9
	N	62.7	46.4	35.1	53.9
SFA Participates in a Food Purchasing Cooperative	Y	70.7	57.4**	33.6	57.2
	N	60.2	37.1	34.6	54.4
Schools in SFA Offer Brand-Name or Chain Restaurant Foods	Y	61.2	20.7*	40.0	47.8
	N	66.3	51.4	33.5	56.3
School Participates in Farm to School Program	Y	70.5	48.5	39.5	54.5
	N	65.1	48.1	32.2	56.2
Characteristics of the School Meal Programs					
School Offers Grab-and-Go Option at Breakfast	Y	†	47.9	34.9	50.1
	N		48.2	34.0	56.4
Students Have Option of Eating Breakfast in the Classroom	Y	69.4	70.5	27.4	59.5
	N	64.4	46.2	35.4	54.6
School Participates in the Fresh Fruit and Vegetable Program	Y	65.5	n.a.	n.a.	n.a.
	N	66.5	n.a.	n.a.	n.a.
Menu Planning and Meal Service Characteristics					
School Uses Cycle Menus	Y	66.7	47.3	34.7	56.1
	N	64.8	49.5	33.1	55.3
School Receives Fully or Partially Prepared Meals from a Separate Production or Central Kitchen	Y	59.1	64.0	†	49.4
	N	68.1	46.3		57.1
SFA Uses a Foodservice Management Company	Y	68.7	31.0*	23.7	53.1
	N	65.7	52.5	37.2	56.5
School Uses Offer-Versus-Serve at Breakfast	Y	68.2	51.0	34.2	57.9
	N	59.5	33.8	33.8	47.5
School Has Policies and Procedures for Accommodating Students with Food Allergies or Special Dietary Needs	Y	63.0**	48.6	36.4	54.5
	N	89.0	44.3	9.5	68.7
Price Charged for Paid Breakfast					
School Offered Free Breakfast to All Students		63.8	45.5	31.6	52.8
Less than \$1.25 (<i>reference category</i>)		68.1	46.6	50.7	61.5
\$1.25 to \$1.49		58.9	37.5	35.8	49.0
\$1.50 to \$1.99		70.8	59.7	31.7	62.1
\$2.00 or more		77.1	†	51.5	65.0
Number of Students		418	244	237	899
Number of Schools		93	76	76	245

Source: School Nutrition and Meal Cost Study, Child/Youth Interview, School Food Authority Director Survey, School Nutrition Manager Survey, and Cafeteria Observation Guide, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression-adjusted mean percentages of students who (1) attended a school that offered the SBP; (2) ever ate a school breakfast; and (3) reported that they “liked” the school breakfast (as opposed to not liking the school breakfast or considering it to be “only okay”). Estimates control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid breakfast. Variables with rows labeled “Y” and “N” report adjusted mean SBP satisfaction rates within schools that do and do not meet the variable criteria, respectively. Otherwise, regression-adjusted means are reported for each category within a variable. See Appendix C for more details on characteristic descriptions and selection methods.

Difference in satisfaction rates between schools with and without a dichotomous characteristic is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level. For variables containing multiple categories, the difference in satisfaction rates between schools in the corresponding category and schools in the reference category is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

† Variable was excluded from the model due to low within-sample variation or high correlation with another variable that better explained variation in student satisfaction with SBP breakfasts.

FNS = Food and Nutrition Service; SBP = School Breakfast Program; SFA = school food authority.

Table D.30. Regression Coefficient Estimates for the Relationships between Student Satisfaction with SBP Breakfasts and School Foodservice Operations

	Elementary Schools	Middle Schools	High Schools	All Schools
Food Purchasing Characteristics				
SFA Uses Alliance for a Healthier Generation or Other Similar Tools for Selecting and Purchasing Healthy Foods	48.7 (31.5)	26.3 (58.9)	-12.4 (52.4)	23.7 (25.7)
SFA Participates in a Food Purchasing Cooperative	52.2 (29.9)	129.4** (46.7)	-5.9 (57.5)	13.2 (24.2)
Schools in SFA Offer Brand-Name or Chain Restaurant Foods	-24.9 (69.4)	-225.0* (93.1)	35.8 (100.6)	-39.1 (31.1)
School Participates in Farm to School Program	28.0 (48.3)	2.7 (76.4)	41.3 (58.4)	-8.3 (27.8)
Characteristics of the School Meal Programs				
School Offers Grab-and-Go Option at Breakfast	†	-1.7 (60.8)	5.0 (61.2)	-29.3 (34.8)
Students Have Option of Eating Breakfast in the Classroom	25.7 (30.9)	139.2 (88.1)	-46.9 (104.1)	23.0 (23.1)
School Participates in the Fresh Fruit and Vegetable Program	-4.9 (34.1)	n.a. n.a.	n.a. n.a.	n.a. n.a.
Menu Planning and Meal Service Characteristics				
School Uses Cycle Menus	9.1 (40.0)	-12.6 (69.1)	9.4 (56.3)	3.9 (26.2)
School Receives Fully or Partially Prepared Meals from a Separate Production or Central Kitchen	-43.9 (37.2)	102.7 (65.4)	†	-35.8 (22.4)
SFA Uses a Foodservice Management Company	15.8 (40.7)	-140.7* (54.4)	-82.1 (43.2)	-15.6 (29.7)
School Uses Offer-Versus-Serve at Breakfast	42.0 (38.0)	111.4 (79.5)	2.3 (107.0)	48.6 (26.7)
School Has Policies and Procedures for Accommodating Students with Food Allergies or Special Dietary Needs	-179.0** (65.9)	25.6 (121.6)	199.2 (163.5)	-70.5 (40.4)
Price Charged for Paid Breakfast				
School Offered Free Breakfast to All Students	-21.0 (29.8)	-6.3 (63.8)	-99.8 (75.0)	-40.9 (24.5)
Less than \$1.25 (<i>reference category</i>)	--0--	--0--	--0--	--0--
\$1.25 to \$1.49	-44.2 (54.6)	-51.8 (71.6)	-76.6 (78.9)	-58.1 (29.5)
\$1.50 to \$1.99	14.2 (36.9)	69.9 (80.3)	-99.0 (94.7)	3.1 (29.2)
\$2.00 or more	50.6 (66.6)	†	3.7 (86.0)	17.4 (45.9)

	Elementary Schools	Middle Schools	High Schools	All Schools
Student Characteristics				
Student Race and Ethnicity				
White, non-Hispanic (<i>reference category</i>)	--0--	--0--	--0--	--0--
Hispanic	45.0 (34.6)	49.5 (63.8)	-78.3 (62.7)	18.7 (19.9)
Black, non-Hispanic	4.0 (39.6)	206.9* (81.7)	-20.8 (86.9)	14.7 (27.0)
Other	-152.0** (54.8)	-93.6 (92.0)	-65.9 (81.5)	-101.6** (36.7)
Student Is Female	2.4 (28.8)	11.7 (37.6)	-52.3 (54.8)	-7.9 (22.2)
Student Is Certified for Free or Reduced-Price Meals	-100.5* (47.5)	56.9 (44.4)	-22.8 (53.3)	-8.7 (22.9)
School and SFA Characteristics				
Share of Students Approved for Free or Reduced-Price Meals				
Less than 40 percent (<i>reference category</i>)	--0--	--0--	--0--	--0--
40 percent or more	43.2 (36.9)	-50.4 (70.3)	-80.1 (55.1)	-18.2 (23.9)
Urbanicity				
Urban (<i>reference category</i>)	--0--	--0--	--0--	--0--
Suburban	57.9 (38.2)	206.5** (75.1)	-154.6* (66.3)	59.7* (27.1)
Rural	40.1 (43.3)	13.6 (61.2)	-212.9** (64.3)	6.3 (27.4)
School Size				
Fewer than 500 students (<i>reference category</i>)	--0--	--0--	--0--	--0--
500 to 999 students	-21.6 (28.1)	100.3 (52.9)	-58.0 (66.7)	-3.0 (24.5)
1,000 or more students	‡	151.8 (79.0)	-124.9 (71.8)	37.0 (35.5)
FNS Region				
Mid-Atlantic (<i>reference category</i>)	--0--	--0--	--0--	--0--
Northeast	24.8 (70.9)	364.8** (108.2)	159.0 (131.1)	84.4 (44.7)
Southeast	-46.8 (47.1)	6.3 (88.2)	-17.8 (89.6)	-21.4 (34.6)
Midwest	-19.4 (56.8)	144.5 (75.9)	104.2 (83.5)	38.6 (35.1)
Southwest	34.3 (52.1)	25.1 (69.6)	8.8 (97.1)	28.4 (33.1)

	Elementary Schools	Middle Schools	High Schools	All Schools
Mountain Plains	-82.1 (65.4)	298.9 (226.0)	77.8 (104.5)	39.3 (52.7)
Western	-5.3 (54.1)	-5.6 (88.5)	84.7 (120.2)	27.1 (38.1)
Number of Students	418	244	237	899
Number of Schools	93	76	76	245

Source: School Nutrition and Meal Cost Study, Child/Youth Interview, School Food Authority Director Survey, School Nutrition Manager Survey, and Cafeteria Observation Guide, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression coefficients (with standard errors in parentheses) from multivariate models that control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid breakfast. See Appendix C for more details on characteristic descriptions and selection methods.

Relationship between characteristic and satisfaction rate is significantly different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

--0-- = Reference category. Coefficient estimates for mutually exclusive categories are relative to the reference category's satisfaction rate.

† Variable was excluded from the model due to low within-sample variation or high correlation with another variable that better explained variation in student satisfaction with SBP breakfasts.

‡ Category was combined with the above category due to sparseness of observations.

FNS = Food and Nutrition Service; SBP = School Breakfast Program; SFA = school food authority.

Table D.31. Relationships between Student Satisfaction with SBP Breakfasts and the School Food Environment: Regression-Adjusted Mean Student Satisfaction Rates

	Yes/ No	Elementary Schools	Middle Schools	High Schools	All Schools
Mean Percentage of Students Satisfied with School Breakfast		66.2	48.7	34.1	55.9
Wellness Policies and Practices					
SFA Has Nutrition Standards for School Meals that Exceed Federal Standards	Y	66.3	36.5	31.3	54.8
	N	66.1	52.6	35.4	56.4
School Conducted a Nutrition Education Activity in the Classroom or Foodservice Area	Y	68.2	52.3	38.0	57.3
	N	64.1	44.1	29.3	54.4
Competitive Foods					
School Sells Foods Other than Milk on an A la Carte Basis	Y	68.2	50.4	35.8*	57.2
	N	60.5	33.1	4.7	50.4
School Sells Foods and Beverages in Vending Machine	Y	51.7	43.9	38.8*	52.5
	N	67.8	51.7	11.9	57.7
School Sells Foods and/or Beverages via a School Store or Snack Bar	Y	65.0	50.3	34.7	56.9
	N	66.6	47.3	33.9	55.5
SFA Has Standards for Competitive Foods that Exceed Smart Snacks in Schools Standards	Y	83.4***	51.9	22.2	61.0
	N	60.9	46.9	39.1	54.3
Meal Service Practices					
Length of Breakfast Period					
Less than 25 minutes (<i>reference category</i>)		62.1	47.6	37.3	53.8
25 to 39 minutes		56.4	53.3	50.2	48.4
40 minutes or more		69.5	33.6	27.9	61.0
Last Bus Arrives Before or at Same Time as Breakfast	Y	53.5*	59.5	44.4	46.6*
	N	68.5	45.8	32.7	57.5
Number of Students		418	244	237	899
Number of Schools		93	76	76	245

Source: School Nutrition and Meal Cost Study, Child/Youth Interview, School Food Authority Director Survey, School Nutrition Manager Survey, Principal Survey, Vending Machine and Other Sources of Foods and Beverages Checklist, A la Carte Checklist, and Cafeteria Observation Guide, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression-adjusted mean percentages of students who (1) attended a school that offered the SBP; (2) ever ate a school breakfast; and (3) reported that they “liked” the school breakfast (as opposed to not liking the school breakfast or considering it to be “only okay”). Estimates control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid breakfast. Variables with rows labeled “Y” and “N” report adjusted mean SBP satisfaction rates within schools that do and do not meet the variable criteria, respectively. Otherwise, regression-adjusted means are reported for each category within a variable. See Appendix C for more details on characteristic descriptions and selection methods.

Difference in satisfaction rates between schools with and without a dichotomous characteristic is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level. For variables containing multiple categories, the difference in satisfaction rates between schools in the corresponding category and schools in the reference category is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

† Variable was excluded from the model due to low within-sample variation or high correlation with another variable that better explained variation in student satisfaction with SBP breakfasts.

SBP = School Breakfast Program; SFA = school food authority.

Table D.32. Regression Coefficient Estimates for the Relationships between Student Satisfaction with SBP Breakfasts and the School Food Environment

	Elementary Schools	Middle Schools	High Schools	All Schools
Wellness Policies and Practices				
SFA Has Nutrition Standards for School Meals that Exceed Federal Standards	1.0 (26.7)	-95.9 (67.7)	-26.2 (51.1)	-7.6 (17.3)
School Conducted a Nutrition Education Activity in the Classroom or Foodservice Area	21.8 (21.5)	48.5 (49.9)	55.8 (53.8)	14.0 (19.0)
Competitive Foods				
School Sells Foods Other than Milk on an A la Carte Basis	40.5 (29.6)	102.9 (96.6)	327.6* (130.0)	32.7 (17.9)
School Sells Foods and Beverages in Vending Machine	-82.1 (48.2)	-46.5 (49.6)	222.2* (109.5)	-24.8 (29.2)
School Sells Foods and/or Beverages via a School Store or Snack Bar	-8.1 (35.8)	17.3 (78.7)	4.7 (53.8)	6.3 (22.2)
SFA Has Standards for Competitive Foods that Exceed Smart Snacks in Schools Standards	135.3*** (36.3)	29.6 (90.7)	-113.0 (72.0)	32.9 (24.4)
Meal Service Practices				
Length of Breakfast Period				
Less than 25 minutes (<i>reference category</i>)	--0--	--0--	--0--	--0--
25 to 39 minutes	-30.3 (38.1)	34.9 (65.8)	78.4 (72.5)	-25.5 (18.8)
40 minutes or more	41.9 (44.2)	-89.3 (90.9)	-62.8 (65.9)	35.4 (29.8)
Last Bus Arrives Before or at Same Time as Breakfast	-76.7* (36.4)	79.8 (63.2)	73.4 (92.1)	-52.1* (21.7)
Student Characteristics				
Student Race and Ethnicity				
White, non-Hispanic (<i>reference category</i>)	--0--	--0--	--0--	--0--
Hispanic	43.9 (35.4)	50.5 (60.2)	-58.5 (79.4)	13.8 (20.0)
Black, non-Hispanic	-23.2 (38.8)	244.5* (101.0)	-18.9 (71.6)	6.6 (28.1)
Other	-156.7* (61.9)	-21.0 (65.0)	-124.6 (110.8)	-95.6* (37.8)
Student Is Female	1.7 (30.5)	20.2 (40.7)	-32.3 (65.3)	-11.1 (22.4)
Student Is Certified for Free or Reduced-Price Meals	-90.7 (52.2)	62.8 (57.7)	-29.5 (69.0)	-16.8 (25.6)

	Elementary Schools	Middle Schools	High Schools	All Schools
Student Is a Picky Eater [Parent-reported]				
Yes, very (reference category)	--0--	--0--	--0--	--0--
Somewhat	-12.5 (41.2)	-41.4 (50.4)	-114.7 (94.8)	-37.2 (31.3)
No	-16.7 (46.8)	-88.3 (68.2)	-40.0 (77.1)	-37.2 (29.0)
Amount Student Eats Compared to Students of the Same Age [Parent-reported]				
Larger amount (reference category)	--0--	--0--	--0--	--0--
Same amount	-10.5 (35.8)	96.4 (61.9)	54.8 (65.2)	4.4 (20.3)
Smaller amount	-7.0 (54.0)	-7.0 (76.4)	-54.5 (148.8)	-15.3 (41.3)
Student Has Food Allergies or Special Dietary Needs	40.7 (47.7)	-36.3 (99.7)	10.9 (65.4)	13.2 (27.8)
Student's Level of Activity Compared to Students of the Same Age [Parent-reported]				
Less active (reference category)	--0--	--0--	--0--	--0--
About as active	-59.2 (47.8)	-78.3 (64.4)	-7.2 (64.4)	-34.7 (26.2)
More active	-69.0 (51.2)	-58.5 (62.9)	87.4 (82.3)	-22.9 (31.8)
Much more active	-35.4 (50.5)	6.2 (80.5)	-70.2 (90.5)	-26.9 (33.1)
Student's Health Status [Parent-reported]				
Fair or poor (reference category)	--0--	--0--	--0--	--0--
Good	115.9 (67.8)	117.9 (109.7)	73.2 (109.4)	84.9* (36.1)
Very good	49.8 (75.0)	29.0 (90.7)	32.5 (100.8)	31.6 (37.5)
Excellent	88.6 (70.1)	-21.2 (89.9)	85.6 (104.4)	63.5 (39.1)
School and SFA Characteristics				
Share of Students Approved for Free or Reduced-Price Meals				
Less than 40 percent (reference category)	--0--	--0--	--0--	--0--
40 percent or more	32.6 (38.8)	-27.0 (74.6)	-100.9 (59.4)	-8.1 (24.3)

	Elementary Schools	Middle Schools	High Schools	All Schools
Urbanicity				
Urban (reference category)	--0--	--0--	--0--	--0--
Suburban	49.3 (41.1)	147.8* (74.3)	-226.3* (90.3)	54.8 (27.7)
Rural	2.5 (42.3)	8.9 (91.4)	-220.1* (90.9)	-8.8 (25.9)
School Size				
Fewer than 500 students (reference category)	--0--	--0--	--0--	--0--
500 to 999 students	29.2 (28.1)	54.2 (60.6)	-40.9 (69.5)	13.9 (21.0)
1,000 or more students	‡	27.0 (95.7)	-253.6** (86.4)	51.2 (35.1)
FNS Region				
Mid-Atlantic (reference category)	--0--	--0--	--0--	--0--
Northeast	-39.7 (58.3)	105.8 (112.4)	343.8** (122.8)	50.8 (36.5)
Southeast	-46.6 (53.3)	53.2 (152.3)	-22.9 (95.1)	-25.0 (35.2)
Midwest	22.8 (47.9)	-3.8 (115.4)	175.7 (96.0)	56.1 (34.0)
Southwest	13.1 (43.0)	-8.2 (125.9)	28.3 (96.3)	26.4 (34.0)
Mountain Plains	1.6 (56.5)	100.9 (161.5)	122.8 (85.1)	59.6 (45.6)
Western	-23.3 (46.3)	-79.9 (115.8)	274.0* (117.6)	23.7 (37.5)
Price Charged for Paid Breakfast				
School Offered Free Breakfast to All Students	-46.1 (31.3)	-47.9 (82.7)	-133.9 (87.5)	-34.8 (27.2)
Less than \$1.25 (reference category)	--0--	--0--	--0--	--0--
\$1.25 to \$1.49	-86.9 (44.7)	45.1 (74.9)	-92.9 (78.7)	-59.2* (27.0)
\$1.50 to \$1.99	38.0 (54.8)	110.6 (80.6)	55.9 (67.7)	2.0 (35.3)
\$2.00 or more	-36.7 (56.7)	‡	-17.9 (98.2)	1.9 (45.7)
Number of Students	418	244	237	899
Number of Schools	93	76	76	245

Source: School Nutrition and Meal Cost Study, Child/Youth Interview, School Food Authority Director Survey, School Nutrition Manager Survey, Principal Survey, Vending Machine and Other Sources of Foods and Beverages Checklist, A la Carte Checklist, and Cafeteria Observation Guide, school year 2014-2015.

Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression coefficients (with standard errors in parentheses) from multivariate models that control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid breakfast. See Appendix C for more details on characteristic descriptions and selection methods.

Relationship between characteristic and satisfaction rate is significantly different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

--0-- = Reference category. Coefficient estimates for mutually exclusive categories are relative to the reference category's satisfaction rate.

‡ Category was combined with the above category due to sparseness of observations.

FNS = Food and Nutrition Service; SBP = School Breakfast Program; SFA = school food authority.

Table D.33. Relationships between Student Satisfaction with SBP Breakfasts and Key Characteristics of Students, Schools, and SFAs: Regression-Adjusted Mean Satisfaction Rates

	Yes/ No	Elementary Schools	Middle Schools	High Schools	All Schools
Mean Percentage of Students Satisfied with School Breakfast		66.2	48.7	34.1	55.9
Student Characteristics					
Student Race and Ethnicity					
White, non-Hispanic (<i>reference category</i>)		65.9	38.3	37.3	56.1
Hispanic		73.7	46.6	28.1	59.0
Black, non-Hispanic		61.4	77.1*	34.2	57.5
Other		34.5*	35.1	19.4	36.0*
Student Is Female	Y N	66.4 66.0	50.3 46.9	31.5 36.6	54.6 56.9
Student Is Certified for Free or Reduced-Price Meals	Y N	63.8 79.2	50.9 40.3	32.6 37.2	55.1 58.6
Student Is a Picky Eater [Parent-reported]					
Yes, very (<i>reference category</i>)		68.3	55.2	42.9	61.5
Somewhat		66.0	48.2	24.9	54.0
No		65.2	40.4	36.3	54.0
Amount Student Eats Compared to Students of the Same Age [Parent-reported]					
Larger amount (<i>reference category</i>)		67.4	39.3	30.8	55.8
Same amount		65.5	55.6	39.6	56.7
Smaller amount		66.1	38.2	23.0	52.6
Student Has Food Allergies or Special Dietary Needs	Y N	72.8 65.6	42.3 48.5	35.7 34.0	58.4 55.7
Student's Level of Activity Compared to Students of the Same Age [Parent-reported]					
Less active (<i>reference category</i>)		75.3	56.7	33.1	61.1
About as active		65.0	43.1	32.0	54.0
More active		63.1	46.5	48.0	56.5
Much more active		69.3	57.8	22.5	55.6
Student's Health Status [Parent-reported]					
Fair or poor (<i>reference category</i>)		50.6	47.1	27.2	45.4
Good		72.8	66.4	38.3	63.2*
Very good		60.7	52.0	31.9	52.2
Excellent		68.0	43.5	40.3	58.9
School and SFA Characteristics					
Share of Students Approved for Free or Reduced-Price Meals					
Less than 40 percent (<i>reference category</i>)		61.2	51.9	43.4	57.1
40 percent or more		67.3	47.3	26.9	55.5

	Yes/ No	Elementary Schools	Middle Schools	High Schools	All Schools
Urbanicity					
Urban (<i>reference category</i>)		62.3	38.1	62.7	51.5
Suburban		71.4	64.5*	26.6*	62.7
Rural		62.8	39.7	27.5*	49.6
School Size					
Fewer than 500 students (<i>reference category</i>)		62.6	42.0	57.4	52.4
500 to 999 students		68.1	51.1	51.4	55.3
1,000 or more students			46.5	23.6**	62.7
FNS Region					
Mid-Atlantic (<i>reference category</i>)		68.0	47.4	22.3	51.3
Northeast		60.5	65.3	73.7**	61.7
Southeast		59.2	56.5	19.7	46.0
Midwest		71.9	46.8	47.4	62.8
Southwest		70.3	46.0	25.7	56.8
Mountain Plains		68.3	64.5	39.0	63.5
Western		63.7	34.3	63.3*	56.2
Price Charged for Paid Breakfast					
School Offered Free Breakfast to All Students		63.7	32.5	24.8	54.0
Less than \$1.25 (<i>reference category</i>)		72.1	40.6	45.8	61.2
\$1.25 to \$1.49		55.7	48.6	30.7	48.9*
\$1.50 to \$1.99		78.1	60.2	55.2	61.6
\$2.00 or more		65.5	†	42.7	61.6
Number of Students		418	244	237	899
Number of Schools		93	76	76	245

Source: School Nutrition and Meal Cost Study, Child/Youth Interview, Parent Interview, School Food Authority Director Survey, Common Core of Data (CCD) 2011-2012, 2011 U.S. Census Bureau's Small Area Income and Poverty Estimates school district file, and Food and Nutrition Service's SFA Verification Summary Report 2012-2013, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression-adjusted mean percentages of students who (1) attended a school that offered the SBP; (2) ever ate a school breakfast; and (3) reported that they "liked" the school breakfast (as opposed to not liking the school breakfast or considering it to be "only okay"). Estimates control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid breakfast. Variables with rows labeled "Y" and "N" report adjusted mean SBP satisfaction rates within schools that do and do not meet the variable criteria, respectively. Otherwise, regression-adjusted means are reported for each category within a variable. See Appendix C for more details on characteristic descriptions and selection methods.

Difference in satisfaction rates between schools with and without a dichotomous characteristic is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level. For variables containing multiple categories, the difference in satisfaction rates between schools in the corresponding category and schools in the reference category is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

† Variable was excluded from the model due to low within-sample variation or high correlation with another variable that better explained variation in student satisfaction with SBP breakfasts.

FNS = Food and Nutrition Service; SBP = School Breakfast Program; SFA = school food authority.

Table D.34. Regression Coefficient Estimates for the Relationships between Student Satisfaction with SBP Breakfasts and Key Characteristics of Students, Schools, and SFAs

	Elementary Schools	Middle Schools	High Schools	All Schools
Student Characteristics				
Student Race and Ethnicity				
White, non-Hispanic (<i>reference category</i>)	--0--	--0--	--0--	--0--
Hispanic	43.9 (35.4)	50.5 (60.2)	-58.5 (79.4)	13.8 (20.0)
Black, non-Hispanic	-23.2 (38.8)	244.5* (101.0)	-18.9 (71.6)	6.6 (28.1)
Other	-156.7* (61.9)	-21.0 (65.0)	-124.6 (110.8)	-95.6* (37.8)
Student Is Female	1.7 (30.5)	20.2 (40.7)	-32.3 (65.3)	-11.1 (22.4)
Student Is Certified for Free or Reduced-Price Meals	-90.7 (52.2)	62.8 (57.7)	-29.5 (69.0)	-16.8 (25.6)
Student Is a Picky Eater [Parent-reported]				
Yes, very (<i>reference category</i>)	--0--	--0--	--0--	--0--
Somewhat	-12.5 (41.2)	-41.4 (50.4)	-114.7 (94.8)	-37.2 (31.3)
No	-16.7 (46.8)	-88.3 (68.2)	-40.0 (77.1)	-37.2 (29.0)
Amount Student Eats Compared to Students of the Same Age [Parent-reported]				
Larger amount (<i>reference category</i>)	--0--	--0--	--0--	--0--
Same amount	-10.5 (35.8)	96.4 (61.9)	54.8 (65.2)	4.4 (20.3)
Smaller amount	-7.0 (54.0)	-7.0 (76.4)	-54.5 (148.8)	-15.3 (41.3)
Student Has Food Allergies or Special Dietary Needs	40.7 (47.7)	-36.3 (99.7)	10.9 (65.4)	13.2 (27.8)
Student's Level of Activity Compared to Students of the Same Age [Parent-reported]				
Less active (<i>reference category</i>)	--0--	--0--	--0--	--0--
About as active	-59.2 (47.8)	-78.3 (64.4)	-7.2 (64.4)	-34.7 (26.2)
More active	-69.0 (51.2)	-58.5 (62.9)	87.4 (82.3)	-22.9 (31.8)
Much more active	-35.4 (50.5)	6.2 (80.5)	-70.2 (90.5)	-26.9 (33.1)

	Elementary Schools	Middle Schools	High Schools	All Schools
Student's health status [Parent-reported]				
Fair or poor (<i>reference category</i>)	--0--	--0--	--0--	--0--
Good	115.9 (67.8)	117.9 (109.7)	73.2 (109.4)	84.9* (36.1)
Very good	49.8 (75.0)	29.0 (90.7)	32.5 (100.8)	31.6 (37.5)
Excellent	88.6 (70.1)	-21.2 (89.9)	85.6 (104.4)	63.5 (39.1)
School and SFA Characteristics				
Share of Students Approved for Free or Reduced-Price Meals				
Less than 40 percent (<i>reference category</i>)	--0--	--0--	--0--	--0--
40 percent or more	32.6 (38.8)	-27.0 (74.6)	-100.9 (59.4)	-8.1 (24.3)
Urbanicity				
Urban (<i>reference category</i>)	--0--	--0--	--0--	--0--
Suburban	49.3 (41.1)	147.8* (74.3)	-226.3* (90.3)	54.8 (27.7)
Rural	2.5 (42.3)	8.9 (91.4)	-220.1* (90.9)	-8.8 (25.9)
School Size				
Fewer than 500 students (<i>reference category</i>)	--0--	--0--	--0--	--0--
500 to 999 students	29.2 (28.1)	54.2 (60.6)	-40.9 (69.5)	13.9 (21.0)
1,000 or more students	‡	27.0 (95.7)	-253.6** (86.4)	51.2 (35.1)
FNS Region				
Mid-Atlantic (<i>reference category</i>)	--0--	--0--	--0--	--0--
Northeast	-39.7 (58.3)	105.8 (112.4)	343.8** (122.8)	50.8 (36.5)
Southeast	-46.6 (53.3)	53.2 (152.3)	-22.9 (95.1)	-25.0 (35.2)
Midwest	22.8 (47.9)	-3.8 (115.4)	175.7 (96.0)	56.1 (34.0)
Southwest	13.1 (43.0)	-8.2 (125.9)	28.3 (96.3)	26.4 (34.0)
Mountain Plains	1.6 (56.5)	100.9 (161.5)	122.8 (85.1)	59.6 (45.6)
Western	-23.3 (46.3)	-79.9 (115.8)	274.0* (117.6)	23.7 (37.5)

	Elementary Schools	Middle Schools	High Schools	All Schools
Price Charged for Paid Breakfast				
School Offered Free Breakfast to All Students	-46.1 (31.3)	-47.9 (82.7)	-133.9 (87.5)	-34.8 (27.2)
Less than \$1.25 (<i>reference category</i>)	--0--	--0--	--0--	--0--
\$1.25 to \$1.49	-86.9 (44.7)	45.1 (74.9)	-92.9 (78.7)	-59.2* (27.0)
\$1.50 to \$1.99	38.0 (54.8)	110.6 (80.6)	55.9 (67.7)	2.0 (35.3)
\$2.00 or more	-36.7 (56.7)	†	-17.9 (98.2)	1.9 (45.7)
Number of Students	418	244	237	899
Number of Schools	93	76	76	245

Source: School Nutrition and Meal Cost Study, Child/Youth Interview, Parent Interview, School Food Authority Director Survey, Common Core of Data (CCD) 2011-2012, 2011 U.S. Census Bureau's Small Area Income and Poverty Estimates school district file, and Food and Nutrition Service's SFA Verification Summary Report 2012-2013, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression coefficients (with standard errors in parentheses) from multivariate models that control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid breakfast. See Appendix C for more details on characteristic descriptions and selection methods.

Relationship between characteristic and satisfaction rate is significantly different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

--0-- = Reference category. Coefficient estimates for mutually exclusive categories are relative to the reference category's satisfaction rate.

† Variable was excluded from the model due to low within-sample variation or high correlation with another variable that better explained variation in student satisfaction with SBP breakfasts.

‡ Category was combined with the above category due to sparseness of observations.

FNS = Food and Nutrition Service; NSLP = National School Lunch Program; SFA = school food authority.

Table D.35. Relationships between Parent’s Level of Satisfaction with NSLP Lunches and Key Characteristics of the Lunches: Regression-Adjusted Mean Satisfaction Rates

	Yes/ No	All Schools		
		Very Satisfied	Somewhat Satisfied	Not Satisfied
Mean Percentages of Parents with Different Levels of Satisfaction with NSLP Lunches		24.3	50.3	25.4
Overall Nutritional Quality of Prepared NSLP Lunches				
Total HEI-2010 Score of Average Lunch Prepared				
Lowest Quartile—64.9 to 79.5 points (<i>reference category</i>)		26.8	50.4	22.9
Second Quartile—79.6 to 83.0 points		20.9*	50.1	29.0**
Third Quartile—83.1 to 85.7 points		25.1	50.5	24.5
Highest Quartile—85.8 to 92.8 points		24.5	50.5	25.0
Compliance of Daily and Weekly Lunch Menus with NSLP Nutrition Standards				
Met Daily Quantity Requirement for Grains	Y	22.7	50.2	27.1
	N	26.1	50.3	23.6
Met Daily Quantity Requirement for Meats/Meat Alternates	Y	24.6	50.4	25.1
	N	24.1	50.4	25.5
Met Daily Quantity Requirement for Vegetables	Y	24.9	50.3	24.8
	N	23.8	50.3	25.9
Met Weekly Quantity Requirement for Meats/Meat Alternates	Y	24.4	50.3	25.2
	N	24.5	50.3	25.1
Met Weekly Quantity Requirement for Vegetables	Y	23.2	50.4	26.4
	N	29.2	50.0	20.8
Met Requirement that at Least Half of Weekly Grains Are Whole Grain-Rich	Y	24.1	50.3	25.5
	N	28.6	50.0	21.3
Met Minimum Calorie Level	Y	23.2	50.1	26.7
	N	26.8	50.1	23.1
Met Maximum Calorie Level	Y	24.3	50.4	25.4
	N	24.8	50.4	24.8
Met Target 1 Sodium Limit	Y	24.9	50.4	24.7
	N	22.9	50.3	26.8
Types of Foods Offered in Lunch Menus				
All Daily Menus Offered Raw Vegetables	Y	22.7	50.4	26.9
	N	26.7	50.4	22.9
Median Number of Vegetable Choices Offered per Day				
2 or fewer (<i>reference category</i>)		23.3	50.2	26.5
3 to 4		26.4	50.2	23.4
5 or more		23.2	50.2	26.7

	Yes/ No	All Schools		
		Very Satisfied	Somewhat Satisfied	Not Satisfied
More than Half of Daily Menus Offered Dark Green Vegetables or Legumes	Y	24.5	50.4	25.2
	N	24.5	50.4	25.2
More than Half of Daily Menus Offered Red and Orange Vegetables	Y	27.9**	49.9	22.1**
	N	21.8	49.9	28.4
At Least One Daily Menu Offered Side Salad Bar	Y	29.7*	49.8	20.5*
	N	23.7	50.3	26.0
No Daily Menus Offered French Fries or Similar Potato Products	Y	22.7	50.2	27.2
	N	25.3	50.3	24.4
Percentage of Daily Menus that Offered Pizza or Pizza Products				
Less than 20 percent (<i>reference category</i>)		25.9	50.6	23.4
Between 20 and 99 percent		25.2	50.7	24.1
100 percent		21.1	50.3	28.6
At Least One Daily Menu Offered Breaded Meat (as Separate Choice or as Part of a Sandwich)	Y	24.3	50.4	25.4
	N	25.4	50.4	24.2
Number of Students		1,793	1,793	1,793
Number of Schools		288	288	288

Source: School Nutrition and Meal Cost Study, Parent Interview, and Menu Survey, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression-adjusted mean levels of satisfaction among parents who reported that their child had ever eaten a school lunch. The “not satisfied” category includes responses of “somewhat dissatisfied” and “very dissatisfied” because very few parents reported that they were very dissatisfied with school lunches. Estimates control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid lunch. Variables with rows labeled “Y” and “N” report adjusted mean NSLP satisfaction rates within schools that do and do not meet the variable criteria, respectively. Otherwise, regression-adjusted means are reported for each category within a variable. See Appendix C for more details on characteristic descriptions and selection methods.

Difference in satisfaction rates between schools with and without a dichotomous characteristic is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level. For variables containing multiple categories, the difference in satisfaction rates between schools in the corresponding category and schools in the reference category is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

HEI = Healthy Eating Index; NSLP = National School Lunch Program; SFA = school food authority.

Table D.36. Regression Coefficient Estimates for the Relationships between Parent’s Level of Satisfaction with NSLP Lunches and Key Characteristics of the Lunches: All Schools

	All Schools		
	Very Satisfied	Somewhat Satisfied	Not Satisfied
Overall Nutritional Quality of Prepared SBP Breakfast			
Total HEI-2010 Score of Average Lunch Prepared			
Lower Quartile (<i>reference category</i>)	--0--	--0--	--0--
Second Quartile	-5.9* (2.3)	-0.3 (0.3)	6.2** (2.4)
Third Quartile	-1.7 (2.7)	0.1 (0.2)	1.6 (2.5)
Upper Quartile	-2.3 (3.4)	0.1 (0.2)	2.2 (3.3)
Compliance of Daily and Weekly Breakfast Menus with SBP Nutrition Standards			
Met Daily Quantity Requirement for Grains	-3.4 (1.9)	-0.1 (0.2)	3.5 (2.0)
Met Daily Quantity Requirement for Meats/Meat Alternates	0.5 (3.0)	0.0 (0.1)	-0.5 (3.0)
Met Daily Quantity Requirement for Vegetables	1.1 (2.5)	0.0 (0.1)	-1.1 (2.6)
Met Weekly Quantity Requirement for Meats/Meat Alternates	-0.1 (2.5)	0.0 (0.0)	0.1 (2.5)
Met Weekly Quantity Requirement for Vegetables	-6.0 (3.8)	0.4 (0.6)	5.6 (3.2)
Met Requirement that at Least Half of Weekly Grains Are Whole Grain-Rich	-4.5 (3.3)	0.3 (0.5)	4.2 (2.8)
Met Minimum Calorie Level	-3.6 (2.1)	0.0 (0.2)	3.6 (2.0)
Met Maximum Calorie Level	-0.6 (3.1)	0.0 (0.0)	0.6 (3.1)
Met Target 1 Sodium Limit	2.0 (2.6)	0.1 (0.2)	-2.1 (2.9)
Types of Foods Offered in Breakfast Menu			
All Daily Menus Offered Raw Vegetables	-4.0 (2.3)	0.0 (0.2)	4.1 (2.3)
Median Number of Vegetable Choices Offered per Day			
2 or fewer (<i>reference category</i>)	--0--	--0--	--0--
3 to 4	3.2 (3.0)	0.0 (0.2)	-3.2 (3.0)
5 or more	-0.1 (4.1)	0.0 (0.4)	0.1 (4.5)

	All Schools		
	Very Satisfied	Somewhat Satisfied	Not Satisfied
More than Half of Daily Menus Offered Dark Green Vegetables or Legumes	0.0 (2.0)	0.0 (0.0)	0.0 (2.1)
More than Half of Daily Menus Offered Red and Orange Vegetables	6.1** (2.3)	0.1 (0.3)	-6.2** (2.3)
At Least One Daily Menu Offered Side Salad Bar	6.0* (3.0)	-0.5 (0.6)	-5.5* (2.5)
No Daily Menus Offered French Fries or Similar Potato Products	-2.7 (2.0)	-0.1 (0.2)	2.8 (2.1)
Percentage of Daily Menus that Offered Pizza or Pizza Products			
Less than 20 percent (reference category)	--0--	--0--	--0--
Between 20 and 99 percent	-0.7 (-0.7)	0.0 (0.0)	0.7 (0.7)
100 percent	-4.8 (3.4)	-0.3 (0.4)	5.1 (3.7)
At Least One Daily Menu Offered Breaded Meat (as Separate Choice or as Part of a Sandwich)	-1.1 (2.6)	0.0 (0.1)	1.1 (2.6)
Student Characteristics			
Student Race and Ethnicity			
White, non-Hispanic (reference category)	--0--	--0--	--0--
Hispanic	2.9 (3.4)	-0.1 (0.3)	-2.8 (3.2)
Black, non-Hispanic	-3.7 (3.5)	-0.5 (0.7)	4.2 (4.3)
Other	-1.0 (3.1)	0.0 (0.2)	1.0 (3.3)
Student Is Female	-2.2 (1.9)	0.0 (0.1)	2.3 (2.0)
Student Is Certified for Free or Reduced-Price Meals	14.0*** (2.7)	0.4 (0.6)	-14.3*** (2.7)
Student Is a Picky Eater [Parent-reported]			
Yes, very (reference category)	--0--	--0--	--0--
Somewhat	-2.2 (3.4)	0.0 (0.2)	2.2 (3.3)
No	-1.8 (3.8)	0.0 (0.2)	1.7 (3.7)

	All Schools		
	Very Satisfied	Somewhat Satisfied	Not Satisfied
Amount Student Eats Compared to Students of the Same Age [Parent-reported]			
Larger amount (reference category)	--0--	--0--	--0--
Same amount	-0.8 (2.8)	0.0 (0.0)	0.8 (2.8)
Smaller amount	-0.5 (3.3)	0.0 (0.0)	0.5 (3.3)
Student Has Food Allergies or Special Dietary Needs	-3.0 (2.9)	-0.3 (0.4)	3.3 (3.4)
Student's Level of Activity Compared to Students of the Same Age [Parent-reported]			
Less active (<i>reference category</i>)	--0--	--0--	--0--
About as active	-3.6 (3.0)	0.2 (0.3)	3.4 (2.7)
More active	-4.7 (3.3)	0.1 (0.3)	4.5 (3.1)
Much more active	-2.6 (3.5)	0.2 (0.3)	2.4 (3.2)
School and SFA Characteristics			
Share of Students Approved for Free or Reduced-Price Meals			
Less than 40 percent (<i>reference category</i>)	--0--	--0--	--0--
40 percent or more	2.5 (2.1)	0.1 (0.1)	-2.6 (2.2)
Urbanicity			
Urban (<i>reference category</i>)	--0--	--0--	--0--
Suburban	2.0 (2.3)	-0.2 (0.2)	-1.9 (2.1)
Rural	-6.7** (2.5)	-1.0 (0.6)	7.7** (2.9)
School Size			
Fewer than 500 students (<i>reference category</i>)	--0--	--0--	--0--
500 to 999 students	0.7 (2.7)	0.0 (0.2)	-0.8 (2.8)
1,000 or more students	2.2 (2.9)	0.0 (0.2)	-2.2 (2.9)

	All Schools		
	Very Satisfied	Somewhat Satisfied	Not Satisfied
FNS Region			
Mid-Atlantic (<i>reference category</i>)	--0--	--0--	--0--
Northeast	-2.2 (4.9)	-0.3 (0.7)	2.5 (5.6)
Southeast	3.3 (4.4)	0.0 (0.3)	-3.3 (4.5)
Midwest	-0.7 (4.2)	-0.1 (0.4)	0.8 (4.6)
Southwest	8.4 (4.4)	-1.0 (0.6)	-7.4 (4.3)
Mountain Plains	-3.5 (4.3)	-0.6 (0.8)	4.1 (5.1)
Western	-2.7 (4.2)	-0.4 (0.6)	3.1 (4.8)
Price Charged for Paid Lunches			
School Offered Free Lunch to All Students	-5.5 (3.2)	-0.1 (0.5)	5.7 (3.5)
\$2.25 or less (<i>reference category</i>)	--0--	--0--	--0--
\$2.26 to \$2.50	-4.4 (2.7)	0.0 (0.3)	4.4 (2.8)
\$2.51 to \$2.75	-6.8** (2.5)	-0.4 (0.5)	7.2* (2.9)
More than \$2.75	-3.0 (3.3)	0.1 (0.2)	2.9 (3.2)
Number of Students	1,793	1,793	1,793
Number of Schools	288	288	288

Source: School Nutrition and Meal Cost Study, Parent Interview, and Menu Survey, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression coefficients (with standard errors in parentheses) from multivariate models that control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid lunch. See Appendix C for more details on characteristic descriptions and selection methods.

Relationship between characteristic and satisfaction rate is significantly different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

--0-- = Reference category. Coefficient estimates for mutually exclusive categories are relative to the reference category's satisfaction rate.

HEI = Healthy Eating Index; FNS = Food and Nutrition Service; NSLP = National School Lunch Program; SFA = school food authority.

Table D.37. Relationships between Parent’s Level of Satisfaction with NSLP Lunches and School Foodservice Operations: Regression-Adjusted Mean Satisfaction Rates

	Yes/ No	All Schools		
		Very Satisfied	Somewhat Satisfied	Not Satisfied
Mean Percentages of Parents with Different Levels of Satisfaction with NSLP Lunches		24.3	50.3	25.4
Food Purchasing Characteristics				
SFA Uses Alliance for a Healthier Generation or Other Similar Tools for Selecting and Purchasing Healthy Foods	Y	24.9	50.4	24.8
	N	24.0	50.3	25.6
SFA Participates in a Food Purchasing Cooperative	Y	28.0**	50.1	21.9*
	N	20.7	49.9	29.3
SFA Is Engaged in a Pouring Rights Contract	Y	23.6	50.3	26.0
	N	24.8	50.3	24.9
Schools in SFA Offer Brand-Name or Chain Restaurant Foods	Y	23.1	50.3	26.6
	N	24.5	50.4	25.1
School Participates in Farm to School Program	Y	25.7	50.3	24.0
	N	24.2	50.3	25.5
Menu Planning and Meal Service Characteristics				
School Uses Cycle Menus	Y	24.3	50.3	25.3
	N	24.6	50.4	25.1
School Participates in the Fresh Fruit and Vegetable Program	Y	26.0	50.4	23.6
	N	24.1	50.4	25.5
School Receives Fully or Partially Prepared Meals from a Separate Production or Central Kitchen	Y	19.8*	49.7	30.5*
	N	25.4	50.4	24.3
SFA Uses a Foodservice Management Company	Y	26.9	50.1	23.0
	N	23.8	50.2	26.0
School Has Policies and Procedures for Accommodating Students with Food Allergies or Special Dietary Needs	Y	24.2	50.4	25.5
	N	26.3	50.3	23.4
Number of HealthierUS School Challenge Smarter Lunchroom Techniques Used				
Zero (<i>reference category</i>)		23.9	50.4	25.7
1		25.0	50.4	24.6
2 to 3		25.2	50.4	24.4
4 to 7		22.7	50.3	27.1
Price Charged for Paid Lunches				
School Offered Free Lunch to All Students		23.4	50.9	25.8
\$2.25 or less (<i>reference category</i>)		28.3	50.6	21.2
\$2.26 to \$2.50		21.2*	50.6	28.2*
\$2.51 to \$2.75		20.2**	50.3	29.5*
More than \$2.75		20.4*	50.4	29.2*

	Yes/ No	All Schools		
		Very Satisfied	Somewhat Satisfied	Not Satisfied
Number of Students		1,793	1,793	1,793
Number of Schools		288	288	288

Source: School Nutrition and Meal Cost Study, Parent Interview, School Food Authority Director Survey, School Nutrition Manager Survey, and Cafeteria Observation Guide, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression-adjusted mean levels of satisfaction among parents who reported that their child had ever eaten a school lunch. The “not satisfied” category includes responses of “somewhat dissatisfied” and “very dissatisfied” because very few parents reported that they were very dissatisfied with school lunches. Estimates control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid lunch. Variables with rows labeled “Y” and “N” report adjusted mean NSLP satisfaction rates within schools that do and do not meet the variable criteria, respectively. Otherwise, regression-adjusted means are reported for each category within a variable. See Appendix C for more details on characteristic descriptions and selection methods.

Difference in satisfaction rates between schools with and without a dichotomous characteristic is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level. For variables containing multiple categories, the difference in satisfaction rates between schools in the corresponding category and schools in the reference category is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

NSLP = National School Lunch Program; SFA = school food authority.

Table D.38. Regression Coefficient Estimates for the Relationships between Parent’s Level of Satisfaction with NSLP Lunches and School Foodservice Operations: All Schools

	All Schools		
	Very Satisfied	Somewhat Satisfied	Not Satisfied
Food Purchasing Characteristics			
SFA Uses Alliance for a Healthier Generation or Other Similar Tools for Selecting and Purchasing Healthy Foods	0.8 (2.5)	0.0 (0.1)	-0.8 (2.6)
SFA Participates in a Food Purchasing Cooperative	7.3** (2.8)	0.2 (0.4)	-7.5* (3.0)
SFA Is Engaged in a Pouring Rights Contract	-1.1 (2.6)	0.0 (0.1)	1.1 (2.8)
Schools in SFA Offer Brand-Name or Chain Restaurant Foods	-1.4 (4.3)	-0.1 (0.4)	1.5 (4.7)
School Participates in Farm to School Program	1.6 (3.3)	0.0 (0.1)	-1.6 (3.2)
Menu Planning and Meal Service Characteristics			
School Uses Cycle Menus	-0.2 (2.3)	0.0 (0.0)	0.2 (2.3)
School Participates in the Fresh Fruit and Vegetable Program	1.9 (4.0)	0.0 (0.2)	-1.8 (3.8)
School Receives Fully or Partially Prepared Meals from a Separate Production or Central Kitchen	-5.6* (2.5)	-0.7 (0.6)	6.3* (3.1)
SFA Uses a Foodservice Management Company	3.1 (3.0)	-0.1 (0.2)	-3.0 (2.8)
School Has Policies and Procedures for Accommodating Students with Food Allergies or Special Dietary Needs	-2.2 (3.7)	0.0 (0.3)	2.1 (3.5)
Number of HealthierUS School Challenge Smarter Lunchroom Techniques Used			
Zero (<i>reference category</i>)	--0--	--0--	--0--
1	1.1 (2.9)	0.0 (0.1)	-1.2 (3.0)
2 to 3	1.3 (3.0)	0.0 (0.1)	-1.4 (3.1)
4 to 7	-1.2 (3.4)	-0.1 (0.3)	1.3 (3.7)

	All Schools		
	Very Satisfied	Somewhat Satisfied	Not Satisfied
Price Charged for Paid Lunches			
School Offered Free Lunch to All Students	-4.9 (2.9)	0.3 (0.3)	4.6 (2.9)
\$2.25 or less (reference category)	--0--	--0--	--0--
\$2.26 to \$2.50	-7.0* (2.9)	0.0 (0.5)	7.0* (3.1)
\$2.51 to \$2.75	-8.1** (3.0)	-0.3 (0.6)	8.4* (3.3)
More than \$2.75	-7.8* (3.4)	-0.2 (0.7)	8.0* (3.9)
Student Characteristics			
Student Race and Ethnicity			
White, non-Hispanic (reference category)	--0--	--0--	--0--
Hispanic	3.2 (3.7)	-0.2 (0.3)	-3.1 (3.4)
Black, non-Hispanic	-3.1 (3.6)	-0.4 (0.7)	3.5 (4.2)
Other	-1.8 (3.0)	-0.1 (0.3)	1.9 (3.3)
Student Is Female	-2.1 (1.9)	0.0 (0.1)	2.2 (1.9)
Student Is Certified for Free or Reduced-Price Meals	13.5*** (2.9)	0.4 (0.6)	-13.9*** (2.9)
School and SFA Characteristics			
Share of Students Approved for Free or Reduced-Price Meals			
Less than 40 percent (<i>reference category</i>)	--0--	--0--	--0--
40 percent or more	3.1 (2.8)	0.1 (0.2)	-3.2 (3.0)
Urbanicity			
Urban (<i>reference category</i>)	--0--	--0--	--0--
Suburban	2.7 (2.5)	-0.2 (0.2)	-2.5 (2.4)
Rural	-6.9* (2.8)	-1.3 (0.7)	8.2* (3.3)

	All Schools		
	Very Satisfied	Somewhat Satisfied	Not Satisfied
School Size			
Fewer than 500 students (<i>reference category</i>)	--0--	--0--	--0--
500 to 999 students	-1.0 (2.4)	0.0 (0.1)	1.0 (2.4)
1,000 or more students	0.7 (3.4)	0.0 (0.1)	-0.7 (3.3)
FNS Region			
Mid-Atlantic (<i>reference category</i>)	--0--	--0--	--0--
Northeast	-0.9 (5.0)	-0.1 (0.4)	1.0 (5.4)
Southeast	5.0 (4.1)	-0.4 (0.4)	-4.7 (3.9)
Midwest	-1.3 (3.4)	-0.1 (0.3)	1.4 (3.7)
Southwest	4.2 (3.7)	-0.2 (0.4)	-3.9 (3.6)
Mountain Plains	-2.3 (4.0)	-0.3 (0.5)	2.5 (4.5)
Western	-3.3 (4.1)	-0.5 (0.7)	3.8 (4.7)
Number of Students	1,793	1,793	1,793
Number of Schools	288	288	288

Source: School Nutrition and Meal Cost Study, Parent Interview, School Food Authority Director Survey, School Nutrition Manager Survey, and Cafeteria Observation Guide, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression coefficients (with standard errors in parentheses) from multivariate models that control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid lunch. See Appendix C for more details on characteristic descriptions and selection methods.

Relationship between characteristic and satisfaction rate is significantly different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

--0-- = Reference category. Coefficient estimates for mutually exclusive categories are relative to the reference category's satisfaction rate.

FNS = Food and Nutrition Service; NSLP = National School Lunch Program; SFA = school food authority.

Table D.39. Relationships between Parent’s Level of Satisfaction with NSLP Lunches and Key Characteristics of the School Food Environment: Regression-Adjusted Mean Satisfaction Rates

	Yes/ No	All Schools		
		Very Satisfied	Somewhat Satisfied	Not Satisfied
Mean Percentages of Parents with Different Levels of Satisfaction with NSLP Lunches		24.3	50.3	25.4
Wellness Policies and Practices				
SFA Has Nutrition Standards for School Meals that Exceed Federal Standards	Y	24.1	50.3	25.6
	N	24.6	50.4	25.0
School Conducted a Nutrition Education Activity in the Classroom or Foodservice Area	Y	26.0	50.4	23.6
	N	22.4	50.3	27.3
School Operates a School Garden (<i>elementary schools only</i>)	Y	13.9**	46.3	39.9*
	N	25.0	50.4	24.6
Competitive Foods				
School Sells Foods Other than Milk on an A la Carte Basis	Y	25.4	50.2	24.4
	N	20.3	49.6	30.2
School Sells Foods and Beverages in Vending Machine	Y	23.0	50.5	26.5
	N	25.3	50.5	24.2
School Sells Foods and/or Beverages via a School Store or Snack Bar	Y	26.5	50.4	23.1
	N	23.6	50.4	26.0
SFA Has Standards for Competitive Foods that Exceed Smart Snacks in Schools Standards	Y	26.9	50.3	22.8
	N	24.2	50.4	25.4
Meal Service Practices				
Length of Lunch Period				
Less than 30 minutes (<i>reference category</i>)		23.1	50.3	26.7
30 to 44 minutes		25.2	50.3	24.4
45 minutes or more		23.5	50.3	26.2
School Has Other Activities Scheduled during Lunch Period	Y	26.7	50.2	23.1
	N	23.5	50.2	26.3
School Has More than One Line or Station that Offers Reimbursable Lunches or Components of Reimbursable Lunches	Y	26.2	50.0	23.8
	N	22.3	49.8	27.9
Number of Students		1,793	1,793	1,793
Number of Schools		288	288	288

Source: School Nutrition and Meal Cost Study, Parent Interview, School Food Authority Director Survey, School Nutrition Manager Survey, Principal Survey, Vending Machine and Other Sources of Foods and Beverages Checklist, A la Carte Checklist, and Cafeteria Observation Guide, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression-adjusted mean levels of satisfaction among parents who reported that their child had ever eaten a school lunch. The “not satisfied” category includes responses of “somewhat dissatisfied”

and “very dissatisfied” because very few parents reported that they were very dissatisfied with school lunches. Estimates control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid lunch. Variables with rows labeled “Y” and “N” report adjusted mean NSLP satisfaction rates within schools that do and do not meet the variable criteria, respectively. Otherwise, regression-adjusted means are reported for each category within a variable. See Appendix C for more details on characteristic descriptions and selection methods.

Difference in satisfaction rates between schools with and without a dichotomous characteristic is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level. For variables containing multiple categories, the difference in satisfaction rates between schools in the corresponding category and schools in the reference category is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

NSLP = National School Lunch Program; SFA = school food authority.

Table D.40. Regression Coefficient Estimates for the Relationships between Parent’s Level of Satisfaction with NSLP Lunches and Key Characteristics of the School Food Environment: All Schools

	All Schools		
	Very Satisfied	Somewhat Satisfied	Not Satisfied
Wellness Policies and Practices			
SFA Has Nutrition Standards for School Meals that Exceed Federal Standards	-0.6 (2.5)	0.0 (0.1)	0.6 (2.5)
School Conducted a Nutrition Education Activity in the Classroom or Foodservice Area	3.6 (2.1)	0.1 (0.2)	-3.7 (2.1)
School Operates a School Garden	-11.1** (3.4)	-4.2 (2.9)	15.3* (6.3)
Competitive Foods			
School Sells Foods Other than Milk on an A la Carte Basis	5.1 (2.7)	0.6 (0.7)	-5.7 (3.4)
School Sells Foods and Beverages in Vending Machine	-2.3 (2.4)	-0.1 (0.1)	2.4 (2.5)
School Sells Foods and/or Beverages via a School Store or Snack Bar	2.9 (2.0)	0.0 (0.2)	-2.9 (1.9)
SFA Has Standards for Competitive Foods that Exceed Smart Snacks in Schools Standards	2.7 (4.0)	-0.1 (0.4)	-2.6 (3.7)
Meal Service Practices			
Length of Lunch Period			
Less than 30 minutes (<i>reference category</i>)	--0--	--0--	--0--
30 to 44 minutes	2.2 (2.5)	0.1 (0.2)	-2.3 (2.6)
45 minutes or more	0.5 (2.5)	0.0 (0.2)	-0.5 (2.7)
School Has Other Activities Scheduled during Lunch Period	3.2 (2.3)	0.0 (0.2)	-3.2 (2.2)
School Has More than One Line or Station that Offers Reimbursable Lunches or Components of Reimbursable Lunches	3.9 (2.5)	0.2 (0.2)	-4.1 (2.6)

	All Schools		
	Very Satisfied	Somewhat Satisfied	Not Satisfied
Student Characteristics			
Student Race and Ethnicity			
White, non-Hispanic (reference category)	--0--	--0--	--0--
Hispanic	3.1 (3.3)	-0.2 (0.3)	-2.9 (3.1)
Black, non-Hispanic	-4.8 (3.5)	-0.8 (0.9)	5.6 (4.4)
Other	-1.5 (3.1)	-0.1 (0.3)	1.6 (3.4)
Student Is Female	-2.0 (1.9)	0.0 (0.1)	2.1 (1.9)
Student Is Certified for Free or Reduced- Price Meals	13.3*** (2.6)	0.4 (0.6)	-13.7*** (2.7)
Student Is a Picky Eater [Parent-reported]			
Yes, very (reference category)	--0--	--0--	--0--
Somewhat	-2.7 (3.4)	0.0 (0.3)	2.6 (3.2)
No	-2.3 (4.0)	0.1 (0.2)	2.2 (3.8)
Amount Student Eats Compared to Students of the Same Age [Parent- reported]			
Larger amount (reference category)	--0--	--0--	--0--
Same amount	-1.2 (2.8)	0.0 (0.1)	1.2 (2.7)
Smaller amount	-2.0 (3.2)	0.0 (0.2)	2.0 (3.3)
Student Has Food Allergies or Special Dietary Needs	-4.0 (2.8)	-0.4 (0.6)	4.4 (3.4)
Student's Level of Activity Compared to Students of the Same Age [Parent- reported]			
Less active (reference category)	--0--	--0--	--0--
About as active	-3.0 (3.0)	0.1 (0.3)	2.9 (2.8)
More active	-4.0 (3.2)	0.1 (0.3)	3.9 (3.1)
Much more active	-2.5 (3.4)	0.1 (0.3)	2.3 (3.2)

	All Schools		
	Very Satisfied	Somewhat Satisfied	Not Satisfied
School and SFA Characteristics			
Share of Students Approved for Free or Reduced-Price Meals			
Less than 40 percent (reference category)	--0--	--0--	--0--
40 percent or more	3.5 (2.5)	0.1 (0.2)	-3.6 (2.6)
Urbanicity			
Urban (reference category)	--0--	--0--	--0--
Suburban	3.6 (2.7)	-0.3 (0.2)	-3.4 (2.5)
Rural	-6.2* (2.6)	-1.3* (0.6)	7.5* (3.1)
School Size			
Fewer than 500 students (reference category)	--0--	--0--	--0--
500 to 999 students	0.4 (2.7)	0.0 (0.1)	-0.4 (2.9)
1,000 or more students	1.6 (3.3)	0.0 (0.1)	-1.6 (3.4)
FNS Region			
Mid-Atlantic (<i>reference category</i>)	--0--	--0--	--0--
Northeast	0.3 (4.8)	0.0 (0.8)	-0.3 (5.6)
Southeast	7.9 (4.0)	-0.2 (0.7)	-7.7 (4.1)
Midwest	1.0 (3.3)	0.2 (0.5)	-1.2 (3.8)
Southwest	7.6* (3.4)	-0.1 (0.6)	-7.5* (3.6)
Mountain Plains	0.6 (3.8)	0.1 (0.6)	-0.7 (4.5)
Western	-0.2 (3.7)	0.0 (0.7)	0.3 (4.4)

	All Schools		
	Very Satisfied	Somewhat Satisfied	Not Satisfied
Price Charged for Paid Lunches			
School Offered Free Lunch to All Students	-4.4 (3.4)	0.2 (0.3)	4.3 (3.5)
\$2.25 or less (reference category)	--0--	--0--	--0--
\$2.26 to \$2.50	-6.7** (2.5)	-0.1 (0.6)	6.8* (2.7)
\$2.51 to \$2.75	-6.8** (2.6)	-0.2 (0.5)	7.0* (2.8)
More than \$2.75	-6.3* (3.1)	-0.1 (0.4)	6.4 (3.3)
Number of Students	1,793	1,793	1,793
Number of Schools	288	288	288

Source: School Nutrition and Meal Cost Study, Parent Interview, School Food Authority Director Survey, School Nutrition Manager Survey, Principal Survey, Vending Machine and Other Sources of Foods and Beverages Checklist, A la Carte Checklist, and Cafeteria Observation Guide, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression coefficients (with standard errors in parentheses) from multivariate models that control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid lunch. See Appendix C for more details on characteristic descriptions and selection methods.

Relationship between characteristic and satisfaction is significantly different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

--0-- = Reference category. Coefficient estimates for mutually exclusive categories are relative to the reference category's satisfaction rate.

FNS = Food and Nutrition Service; NSLP = National School Lunch Program; SFA = school food authority.

Table D.41. Relationships between Parent's Level of Satisfaction with NSLP Lunches and Key Characteristics of Students, Schools, and SFAs: Regression-Adjusted Mean Satisfaction Rates

	Yes/ No	All Schools		
		Very Satisfied	Somewhat Satisfied	Not Satisfied
Mean Percentages of Parents with Different Levels of Satisfaction with NSLP Lunches		24.3	50.3	25.4
Student Characteristics				
Student Race and Ethnicity				
White, non-Hispanic (<i>reference category</i>)		24.4	50.5	25.2
Hispanic		27.5	50.3	22.2
Black, non-Hispanic		19.6	49.7	30.8
Other		22.9	50.4	26.8
Student Is Female	Y	23.4	50.3	26.3
	N	25.4	50.4	24.2
Student Is Certified for Free or Reduced-Price Meals	Y	30.6***	51.3	18.1***
	N	17.3	50.9	31.8
School and SFA Characteristics				
Share of Students Approved for Free or Reduced-Price Meals				
Less than 40 percent (<i>reference category</i>)		22.3	50.6	27.2
40 percent or more		25.7	50.7	23.5
Urbanicity				
Urban (<i>reference category</i>)		24.6	50.2	25.2
Suburban		28.2	50.0	21.8
Rural		18.4*	49.0*	32.6*
School Size				
Fewer than 500 students (<i>reference category</i>)		23.9	50.2	26.0
500 to 999 students		24.2	50.2	25.6
1,000 or more students		25.4	50.2	24.4
FNS Region				
Mid-Atlantic (<i>reference category</i>)		21.4	50.2	28.4
Northeast		21.7	50.3	28.1
Southeast		29.3	50.1	20.7
Midwest		22.4	50.4	27.2
Southwest		29.0*	50.1	20.9*
Mountain Plains		22.0	50.3	27.7
Western		21.2	50.2	28.7

	Yes/ No	All Schools		
		Very Satisfied	Somewhat Satisfied	Not Satisfied
Price Charged for Paid Lunches				
School Offered Free Lunch to All Students		23.3	50.8	25.9
\$2.25 or less (<i>reference category</i>)		27.8	50.6	21.6
\$2.26 to \$2.50		21.1**	50.5	28.4*
\$2.51 to \$2.75		21.0**	50.4	28.6*
More than \$2.75		21.4*	50.5	28.0
Number of Students		1,793	1,793	1,793
Number of Schools		288	288	288

Source: School Nutrition and Meal Cost Study, Child/Youth Interview, Parent Interview, School Food Authority Director Survey, Common Core of Data (CCD) 2011-2012, 2011 U.S. Census Bureau's Small Area Income and Poverty Estimates school district file, and Food and Nutrition Service's SFA Verification Summary Report 2012-2013, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression-adjusted mean levels of satisfaction among parents who reported that their child had ever eaten a school lunch. The "not satisfied" category includes responses of "somewhat dissatisfied" and "very dissatisfied" because very few parents reported that they were very dissatisfied with school lunches. Estimates control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid lunch. Variables with rows labeled "Y" and "N" report adjusted mean NSLP satisfaction rates within schools that do and do not meet the variable criteria, respectively. Otherwise, regression-adjusted means are reported for each category within a variable. See Appendix C for more details on characteristic descriptions and selection methods.

Difference in satisfaction rates between schools with and without a dichotomous characteristic is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level. For variables containing multiple categories, the difference in satisfaction rates between schools in the corresponding category and schools in the reference category is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

FNS = Food and Nutrition Service; NSLP = National School Lunch Program; SFA = school food authority.

Table D.42. Regression Coefficient Estimates for the Relationships between Parent’s Level of Satisfaction with NSLP Lunches and Key Characteristics of Students, Schools, and SFAs: All Schools

	All Schools		
	Very Satisfied	Somewhat Satisfied	Not Satisfied
Student Characteristics			
Student Race and Ethnicity			
White, non-Hispanic (<i>reference category</i>)	--0--	--0--	--0--
Hispanic	3.1 (3.3)	-0.2 (0.3)	-2.9 (3.1)
Black, non-Hispanic	-4.8 (3.5)	-0.8 (0.9)	5.6 (4.4)
Other	-1.5 (3.1)	-0.1 (0.3)	1.6 (3.4)
Student Is Female	-2.0 (1.9)	0.0 (0.1)	2.1 (1.9)
Student Is Certified for Free or Reduced-Price Meals	13.3*** (2.6)	0.4 (0.6)	-13.7*** (2.7)
Student Is a Picky Eater [Parent-reported]			
Yes, very (<i>reference category</i>)	--0--	--0--	--0--
Somewhat	-2.7 (3.4)	0.0 (0.3)	2.6 (3.2)
No	-2.3 (4.0)	0.1 (0.2)	2.2 (3.8)
Amount Student Eats Compared to Students of the Same Age [Parent-reported]			
Larger amount (<i>reference category</i>)	--0--	--0--	--0--
Same amount	-1.2 (2.8)	0.0 (0.1)	1.2 (2.7)
Smaller amount	-2.0 (3.2)	0.0 (0.2)	2.0 (3.3)
Student Has Food Allergies or Special Dietary Needs	-4.0 (2.8)	-0.4 (0.6)	4.4 (3.4)
Student’s Level of Activity Compared to Students of the Same Age [Parent-reported]			
Less active (<i>reference category</i>)	--0--	--0--	--0--
About as active	-3.0 (3.0)	0.1 (0.3)	2.9 (2.8)
More active	-4.0 (3.2)	0.1 (0.3)	3.9 (3.1)
Much more active	-2.5 (3.4)	0.1 (0.3)	2.3 (3.2)

	All Schools		
	Very Satisfied	Somewhat Satisfied	Not Satisfied
School and SFA Characteristics			
Share of Students Approved for Free or Reduced-Price Meals			
Less than 40 percent (<i>reference category</i>)	--0--	--0--	--0--
40 percent or more	3.5 (2.5)	0.1 (0.2)	-3.6 (2.6)
Urbanicity			
Urban (<i>reference category</i>)	--0--	--0--	--0--
Suburban	3.6 (2.7)	-0.3 (0.2)	-3.4 (2.5)
Rural	-6.2* (2.6)	-1.3* (0.6)	7.5* (3.1)
School Size			
Fewer than 500 students (<i>reference category</i>)	--0--	--0--	--0--
500 to 999 students	0.4 (2.7)	0.0 (0.1)	-0.4 (2.9)
1,000 or more students	1.6 (3.3)	0.0 (0.1)	-1.6 (3.4)
FNS Region			
Mid-Atlantic (<i>reference category</i>)	--0--	--0--	--0--
Northeast	0.3 (4.8)	0.0 (0.8)	-0.3 (5.6)
Southeast	7.9 (4.0)	-0.2 (0.7)	-7.7 (4.1)
Midwest	1.0 (3.3)	0.2 (0.5)	-1.2 (3.8)
Southwest	7.6* (3.4)	-0.1 (0.6)	-7.5* (3.6)
Mountain Plains	0.6 (3.8)	0.1 (0.6)	-0.7 (4.5)
Western	-0.2 (3.7)	0.0 (0.7)	0.3 (4.4)

	All Schools		
	Very Satisfied	Somewhat Satisfied	Not Satisfied
Price Charged for Paid Lunches			
School Offered Free Lunch to All Students	-4.4 (3.4)	0.2 (0.3)	4.3 (3.5)
\$2.25 or less (<i>reference category</i>)	--0--	--0--	--0--
\$2.26 to \$2.50	-6.7** (2.5)	-0.1 (0.6)	6.8* (2.7)
\$2.51 to \$2.75	-6.8** (2.6)	-0.2 (0.5)	7.0* (2.8)
More than \$2.75	-6.3* (3.1)	-0.1 (0.4)	6.4 (3.3)
Number of Students	1,793	1,793	1,793
Number of Schools	288	288	288

Source: School Nutrition and Meal Cost Study, Child/Youth Interview, Parent Interview, School Food Authority Director Survey, Common Core of Data (CCD) 2011-2012, 2011 U.S. Census Bureau's Small Area Income and Poverty Estimates school district file, and Food and Nutrition Service's SFA Verification Summary Report 2012-2013, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression coefficients (with standard errors in parentheses) from multivariate models that control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid lunch. See Appendix C for more details on characteristic descriptions and selection methods.

Relationship between characteristic and satisfaction is significantly different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

--0-- = Reference category. Coefficient estimates for mutually exclusive categories are relative to the reference category's satisfaction rate.

FNS = Food and Nutrition Service; NSLP = National School Lunch Program; SFA = school food authority.

Table D.43. Relationships between Parent’s Level of Satisfaction with SBP Breakfasts and the Nutritional Quality of the Breakfasts: Regression-Adjusted Mean Satisfaction Rates

	Yes/ No	All Schools		
		Very Satisfied	Somewhat Satisfied	Not Satisfied
Mean Percentages of Parents with Different Levels of Satisfaction with SBP Breakfasts		41.4	46.6	12.1
Overall Nutritional Quality of Prepared SBP Breakfasts				
Total HEI-2010 Score of Average Breakfast Prepared				
Lowest Quartile—55.2 to 68.5 points (reference category)		43.9	45.2	10.9
Second Quartile—68.6 to 71.6 points		34.4	49.9	15.6
Third Quartile—71.7 to 74.9 points		41.4	46.6	12.0
Highest Quartile—75.0 to 87.4 points		45.2	44.4	10.4
Compliance of Daily and Weekly Breakfast Menus with SBP Nutrition Standards				
Met Daily Quantity Requirement for Grains	Y	42.2	46.1	11.7
	N	40.0	47.3	12.7
Met Requirement that at Least Half of Weekly Grains Are Whole Grain-Rich	Y	40.0***	47.4**	12.6***
	N	63.6	31.4	4.9
Met Minimum Calorie Level	Y	41.6	46.5	12.0
	N	38.9	47.9	13.3
Met Maximum Calorie Level	Y	43.3	45.5	11.2
	N	37.3	48.6	14.1
Met Target 1 Sodium Limit	Y	40.8	46.9	12.3
	N	42.9	45.7	11.4
Types of Foods Offered in Breakfast Menus				
All Daily Menus Offered Cold Cereal	Y	43.9	45.2	11.0
	N	38.1	48.2	13.6
More than Half of Daily Menus Offered Breakfast Pastries or Muffins	Y	43.6	45.4	11.0
	N	40.1	47.3	12.6
At Least One Daily Menu Offered Pizza or Pizza Products	Y	40.7	46.9	12.3
	N	41.9	46.3	11.8
No Daily Menus Offered French Fries or Similar Potato Products	Y	47.2*	43.2*	9.6*
	N	38.2	48.3	13.5
Number of Students		802	802	802
Number of Schools		235	235	235

Source: School Nutrition and Meal Cost Study, Parent Interview, and Menu Survey, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression-adjusted mean levels of satisfaction among parents whose child attended a school that offered the SBP and had ever eaten a school breakfast. The “not satisfied” category includes responses of “somewhat dissatisfied” and “very dissatisfied” because very few parents reported that they

were very dissatisfied with school breakfasts. Estimates control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid breakfast. Variables with rows labeled “Y” and “N” report adjusted mean SBP satisfaction rates within schools that do and do not meet the variable criteria, respectively. Otherwise, regression-adjusted means are reported for each category within a variable. See Appendix C for more details on characteristic descriptions and selection methods.

Difference in satisfaction rates between schools with and without a dichotomous characteristic is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level. For variables containing multiple categories, the difference in satisfaction rates between schools in the corresponding category and schools in the reference category is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

HEI = Healthy Eating Index; SBP = School Breakfast Program; SFA = school food authority.

Table D.44. Regression Coefficient Estimates for the Relationships between Parent's Level of Satisfaction with SBP Breakfasts and the Nutritional Quality of the Breakfasts: All Schools

	All Schools		
	Very Satisfied	Somewhat Satisfied	Not Satisfied
Nutritional Quality of Prepared SBP Breakfasts			
Total HEI-2010 Score of Average Breakfast Prepared			
Lower Quartile (<i>reference category</i>)	--0--	--0--	--0--
Second Quartile	-9.5 (6.0)	4.7 (3.0)	4.7 (3.1)
Third Quartile	-2.6 (4.6)	1.4 (2.6)	1.1 (1.9)
Upper Quartile	1.3 (6.2)	-0.7 (3.7)	-0.5 (2.5)
Compliance of Daily and Weekly Breakfast Menus with SBP Nutrition Standards			
Met Daily Quantity Requirement for Grains	2.2 (4.1)	-1.2 (2.2)	-1.0 (1.9)
Met Requirement that at Least Half of Weekly Grains Are Whole Grain-Rich	-23.6*** (6.6)	16.0** (5.0)	7.7*** (1.9)
Met Minimum Calorie Level	2.7 (7.9)	-1.4 (3.9)	-1.3 (4.0)
Met Maximum Calorie Level	6.1 (4.0)	-3.2 (2.0)	-2.9 (2.1)
Met Target 1 Sodium Limit	-2.1 (4.7)	1.2 (2.6)	1.0 (2.1)
Types of Foods Offered in Breakfast Menus			
All Daily Menus Offered Cold Cereal	5.7 (4.4)	-3.1 (2.3)	-2.7 (2.2)
More than Half of Daily Menus Offered Breakfast Pastries or Muffins	3.5 (4.1)	-1.9 (2.3)	-1.6 (1.8)
At Least One Daily Menu Offered Pizza or Pizza Products	-1.2 (4.3)	0.6 (2.3)	0.5 (2.0)
No Daily Menus Offered French Fries or Similar Potato Products	9.0* (4.1)	-5.1* (2.4)	-3.9* (1.8)

	All Schools		
	Very Satisfied	Somewhat Satisfied	Not Satisfied
Student Characteristics			
Student Race and Ethnicity			
White, non-Hispanic (<i>reference category</i>)	--0--	--0--	--0--
Hispanic	-2.6 (6.4)	1.4 (3.5)	1.1 (2.9)
Black, non-Hispanic	-5.0 (6.4)	2.7 (3.3)	2.3 (3.1)
Other	-4.7 (9.0)	2.5 (4.7)	2.2 (4.3)
Student Is Female	-1.9 (4.7)	1.0 (2.5)	0.9 (2.2)
Student Is Certified for Free or Reduced-Price Meals	13.9** (5.1)	-6.3*** (1.8)	-7.5* (3.6)
Student Is a Picky Eater [Parent-reported]			
Yes, very (<i>reference category</i>)	--0--	--0--	--0--
Somewhat	4.1 (5.2)	-2.1 (2.6)	-1.9 (2.6)
No	3.4 (6.0)	-1.7 (3.1)	-1.6 (3.0)
Amount Student Eats Compared to Students of the Same Age [Parent-reported]			
Larger amount (<i>reference category</i>)	--0--	--0--	--0--
Same amount	8.7 (5.3)	-4.4 (2.5)	-4.3 (3.0)
Smaller amount	14.7 (9.7)	-8.1 (5.8)	-6.6 (4.1)
Student Has Food Allergies or Special Dietary Needs	16.5 (8.9)	-10.7 (6.3)	-5.9* (2.8)
Student's Level of Activity Compared to Students of the Same Age [Parent-reported]			
Less active (<i>reference category</i>)	--0--	--0--	--0--
About as active	-4.8 (7.0)	2.8 (4.2)	2.0 (2.8)
More active	-9.3 (8.0)	5.0 (4.5)	4.2 (3.5)
Much more active	-1.3 (8.6)	0.8 (5.2)	0.5 (3.4)

	All Schools		
	Very Satisfied	Somewhat Satisfied	Not Satisfied
School and SFA Characteristics			
Share of Students Approved for Free or Reduced-Price Meals			
Less than 40 percent (<i>reference category</i>)	--0--	--0--	--0--
40 percent or more	4.0 (4.4)	-2.1 (2.2)	-1.9 (2.2)
Urbanicity			
Urban (<i>reference category</i>)	--0--	--0--	--0--
Suburban	1.7 (4.9)	-1.0 (2.9)	-0.7 (2.0)
Rural	-8.7 (4.6)	4.3 (2.4)	4.4 (2.3)
School Size			
Fewer than 500 students (<i>reference category</i>)	--0--	--0--	--0--
500 to 999 students	-5.1 (4.0)	2.7 (2.2)	2.4 (1.9)
1,000 or more students	3.2 (5.1)	-1.9 (3.1)	-1.3 (2.0)
FNS Region			
Mid-Atlantic (<i>reference category</i>)	--0--	--0--	--0--
Northeast	11.5 (12.4)	-5.7 (6.1)	-5.8 (6.7)
Southeast	15.1 (10.3)	-7.9 (4.7)	-7.2 (6.1)
Midwest	13.6 (9.4)	-7.0 (3.9)	-6.7 (5.8)
Southwest	7.8 (8.9)	-3.6 (3.3)	-4.2 (5.7)
Mountain Plains	-3.1 (10.0)	1.0 (3.4)	2.1 (6.7)
Western	5.9 (9.2)	-2.6 (3.5)	-3.3 (5.8)

	All Schools		
	Very Satisfied	Somewhat Satisfied	Not Satisfied
Price Charged for Paid Breakfast			
School Offered Free Breakfast to All Students	2.9 (5.1)	-1.6 (2.7)	-1.3 (2.4)
Less than \$1.25 (<i>reference category</i>)	--0--	--0--	--0--
\$1.25 to \$1.49	-1.1 (5.8)	0.6 (3.0)	0.6 (2.8)
\$1.50 to \$1.99	-0.5 (6.2)	0.3 (3.3)	0.2 (3.0)
\$2.00 or more	19.1 (12.7)	-12.5 (9.0)	-6.6 (3.9)
Number of Students	802	802	802
Number of Schools	235	235	235

Source: School Nutrition and Meal Cost Study, Parent Interview, and Menu Survey, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression coefficients (with standard errors in parentheses) from multivariate models that control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid breakfast. See Appendix C for more details on characteristic descriptions and selection methods.

Relationship between characteristic and satisfaction rate is significantly different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

--0-- = Reference category. Coefficient estimates for mutually exclusive categories are relative to the reference category's satisfaction rate.

HEI = Healthy Eating Index; FNS = Food and Nutrition Service; SBP = School Breakfast Program; SFA = school food authority.

Table D.45. Relationships between Parent's Level of Satisfaction with SBP Breakfasts and School Foodservice Operations: Regression-Adjusted Mean Satisfaction Rates

	Yes/ No	All Schools		
		Very Satisfied	Somewhat Satisfied	Not Satisfied
Mean Percentages of Parents with Different Levels of Satisfaction with SBP Breakfasts		41.4	46.6	12.1
Food Purchasing Characteristics				
SFA Uses Alliance for a Healthier Generation or Other Similar Tools for Selecting and Purchasing Healthy Foods	Y	45.2	44.4	10.4
	N	38.4	48.2	13.5
SFA Participates in a Food Purchasing Cooperative	Y	41.4	46.5	12.1
	N	40.9	46.8	12.3
Schools in SFA Offer Brand-Name or Chain Restaurant Foods	Y	50.4	40.9	8.6
	N	40.8	46.8	12.4
School Participates in Farm to School Program	Y	42.9	45.7	11.5
	N	40.8	46.8	12.3
Menu Planning and Meal Service Characteristics				
School Uses Cycle Menus	Y	40.2	47.2	12.6
	N	43.6	45.3	11.1
School Offers Grab-and-Go Option at Breakfast	Y	52.7*	39.4*	7.9*
	N	40.2	47.2	12.7
Students Have Option of Eating Breakfast in the Classroom	Y	41.9	46.2	11.9
	N	41.0	46.8	12.3
School Participates in the Fresh Fruit and Vegetable Program	Y	44.7	44.7	10.7
	N	40.4	47.1	12.5
School Receives Fully or Partially Prepared Meals from a Separate Production or Central Kitchen	Y	36.9	48.8	14.2
	N	42.0	46.2	11.8
SFA Uses a Foodservice Management Company	Y	43.6	45.3	11.1
	N	40.6	47.0	12.4
School Uses Offer-Versus-Serve at Breakfast	Y	42.7	45.8	11.5
	N	35.0	49.7	15.3
School Has Policies and Procedures for Accommodating Students with Food Allergies or Special Dietary Needs	Y	41.0	46.7	12.2
	N	42.8	45.7	11.4
Price Charged for Paid Breakfast				
School Offered Free Breakfast to All Students		44.1	45.1	10.8
Less than \$1.25 (reference category)		46.2	43.8	10.0
\$1.25 to \$1.49		32.6*	50.8*	16.6
\$1.50 to \$1.99		36.0	49.4	14.6
\$2.00 or more		57.4	36.1	6.5

	Yes/ No	All Schools		
		Very Satisfied	Somewhat Satisfied	Not Satisfied
Number of Students		802	802	802
Number of Schools		235	235	235

Source: School Nutrition and Meal Cost Study, Parent Interview, School Food Authority Director Survey, School Nutrition Manager Survey, and Cafeteria Observation Guide, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression-adjusted mean levels of satisfaction among parents whose child attended a school that offered the SBP and had ever eaten a school breakfast. The “not satisfied” category includes responses of “somewhat dissatisfied” and “very dissatisfied” because very few parents reported that they were very dissatisfied with school breakfasts. Estimates control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid breakfast. Variables with rows labeled “Y” and “N” report adjusted mean SBP satisfaction rates within schools that do and do not meet the variable criteria, respectively. Otherwise, regression-adjusted means are reported for each category within a variable. See Appendix C for more details on characteristic descriptions and selection methods.

Difference in satisfaction rates between schools with and without a dichotomous characteristic is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level. For variables containing multiple categories, the difference in satisfaction rates between schools in the corresponding category and schools in the reference category is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

SBP = School Breakfast Program; SFA = school food authority.

Table D.46. Regression Coefficient Estimates for the Relationships between Parent’s Level of Satisfaction with SBP Breakfasts and School Foodservice Operations: All Schools

	All Schools		
	Very Satisfied	Somewhat Satisfied	Not Satisfied
Food Purchasing Characteristics			
SFA Uses Alliance for a Healthier Generation or Other Similar Tools for Selecting and Purchasing Healthy Foods	6.8 (4.5)	-3.8 (2.5)	-3.0 (2.1)
SFA Participates in a Food Purchasing Cooperative	0.5 (5.2)	-0.3 (2.9)	-0.2 (2.4)
Schools in SFA Offer Brand-Name or Chain Restaurant Foods	9.6 (8.3)	-5.9 (5.5)	-3.8 (2.8)
School Participates in Farm to School Program	2.0 (6.9)	-1.1 (3.9)	-0.9 (3.0)
Menu Planning and Meal Service Characteristics			
School Uses Cycle Menus	-3.5 (5.0)	1.9 (2.9)	1.5 (2.2)
School Offers Grab-and-Go Option at Breakfast	12.5* (5.5)	-7.8* (3.7)	-4.7* (2.0)
Students Have Option of Eating Breakfast in the Classroom	0.9 (5.8)	-0.5 (3.2)	-0.4 (2.6)
School Participates in the Fresh Fruit and Vegetable Program	4.2 (6.7)	-2.4 (4.0)	-1.8 (2.7)
School Receives Fully or Partially Prepared Meals from a Separate Production or Central Kitchen	-5.1 (5.9)	2.6 (2.9)	2.5 (3.1)
SFA Uses a Foodservice Management Company	3.0 (5.2)	-1.7 (3.0)	-1.3 (2.2)
School Uses Offer-Versus-Serve at Breakfast	7.7 (7.2)	-3.8 (3.2)	-3.8 (4.1)
School Has Policies and Procedures for Accommodating Students with Food Allergies or Special Dietary Needs	-1.8 (7.1)	1.0 (4.1)	0.8 (3.1)
Price Charged for Paid Breakfast			
School Offered Free Breakfast to All Students	-2.1 (5.9)	1.3 (3.6)	0.8 (2.3)
Less than \$1.25 (<i>reference category</i>)	--0--	--0--	--0--
\$1.25 to \$1.49	-13.7* (6.5)	7.0* (3.2)	6.7 (3.7)
\$1.50 to \$1.99	-10.3 (7.2)	5.6 (3.9)	4.6 (3.5)
\$2.00 or more	11.1 (16.3)	-7.7 (11.8)	-3.4 (4.6)

	All Schools		
	Very Satisfied	Somewhat Satisfied	Not Satisfied
Student Characteristics			
Student Race and Ethnicity			
White, non-Hispanic (<i>reference category</i>)	--0--	--0--	--0--
Hispanic	-1.7 (6.6)	0.9 (3.7)	0.7 (2.9)
Black, non-Hispanic	-5.5 (6.8)	2.9 (3.5)	2.6 (3.3)
Other	-3.6 (9.3)	2.0 (5.0)	1.6 (4.4)
Student Is Female	-1.5 (5.0)	0.8 (2.7)	0.7 (2.3)
Student Is Certified for Free or Reduced-Price Meals	12.2* (5.9)	-5.8** (2.2)	-6.4 (3.8)
School and SFA Characteristics			
Share of Students Approved for Free or Reduced-Price Meals			
Less than 40 percent (<i>reference category</i>)	--0--	--0--	--0--
40 percent or more	0.7 (5.8)	-0.4 (3.1)	-0.3 (2.6)
Urbanicity			
Urban (<i>reference category</i>)	--0--	--0--	--0--
Suburban	0.7 (5.2)	-0.4 (3.1)	-0.3 (2.1)
Rural	-11.0** (4.1)	5.4* (2.3)	5.5* (2.2)
School Size			
Fewer than 500 students (<i>reference category</i>)	--0--	--0--	--0--
500 to 999 students	-8.0 (4.4)	4.5 (2.5)	3.5 (2.0)
1,000 or more students	-4.5 (6.5)	2.7 (3.8)	1.8 (2.8)

	All Schools		
	Very Satisfied	Somewhat Satisfied	Not Satisfied
FNS Region			
Mid-Atlantic (<i>reference category</i>)	--0--	--0--	--0--
Northeast	10.1 (14.2)	-5.2 (7.0)	-4.9 (7.3)
Southeast	13.4 (10.8)	-7.3 (5.2)	-6.1 (6.0)
Midwest	9.4 (11.3)	-4.8 (5.1)	-4.6 (6.3)
Southwest	10.5 (10.1)	-5.4 (4.3)	-5.1 (5.9)
Mountain Plains	-5.9 (10.8)	1.9 (4.0)	4.0 (7.0)
Western	1.4 (10.4)	-0.6 (4.3)	-0.8 (6.1)
Number of Students	802	802	802
Number of Schools	235	235	235

Source: School Nutrition and Meal Cost Study, Parent Interview, School Food Authority Director Survey, School Nutrition Manager Survey, and Cafeteria Observation Guide, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression coefficients (with standard errors in parentheses) from multivariate models that control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid breakfast. See Appendix C for more details on characteristic descriptions and selection methods.

Relationship between characteristic and satisfaction rate is significantly different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

--0-- = Reference category. Coefficient estimates for mutually exclusive categories are relative to the reference category's satisfaction rate.

FNS = Food and Nutrition Service; SBP = School Breakfast Program; SFA = school food authority.

Table D.47. Relationships between Parent's Level of Satisfaction with SBP Breakfasts and the School Food Environment: Regression-Adjusted Mean Satisfaction Rates

	Yes/ No	All Schools		
		Very Satisfied	Somewhat Satisfied	Not Satisfied
Mean Percentages of Parents with Different Levels of Satisfaction with SBP Breakfasts		41.4	46.6	12.1
Wellness Policies and Practices				
SFA Has Nutrition Standards for School Meals that Exceed Federal Standards	Y	46.6*	43.7*	9.7*
	N	38.0	48.5	13.5
School Conducted a Nutrition Education Activity in the Classroom or Foodservice Area	Y	41.5	46.5	12.0
	N	40.9	46.8	12.3
Competitive Foods				
School Sells Foods Other than Milk on an A la Carte Basis	Y	42.1	46.2	11.7
	N	38.1	48.3	13.6
School Sells Foods and Beverages in Vending Machine	Y	38.8	47.9	13.3
	N	42.3	46.1	11.6
School Sells Foods and/or Beverages via a School Store or Snack Bar	Y	49.9**	41.5**	8.5**
	N	37.9	48.6	13.5
SFA Has Standards for Competitive Foods that Exceed Smart Snacks in Schools Standards	Y	38.4	48.1	13.6
	N	41.5	46.5	12.0
Meal Service Practices				
Length of Breakfast Period				
Less than 25 minutes (<i>reference category</i>)		38.1	48.3	13.6
25 to 39 minutes		42.3	46.1	11.6
40 minutes or more		41.3	46.7	12.1
First Bus Arrives Before or at Same Time as Breakfast	Y	29.1**	51.5***	19.5*
	N	45.2	44.3	10.4
Last Bus Arrives Before or at Same Time as Breakfast	Y	39.1	47.8	13.2
	N	41.6	46.4	12.0
Number of Students		802	802	802
Number of Schools		235	235	235

Source: School Nutrition and Meal Cost Study, Parent Interview, School Food Authority Director Survey, School Nutrition Manager Survey, Principal Survey, Vending Machine and Other Sources of Foods and Beverages Checklist, A la Carte Checklist, and Cafeteria Observation Guide, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression-adjusted mean levels of satisfaction among parents whose child attended a school that offered the SBP and had ever eaten a school breakfast. The "not satisfied" category includes responses of "somewhat dissatisfied" and "very dissatisfied" because very few parents reported that they were very dissatisfied with school breakfasts. Estimates control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price SBP by each school for a paid

breakfast. Variables with rows labeled “Y” and “N” report adjusted mean NSLP satisfaction rates within schools that do and do not meet the variable criteria, respectively. Otherwise, regression-adjusted means are reported for each category within a variable. See Appendix C for more details on characteristic descriptions and selection methods.

Difference in satisfaction rates between schools with and without a dichotomous characteristic is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level. For variables containing multiple categories, the difference in satisfaction rates between schools in the corresponding category and schools in the reference category is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

SBP = School Breakfast Program; SFA = school food authority; SY = school year.

Table D.48. Regression Coefficient Estimates for the Relationships between Parent’s Level of Satisfaction with SBP Breakfasts and the School Food Environment: All Schools

	All Schools		
	Very Satisfied	Somewhat Satisfied	Not Satisfied
Wellness Policies and Practices			
SFA Has Nutrition Standards for School Meals that Exceed Federal Standards	8.6* (3.8)	-4.8* (2.2)	-3.8* (1.6)
School Conducted a Nutrition Education Activity in the Classroom or Foodservice Area	0.6 (4.1)	-0.3 (2.2)	-0.3 (1.9)
Competitive Foods			
School Sells Foods Other than Milk on an A la Carte Basis	4.0 (4.6)	-2.1 (2.3)	-1.9 (2.3)
School Sells Foods and Beverages in Vending Machine	-3.5 (4.8)	1.9 (2.5)	1.7 (2.3)
School Sells Foods and/or Beverages via a School Store or Snack Bar	12.0** (4.1)	-7.0** (2.7)	-5.0** (1.6)
SFA Has Standards for Competitive Foods that Exceed Smart Snacks in Schools Standards	-3.1 (6.2)	1.6 (3.0)	1.5 (3.1)
Meal Service Practices			
Length of Breakfast Period			
Less than 25 minutes (<i>reference category</i>)	--0--	--0--	--0--
25 to 39 minutes	4.2 4.8	-2.2 2.5	-2.0 2.4
40 minutes or more	3.2 5.8	-1.6 3.0	-1.5 2.9
First Bus Arrives Before or at Same Time as Breakfast	-16.2** 6.0	7.1*** 2.0	9.0* 4.3
Last Bus Arrives Before or at Same Time as Breakfast	-2.6 5.6	1.3 2.9	1.2 2.7
Student Characteristics			
Student Race and Ethnicity			
White, non-Hispanic (<i>reference category</i>)	--0--	--0--	--0--
Hispanic	2.4 (5.6)	-1.3 (3.1)	-1.1 (2.5)
Black, non-Hispanic	-2.9 (6.1)	1.4 (3.0)	1.4 (3.1)
Other	-0.2 (9.0)	0.1 (4.8)	0.1 (4.3)

	All Schools		
	Very Satisfied	Somewhat Satisfied	Not Satisfied
Student Is Female	-0.6 (5.0)	0.3 (2.7)	0.3 (2.3)
Student Is Certified for Free or Reduced-Price Meals	10.5* (5.3)	-5.0* (2.2)	-5.5 (3.2)
Student Is a Picky Eater [Parent-reported]			
Yes, very (reference category)	--0--	--0--	--0--
Somewhat	3.7 (5.7)	-1.9 (2.8)	-1.8 (2.9)
No	3.1 (6.2)	-1.6 (3.1)	-1.5 (3.1)
Amount Student Eats Compared to Students of the Same Age [Parent-reported]			
Larger amount (reference category)	--0--	--0--	--0--
Same amount	8.7 (4.9)	-4.3 (2.3)	-4.3 (2.7)
Smaller amount	14.5 (9.1)	-8.0 (5.4)	-6.6 (4.0)
Student Has Food Allergies or Special Dietary Needs	17.3 (8.8)	-11.1 (6.2)	-6.2* (2.7)
Student's Level of Activity Compared to Students of the Same Age [Parent-reported]			
Less active (reference category)	--0--	--0--	--0--
About as active	-3.1 (6.9)	1.7 (4.0)	1.3 (3.0)
More active	-5.8 (7.6)	3.1 (4.3)	2.7 (3.4)
Much more active	0.9 (9.1)	-0.5 (5.3)	-0.4 (3.7)
School and SFA Characteristics			
Share of Students Approved for Free or Reduced-Price Meals			
Less than 40 percent (reference category)	--0--	--0--	--0--
40 percent or more	-0.5 (4.7)	0.3 (2.6)	0.3 (2.1)
Urbanicity			
Urban (reference category)	--0--	--0--	--0--
Suburban	3.7 (4.9)	-2.2 (2.9)	-1.5 (2.0)
Rural	-13.2** (4.7)	5.9** (2.2)	7.3** (2.7)

	All Schools		
	Very Satisfied	Somewhat Satisfied	Not Satisfied
School Size			
Fewer than 500 students (<i>reference category</i>)	--0--	--0--	--0--
500 to 999 students	-3.4 (4.0)	1.8 (2.2)	1.5 (1.8)
1,000 or more students	-1.2 (5.1)	0.7 (2.8)	0.5 (2.2)
FNS Region			
Mid-Atlantic (<i>reference category</i>)	--0--	--0--	--0--
Northeast	0.8 (8.9)	-0.3 (3.4)	-0.5 (5.6)
Southeast	12.7 (8.1)	-6.4 (3.9)	-6.3 (4.6)
Midwest	16.7* (8.2)	-8.9* (3.7)	-7.8 (4.7)
Southwest	11.4 (7.5)	-5.6 (3.2)	-5.8 (4.5)
Mountain Plains	3.2 (8.7)	-1.3 (3.4)	-1.9 (5.2)
Western	1.4 (7.1)	-0.5 (2.7)	-0.9 (4.5)
Price Charged for Paid Breakfast			
School Offered Free Breakfast to All Students	1.3 (5.6)	-0.8 (3.3)	-0.5 (2.2)
Less than \$1.25 (<i>reference category</i>)	--0--	--0--	--0--
\$1.25 to \$1.49	-8.9 (5.8)	4.6 (3.0)	4.3 (2.9)
\$1.50 to \$1.99	-10.9* (5.5)	5.4 (2.8)	5.5 (2.9)
\$2.00 or more	1.6 (13.7)	-0.9 (8.4)	-0.6 (5.4)
Number of Students	802	802	802
Number of Schools	235	235	235

Source: School Nutrition and Meal Cost Study, Parent Interview, School Food Authority Director Survey, School Nutrition Manager Survey, Principal Survey, Vending Machine and Other Sources of Foods and Beverages Checklist, A la Carte Checklist, and Cafeteria Observation Guide, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression coefficients (with standard errors in parentheses) from multivariate models that control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid breakfast. See Appendix C for more details on characteristic descriptions and selection methods.

Relationship between characteristic and satisfaction rate is significantly different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

--0-- = Reference category. Coefficient estimates for mutually exclusive categories are relative to the reference category's satisfaction rate.

FNS = Food and Nutrition Service; SBP = School Breakfast Program; SFA = school food authority.

Table D.49. Relationships between Parent's Level of Satisfaction with SBP Breakfasts and Characteristics of the Students, Schools, and SFAs: Regression-Adjusted Mean Satisfaction Rates

	Yes/ No	All Schools		
		Very Satisfied	Somewhat Satisfied	Not Satisfied
Mean Percentages of Parents with Different Levels of Satisfaction with SBP Breakfasts		41.4	46.6	12.1
Student Characteristics				
Student Race and Ethnicity				
White, non-Hispanic (<i>reference category</i>)		41.0	46.7	12.4
Hispanic		43.4	45.3	11.3
Black, non-Hispanic		38.1	48.1	13.8
Other		40.8	46.8	12.4
Student Is Female	Y	40.9	46.8	12.3
	N	41.5	46.5	12.0
Student Is Certified for Free or Reduced-Price Meals	Y	43.1*	45.9*	11.1
	N	32.6	50.9	16.5
School and SFA Characteristics				
Share of Students Approved for Free or Reduced-Price Meals				
Less than 40 percent (<i>reference category</i>)		41.7	46.4	12.0
40 percent or more		41.1	46.7	12.2
Urbanicity				
Urban (<i>reference category</i>)		43.7	45.2	11.1
Suburban		47.4	43.0	9.6
Rural		30.6**	51.0**	18.4**
School Size				
Fewer than 500 students (<i>reference category</i>)		43.2	45.5	11.3
500 to 999 students		39.8	47.4	12.8
1,000 or more students		42.0	46.2	11.8
FNS Region				
Mid-Atlantic (<i>reference category</i>)		32.9	50.4	16.6
Northeast		33.7	50.2	16.1
Southeast		45.7	44.1	10.3
Midwest		49.7*	41.5*	8.8
Southwest		44.4	44.8	10.8
Mountain Plains		36.2	49.1	14.7
Western		34.3	49.9	15.8

	Yes/ No	All Schools		
		Very Satisfied	Somewhat Satisfied	Not Satisfied
Price Charged for Paid Breakfast				
School Offered Free Breakfast to All Students		45.4	44.3	10.2
Less than \$1.25 (<i>reference category</i>)		44.2	45.1	10.7
\$1.25 to \$1.49		35.3	49.7	15.0
\$1.50 to \$1.99		33.2*	50.5	16.3
\$2.00 or more		45.7	44.2	10.1
Number of Students		802	802	802
Number of Schools		235	235	235

Source: School Nutrition and Meal Cost Study, Child/Youth Interview, Parent Interview, School Food Authority Director Survey, Common Core of Data (CCD) 2011-2012, 2011 U.S. Census Bureau's Small Area Income and Poverty Estimates school district file, and Food and Nutrition Service's SFA Verification Summary Report 2012-2013, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression-adjusted mean levels of satisfaction among parents whose child attended a school that offered the SBP and had ever eaten a school breakfast. The "not satisfied" category includes responses of "somewhat dissatisfied" and "very dissatisfied" because very few parents reported that they were very dissatisfied with school breakfasts. Estimates control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid breakfast. Variables with rows labeled "Y" and "N" report adjusted mean SBP satisfaction rates within schools that do and do not meet the variable criteria, respectively. Otherwise, regression-adjusted means are reported for each category within a variable. See Appendix C for more details on characteristic descriptions and selection methods.

Difference in satisfaction rates between schools with and without a dichotomous characteristic is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level. For variables containing multiple categories, the difference in satisfaction rates between schools in the corresponding category and schools in the reference category is statistically different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

FNS = Food and Nutrition Service; SBP = School Breakfast Program; SFA = school food authority.

Table D.50. Regression Coefficient Estimates for the Relationships between Parent’s Level of Satisfaction with SBP Breakfasts and Characteristics of the Student and School: All Schools

	All Schools		
	Very Satisfied	Somewhat Satisfied	Not Satisfied
Student Characteristics			
Student Race and Ethnicity			
White, non-Hispanic (<i>reference category</i>)	--0--	--0--	--0--
Hispanic	2.4 (5.6)	-1.3 (3.1)	-1.1 (2.5)
Black, non-Hispanic	-2.9 (6.1)	1.4 (3.0)	1.4 (3.1)
Other	-0.2 (9.0)	0.1 (4.8)	0.1 (4.3)
Student Is Female	-0.6 (5.0)	0.3 (2.7)	0.3 (2.3)
Student Is Certified for Free or Reduced-Price Meals	10.5* (5.3)	-5.0* (2.2)	-5.5 (3.2)
Student Is a Picky Eater [Parent-reported]			
Yes, very (<i>reference category</i>)	--0--	--0--	--0--
Somewhat	3.7 (5.7)	-1.9 (2.8)	-1.8 (2.9)
No	3.1 (6.2)	-1.6 (3.1)	-1.5 (3.1)
Amount Student Eats Compared to Students of the Same Age [Parent-reported]			
Larger amount (<i>reference category</i>)	--0--	--0--	--0--
Same amount	8.7 (4.9)	-4.3 (2.3)	-4.3 (2.7)
Smaller amount	14.5 (9.1)	-8.0 (5.4)	-6.6 (4.0)
Student Has Food Allergies or Special Dietary Needs	17.3 (8.8)	-11.1 (6.2)	-6.2* (2.7)
Student’s Level of Activity Compared to Students of the Same Age [Parent-reported]			
Less active (<i>reference category</i>)	--0--	--0--	--0--
About as active	-3.1 (6.9)	1.7 (4.0)	1.3 (3.0)
More active	-5.8 (7.6)	3.1 (4.3)	2.7 (3.4)
Much more active	0.9 (9.1)	-0.5 (5.3)	-0.4 (3.7)

	All Schools		
	Very Satisfied	Somewhat Satisfied	Not Satisfied
School and SFA Characteristics			
Share of Students Approved for Free or Reduced-Price Meals			
Less than 40 percent (<i>reference category</i>)	--0--	--0--	--0--
40 percent or more	-0.5 (4.7)	0.3 (2.6)	0.3 (2.1)
Urbanicity			
Urban (<i>reference category</i>)	--0--	--0--	--0--
Suburban	3.7 (4.9)	-2.2 (2.9)	-1.5 (2.0)
Rural	-13.2** (4.7)	5.9** (2.2)	7.3** (2.7)
School Size			
Fewer than 500 students (<i>reference category</i>)	--0--	--0--	--0--
500 to 999 students	-3.4 (4.0)	1.8 (2.2)	1.5 (1.8)
1,000 or more students	-1.2 (5.1)	0.7 (2.8)	0.5 (2.2)
FNS Region			
Mid-Atlantic (<i>reference category</i>)	--0--	--0--	--0--
Northeast	0.8 (8.9)	-0.3 (3.4)	-0.5 (5.6)
Southeast	12.7 (8.1)	-6.4 (3.9)	-6.3 (4.6)
Midwest	16.7* (8.2)	-8.9* (3.7)	-7.8 (4.7)
Southwest	11.4 (7.5)	-5.6 (3.2)	-5.8 (4.5)
Mountain Plains	3.2 (8.7)	-1.3 (3.4)	-1.9 (5.2)
Western	1.4 (7.1)	-0.5 (2.7)	-0.9 (4.5)

	All Schools		
	Very Satisfied	Somewhat Satisfied	Not Satisfied
Price Charged for Paid Breakfast			
School Offered Free Breakfast to All Students	1.3 (5.6)	-0.8 (3.3)	-0.5 (2.2)
Less than \$1.25 (<i>reference category</i>)	--0--	--0--	--0--
\$1.25 to \$1.49	-8.9 (5.8)	4.6 (3.0)	4.3 (2.9)
\$1.50 to \$1.99	-10.9* (5.5)	5.4 (2.8)	5.5 (2.9)
\$2.00 or more	1.6 (13.7)	-0.9 (8.4)	-0.6 (5.4)
Number of Students	802	802	802
Number of Schools	235	235	235

Source: School Nutrition and Meal Cost Study, Child/Youth Interview, Parent Interview, School Food Authority Director Survey, Common Core of Data (CCD) 2011-2012, 2011 U.S. Census Bureau's Small Area Income and Poverty Estimates school district file, and Food and Nutrition Service's SFA Verification Summary Report 2012-2013, school year 2014-2015. Estimates are weighted to be nationally representative of all students in public, non-charter schools offering the National School Lunch Program.

Notes: Estimates are regression coefficients (with standard errors in parentheses) from multivariate models that control for demographic characteristics of each student, institutional characteristics of schools and SFAs, and the price charged by each school for a paid breakfast. See Appendix C for more details on characteristic descriptions and selection methods.

Relationship between characteristic and satisfaction rate is significantly different from zero at the ***0.001 level, ** 0.01 level, or * 0.05 level.

--0-- = Reference category. Coefficient estimates for mutually exclusive categories are relative to the reference category's satisfaction rate.

FNS = Food and Nutrition Service; SBP = School Breakfast Program; SFA = school food authority.

APPENDIX E

METHODS USED TO COLLECT AND ANALYZE PLATE WASTE DATA

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This appendix describes the approaches used to collect, process, and analyze the plate waste data. Plate waste is a measure of the amount of available food that is discarded (not consumed). Additional details, including information on sampling, recruiting, weighting, and training of field staff, are provided in a separate SNMCS methodology report (Zeidman et al. 2019).

A. Data Collection

Plate waste observations were conducted in 170 schools that participated in the NSLP within 57 SFAs (3 schools per SFA in 56 SFAs and 2 schools per SFA in one SFA).¹ To ensure that the required number of reimbursable meals could be observed on one day, schools recruited for this part of the study had to serve a minimum number of lunches per day.² In addition, meals had to be served in cafeterias, and students had to consume their meals in cafeterias so field interviewers could record information on foods taken and wasted from a single, central location. For these reasons, findings from the plate waste analyses are representative of public, non-charter schools that offer the NSLP, serve a minimum number of lunches per day,³ and serve meals in cafeteria-based settings.

Observations were conducted one day during a specific week when SNMs were completing the Menu Survey (see Chapter 1), which collected detailed data about the foods offered and served in reimbursable meals. Prior to conducting the observations, field interviewers recorded the name/description and portion size of all foods offered in reimbursable meals that day and purchased servings of non-packaged foods for use as visual points of reference for a single portion. Thus, for each food, field interviewers established a reference portion for a single portion of each food.

During meal periods, field interviewers stood near a point-of-sale or other predetermined location that allowed them to clearly observe trays that included reimbursable meals. The goal for lunch was 30 completed observations, and the goal for breakfast was 15 completed observations. To ensure that these goals were met, field interviewers observed 40 randomly selected lunch trays and 25 breakfast trays. Observations were spread evenly across all meal periods and serving lines.

For each observed tray, field interviewers recorded the specific foods students selected and the number of portions taken, based on the established reference portion. (Foods that were available only for a la carte purchase or obtained from other sources were not observed.) Observed trays were tagged and students were asked to return their trays to a designated area by the end of the meal period. Field interviewers also recorded the students' gender (based on observation). Field interviewers observed all returned trays and, using a validated method,

¹ As described below, the number of schools and SFAs included in the final analysis sample was smaller.

² The minimum number of lunches served per day in the final sample of schools included in the plate waste analysis were 157 lunches for elementary schools, 220 for middle schools, and 87 for high schools.

³ Data for the full sample of schools that completed the SNMCS Menu Survey indicate that, in SY 2014-2015, more than three-quarters of all NSLP schools served the minimum number of lunches per day reflected in the plate waste sample (78 percent of elementary schools, 77 percent of middle schools, and 90 percent of high schools).

visually estimated the proportion of solid foods remaining by recording 0 (no food remaining), 1 (all of the food remaining, that is, none was consumed), or $\frac{1}{4}$, $\frac{1}{2}$, or $\frac{3}{4}$.⁴ Amounts of remaining liquids were directly measured using a liquid measuring cup. Interviewers did not observe students during the actual meal consumption period so the methodology assumes that any foods not remaining on the tray were consumed in full.

B. Data Processing

The study team linked foods from each plate waste observation to the corresponding item in the school's Menu Survey data, using the food name and descriptive details from both data sources. The Menu Survey data provided the gram weight and calorie, nutrient, and USDA Food Pattern food group content of one portion of the food.

During data processing, the study team identified some foods included in the plate waste observations that did not appear in a school's Menu Survey data for the corresponding meal and day. For these cases, the study team first attempted to match the food to a different meal or day within the same school. For example, if a taco pie was observed on a student's tray on a Tuesday at lunch, but it appeared in the school's Menu Survey data for Monday, the records were matched. In addition, for a subset of single-ingredient foods with relatively standard composition and portion sizes (for example, a medium apple or an 8-ounce carton of skim milk), matches were made to a corresponding food in a different school and/or meal, preferably within the same SFA. If a food could not be matched to the Menu Survey data, the food and, ultimately, the tray containing the food, was dropped from the analysis. In addition, all plate waste observations had to be dropped for five schools with incomplete Menu Survey data (which were not included in the Menu Survey analysis).

In creating the analysis file, portion sizes recorded in fluid ounces in the plate waste observation data were converted to grams and compared to the gram weights reported in the Menu Survey. In the few cases where there was a large discrepancy in portion size between the two data sources, the portion size reported in the observation data was retained unless there was evidence of an obvious data entry error (for example, 80 ounces rather than 8 ounces).

Ultimately, the plate waste observation data were merged with the Menu Survey data to create a food-level file that included, for each food reported in the plate waste observations, the gram weight and calorie, nutrient, and USDA Food Pattern food group content of one portion of the food, as well as internal codes necessary to assign foods to major and minor food groups (see Appendix H).

Table E.1 summarizes the final disposition of the plate waste observation data. The released sample includes all trays that were tagged for plate waste observation. The completed sample includes all trays that were returned by students in a shape that allowed field interviewers to

⁴ Hanks, Wansink, and Just (2014) compared three visual estimation methods for assessing plate waste in school lunches (quarter-waste method, half-waste method, and photographic method) to weighed plate waste. The method used in this study—the quarter-waste method, in which waste is measured in quarter-waste increments—was found to be the most reliable visual estimation method.

estimate the percentage wasted. The final analysis sample—6,253 lunch trays and 3,601 breakfast trays—includes all trays that were successfully matched to the Menu Survey data.

Table E.1. Final Disposition of Plate Waste Observations

	Lunch Observations		Breakfast Observations	
	Schools	Trays	Schools	Trays
Released sample ^a	170	7,559	157	4,051
Completed sample ^b	170	7,182	157	3,874
Analysis sample ^c	165	6,253	154	3,601

Source: School Nutrition and Meal Cost Study, Plate Waste Observations, school year 2014-2015.

^aIncludes all trays that were tagged for plate waste observation.

^bIncludes all trays returned by students in a shape that allowed field interviewers to estimate percentage wasted.

^cIn the final analysis sample, five schools (and 210 trays) were dropped from the lunch sample and three schools (and 68 trays) were dropped from the breakfast sample because the schools' Menu Survey data were incomplete (and the schools were not included in the Menu Survey analysis). An additional 719 trays were excluded from the lunch analysis and 205 trays were excluded from the breakfast analysis because the trays included one or more foods that could not be matched to the Menu Survey.

C. Data Analysis

Data on gram weights were combined with information about the number of portions taken and the amounts wasted to estimate the percentage of each observed food that was wasted. Similarly, data on the calorie, nutrient, and USDA Food Pattern food group content were combined with information about the number of portions taken and the amounts wasted to estimate the percentage of available calories, nutrients, and USDA Food Pattern food group equivalents that were wasted.

Because of the complex eligibility requirements for the plate waste sample, it was not possible to prepare standard unbiased sampling weights for the plate waste analysis. Instead, the study team used a regression-based approach to develop school-level weights for the descriptive analyses (see Chapter 5, Sections B and C).⁵ Findings from these analyses are representative of public, non-charter schools that offer the NSLP, serve meals in cafeteria-based settings, and serve a minimum number of lunches per day.

The study team also examined the relationships between plate waste and four key domains: (1) student gender, (2) characteristics of NSLP lunches, (3) characteristics of school foodservice operations, and (4) characteristics of the school food environment. These analyses were conducted at the tray level. It was not possible to extend the regression-based approach used to develop school-level weights to develop tray-level weights. So all analyses that examined factors associated with plate waste were unweighted (see Chapter 5, Sections D and E). Thus, findings are not generalizable outside of the plate waste sample analyzed in this study and should be interpreted with caution.

⁵ Additional details about the sampling and weighting of schools for the plate waste study are provided in the SNMCS methodology report (Zeidman et al. 2019).

General Approach to Multivariate Modeling

The multivariate analyses were conducted using a limited set of plate waste outcomes: the percentage of calories wasted, and, based on USDA Food Pattern food groups, the percentage of fruits, vegetables, and dairy wasted. Because vegetables were observed on relatively few trays, especially at breakfast, analyses that focused on NSLP lunches included a single, combined measure for fruits and vegetables and analyses that focused on SBP breakfasts excluded vegetables.

Multivariate models explored relationships between these plate waste outcomes and key characteristics in three domains:

- Characteristics of school meals, including compliance of daily and weekly menus with selected NSLP and SBP nutrition standards
- Characteristics of school foodservice operations
- Characteristics of the school food environment

Within each domain and for each outcome, single-equation regression models were used to estimate these relationships at the tray level, taking the general form of:

$$(1) \quad Y_s = X'_s \beta + Z'_s \gamma + Q'_s \delta + \varepsilon_s,$$

where Y_s is the percentage wasted for calories, fruits/vegetables, and dairy for tray s , X_s is a vector of institutional characteristics of school s and the school's SFA with coefficient β , Z_s is a vector of demographic characteristics of the school's students with coefficient γ , Q_s is a vector of key characteristics and factors within the domain of interest with δ as the corresponding coefficient, and ε_s is a random error term.

When estimating the relationships between plate waste and key characteristics of the meals, school foodservice operations, or the school food environment, it is important to control for other factors that may influence plate waste and also be correlated with various meal and school characteristics. For example, food purchasing behaviors, such as use of food purchasing cooperatives, may vary by FNS region, but regional differences in the quality and types of foods available for purchase may partially explain differences between schools in percentage of plate waste. In this case, not controlling for regional differences would overestimate the strength of the relationship between use of food purchasing cooperatives and the percentage of plate waste. For this reason, multivariate models that explored relationships between plate waste and characteristics of the meals, school foodservice operations, and the school food environment included institutional and demographic characteristics not controlled by the SFA in vectors X_s , Q_s , and Z_s of equation (1), respectively.

Sample strata and clustering were used to account for the complex sampling design of the study in producing estimates, calculating standard errors, and testing for statistical significance. Although key variables of interest were drawn from multiple instruments, the primary sample

used for multivariate analyses included the schools in which plate waste was observed. This included 6,253 trays in 165 schools participating in the NSLP and 3,601 trays in 154 schools participating in the SBP.

Main results are reported in Chapter 5, which presents regression-adjusted mean percentage wasted for calories and select USDA Food Pattern food groups that control for the institutional and demographic characteristics of each school and their SFA, as well as specific key characteristics. For each key characteristic, regression-adjusted mean percentages are presented separately by subcategories of the characteristic. Statistical significance reported is for the difference between the regression-adjusted mean reported for that particular category of the characteristic and the regression-adjusted mean for the characteristic's reference category. For dichotomous variables, the reference category is the row for schools that do not exhibit the particular characteristic. For variables with more than two categories, the reference group is labeled in the leftmost column. Symbols for statistical significance are not reported for reference categories.

Current practice in rigorous policy analysis calls for attention to multiple comparison bias—the fact that when multiple hypotheses about associations between program features and outcomes are tested, the probability of finding significant associations by chance (known as false discovery) increases, which can lead to incorrect conclusions. Given the many relationships between plate waste and key characteristics examined in these analyses, findings should be considered exploratory and interpreted with caution.

Findings presented in Chapter 5 focus on characteristics that had a significant association for all school combined. Estimates for models using all schools were more precise due to larger sample sizes and therefore better suited for detecting significant differences while controlling for other factors. Full tabulations that include estimates for all characteristics examined within each domain and by school type are provided in Appendix F. Appendix F also includes tabulations that present full results for regression coefficient estimates underlying each table in the main body of the report, along with their standard errors. Control variables in each model—for which regression-adjusted means are not reported in the main body—also have coefficient estimates and standard errors reported in appendix tables.

1. Variable Selection and Exclusion

For each of the four domains identified above, the initial set of characteristics considered for inclusion in multivariate analyses consisted of relevant variables gathered from the Plate Waste Observations, Menu Survey, Principal Survey, SNM Survey, Cafeteria Observation Guide, A la Carte Checklist, Vending Machine and Other Sources of Foods and Beverages Checklist, SFA Director Survey, School Nutrition Manager Cost Interview, and SFA Director and Business Manager Onsite and Follow-Up Cost Interview (see Chapter 1). For the first domain (characteristics of school meals), the study team collaborated with FNS to identify the key measures compliance to be included in the analysis.

Continuous and categorical variables were transformed to exhibit appropriate variation given the distribution of values across sample schools. For example, in 75 percent of sampled schools, all daily menus met the requirement that at least half of all grains must be whole grain-rich. For such cases, categorical variables were created to compare the large proportion of

schools taking on one value (in this case, 100 percent of daily menus) with observations taking on lower or higher values. This produced categorical-specific samples large enough to detect meaningful differences in outcome variables between schools in different categories of independent variables.

Among the list of variables considered for the multivariate analyses, a subset were excluded from selected analyses because of (1) a high proportion of missing values, (2) low within-sample variation, or (3) high correlation with another variable that better explained variation in the outcome of interest. Details about how the study team determined which variables to exclude are presented below. Table E.2 lists variables that were excluded from all models for each outcome (that is, from models that were estimated for elementary schools, middle schools, high schools, and all schools combined). The variables retained in each model are reported in tables presented in Chapter 5 and Appendix F, which also note if a variable was excluded from the analysis for one or two school types only.

a. High Proportions of Missing Values

Multivariate analyses excluded variables originally missing values for at least 30 percent of the estimation sample. This includes both missing values stemming from non-response to a particular survey item and missing values reflecting partial overlap between schools in the plate waste sample and schools sampled for other instruments from which variables were drawn.

Missing values in variables retained for analyses were handled in one of two ways, depending on the type of variable. For binary and discrete categorical variables, missing values were replaced with a value of zero and an indicator specific to the particular variable was constructed to flag observations with originally missing values. For continuous variables, missing values were imputed using the sample mean among schools included in the analysis that were not originally missing values for the variable. This approach was used to minimize any influence of imputed values on results, while retaining schools in the estimation sample if they were missing values for only a subset of variables.

b. No or Little Variation between Observations

Final models excluded dichotomous variables for which 95 percent or more of the sample was contained in one category. Similarly, categorical variables were excluded when 95 percent or more of the sample belonged to one category. When one or more categories contained 10 percent or less of the sample, the study team attempted to logically combine adjacent or similar categories to group more than 10 percent in each redefined category.

c. Highly Correlated Variables

Simultaneously including characteristics that are highly correlated in a linear regression can lead to issues of multicollinearity, resulting in models that cannot properly identify how these characteristics are related to the nutritional quality of school meals. To address this potential issue, we analyzed correlations for all pairwise combinations of independent variables originally considered for multivariate models. Beginning with pairs exhibiting the strongest correlations, we excluded the one variable from each having the weakest correlation with each plate waste outcome. This pairwise exclusion continued until no correlations greater than an absolute value of 0.7 remained among variables simultaneously included in a multivariate model.

Table E.2. Variables Considered for Plate Waste Regression Analyses But Ultimately Excluded

	Meal Type	Outcome		
		Calories	Fruits and Vegetables ^a	Dairy
At Least One Daily Menu Offered Meat or Meat Alternates (as Separate Choice or as Part of an Entrée)	SBP (<i>only</i>)	LV	LV	LV
School Receives Fully or Partially Prepared Meals from a Separate Production or Central Kitchen	NSLP (<i>only</i>)	LV	LV	LV
School Participates in School Breakfast Program	NSLP (<i>only</i>)	LV	LV	LV

Note: Table presents variables that were initially considered for inclusion in each multivariate analysis, but were excluded due to low within-sample variation (LV).

^aFruits and vegetables were combined for analyses of plate waste in NSLP lunches. Analyses of plate waste in SBP breakfasts included fruits only.

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

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APPENDIX F

CHAPTER 5 SUPPLEMENTAL TABLES

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Table F.1. Mean Amounts of USDA Food Pattern Food Groups Selected and Wasted in NSLP Lunches

	Elementary Schools		Middle Schools		High Schools		All Schools	
	Mean Amount Selected	Mean Amount Wasted ^a	Mean Amount Selected	Mean Amount Wasted ^a	Mean Amount Selected	Mean Amount Wasted ^a	Mean Amount Selected	Mean Amount Wasted ^a
Fruits (cups)	0.6	0.2	0.7	0.2	0.7	0.2	0.7	0.2
Vegetables (cups)	0.5	0.3***	0.5	0.1	0.5	0.1###	0.5	0.2
Dark green (cups)	0.1	0.3*	0.1	0.1	0.1	0.1 ^	0.1	0.2
Red and orange (cups)	0.1	0.1***	0.2	0.1	0.2	0.1###	0.1	0.1
Legumes (cups) ^b	0.0 ^	0.2 ^	0.0 ^	0.1 ^	0.0 ^	0.1	0.0^	0.1
Starchy (cups)	0.2	0.1*	0.1	0.1	0.2	0.1##	0.2	0.1
Other (cups)	0.1	0.1	0.1	0.1	0.1	0.1#	0.1	0.1
Grains (oz)	2.1	0.5***	2.1†††	0.2	2.6##	0.2###	2.2	0.4
Whole grains (oz)	1.3	0.3***	1.3†	0.2	1.7#	0.2###	1.4	0.3
Dairy (cups)	1.3	0.4***	1.2	0.3†††	1.2	0.2###	1.2	0.3
Protein Foods (oz) ^c	1.2	0.3**	1.5	0.2†	1.5	0.1###	1.3	0.2
Oils (tsp)	1.4	0.3***	1.3	0.1	1.7	0.2#	1.5	0.3
Empty Calories (kcal)	107	29***	108	16	115	13###	109	23
Calories from solid fats (kcal)	45	11**	55	6	63	6##	51	9
Calories from added sugars (kcal)	62	19***	53	11††	52	7###	58	15
Number of Trays	2,186	2,186	2,109	2,109	1,958	1,958	6,253	6,253
Number of Schools	56	56	56	56	53	53	165	165

Source: School Nutrition and Meal Cost Study, Plate Waste Observations, school year 2014-2015. School-level tabulations are weighted to be nationally representative of public, non-charter schools that offer the National School Lunch Program, serve reimbursable meals in cafeteria-based settings, and serve a minimum number of lunches per day (at least 175 lunches in elementary schools, 220 lunches in middle schools, and 87 lunches in high schools).

Notes: The USDA Food Pattern food groups are largely consistent with the meal components used in planning NSLP lunches, with two exceptions: (1) fluid milk is considered a separate meal component, and (2) other dairy foods such as yogurt and cheese are counted as meat alternates.

The fruits group includes both whole fruit (any fresh, canned, dried, or frozen fruit) and 100% fruit juice.

^aIf a tray did not contain a specific food group, it was excluded when estimating the amount wasted. Thus, it is possible for the mean amount wasted to be larger than the mean amount selected for a given food group if there was a sufficient number of trays that did not contain the food group.

^bIncludes legumes credited as vegetables on the Menu Survey.

^cIncludes legumes credited as a meat alternate on the Menu Survey.

Difference between elementary and middle schools is significantly different from zero at the ***0.001 level, **0.01 level, or *0.05 level.

Difference between middle and high schools is significantly different from zero at the ^{†††}0.001 level, ^{††}0.01 level, or [†]0.05 level.

Difference between elementary and high schools is significantly different from zero at the ^{###}0.001 level, ^{##}0.01 level, or [#]0.05 level.

cups = cup equivalents; NSLP = National School Lunch Program; oz = ounce equivalents; tsp = teaspoons.

[^]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.

Table F.2. Mean Proportion of USDA Food Pattern Food Groups Wasted in NSLP Lunches

	Mean Proportion Wasted			
	Elementary Schools	Middle Schools	High Schools	All Schools
Fruits	29.7*	24.0	19.9###	26.6
Vegetables	37.2***	20.4	16.1###	29.8
Dark green	37.8***	22.4	18.4###	30.3
Red and orange	38.9***	18.0	14.6###	29.5
Legumes ^a	36.5*	20.3	23.4	28.6
Starchy	30.4*	17.4	15.3##	25.2
Other	38.4***	21.8	16.6###	29.8
Grains	19.6***	11.2	8.7###	16.0
Whole grains	19.6***	11.5†††	6.8###	15.4
Dairy	31.6***	20.2†††	13.3###	25.7
Protein Foods ^b	17.9***	9.7†	7.1###	14.1
Oils	19.9***	10.6	8.9###	15.9
Empty Calories	26.9***	15.6††	11.4###	21.7
Calories from solid fats	24.5***	11.8	9.9###	19.1
Calories from added sugars	28.9***	18.9†††	12.9###	23.7
Number of Trays	2,186	2,109	1,958	6,253
Number of Schools	56	56	53	165

Source: School Nutrition and Meal Cost Study, Plate Waste Observations, school year 2014-2015. School-level tabulations are weighted to be nationally representative of public, non-charter schools that offer the National School Lunch Program, serve reimbursable meals in cafeteria-based settings, and serve a minimum number of lunches per day (at least 175 lunches in elementary schools, 220 lunches in middle schools, and 87 lunches in high schools).

Notes: The USDA Food Pattern food groups are largely consistent with the meal components used in planning NSLP lunches, with two exceptions: (1) fluid milk is considered a separate meal component, and (2) other dairy foods such as yogurt and cheese are counted as meat alternates.

The fruits group includes both whole fruit (any fresh, canned, dried, or frozen fruit) and 100% fruit juice.

^aIncludes legumes credited as vegetables on the Menu Survey.

^bIncludes legumes credited as a meat alternate on the Menu Survey.

Difference between elementary and middle schools is significantly different from zero at the ***0.001 level or *0.05 level.

Difference between middle and high schools is significantly different from zero at the †††0.001 level, ††0.01 level, or †0.05 level.

Difference between elementary and high schools is significantly different from zero at the ###0.001 level or ##0.01 level.

NSLP = National School Lunch Program.

Table F.3. Mean Amounts of Calories and Nutrients Selected and Wasted in NSLP Lunches

	Elementary Schools		Middle Schools		High Schools		All Schools	
	Mean Amount Selected	Mean Amount Wasted ^a	Mean Amount Selected	Mean Amount Wasted ^a	Mean Amount Selected	Mean Amount Wasted ^a	Mean Amount Selected	Mean Amount Wasted ^a
Calories (kcal)	554	145***	561 [†]	85	634 [#]	71 ^{###}	573	119
Macronutrients								
Total Fat (g)	16	4***	17	2	20 [#]	2 ^{###}	17	3
Saturated Fat (g)	5	1***	6	1	7 [#]	1 ^{###}	6	1
Monounsaturated Fat (g)	5	1***	6	1	7 [#]	1 [#]	6	1
Polyunsaturated Fat (g)	5	1***	4	1	5	1 [#]	5	1
Linoleic acid (g)	4	1***	4	0	5	0 ^{###}	4	1
Alpha-linolenic acid (g)	0.5	0.1***	0.5	0.1	0.6	0.1 [#]	0.5	0.1
Carbohydrate (g)	81	23***	77 ^{††}	14	88	11 ^{###}	82	19
Protein (g)	26	7***	29	4 ^{††}	30 [#]	3 ^{###}	27	6
Vitamins								
Vitamin A (mcg RAE)	307	117***	272	58	263	54 ^{##^}	291	94
Vitamin C (mg)	25	9	31	7	32	5 [#]	28	8
Vitamin D (mcg)	7.9	2.3	15.3	1.8	21.7 ^{##^}	1.7	12.2	2.1
Vitamin E (mg AT)	2.0	0.6***	2.1	0.3	2.2	0.3 ^{###}	2.1	0.5
Vitamin B ₆ (mg)	0.5	0.1***	0.6	0.1 [†]	0.7 [#]	0.1 ^{###}	0.6	0.1
Vitamin B ₁₂ (mcg)	1.5 [*]	0.5 [*]	2.1	0.3 [†]	2.0	0.2 ^{###}	1.7	0.4
Folate (mcg DFE)	87	26***	92	16 ^{††}	92	11 ^{###}	89	21
Niacin (mg)	6	1***	6 [†]	1	7 ^{###}	1 ^{###}	6	1
Riboflavin (mg)	0.7	0.2***	0.7	0.1 ^{†††}	0.7	0.1 ^{###}	0.7	0.2
Thiamin (mg)	0.4	0.1***	0.5	0.1 [†]	0.5 [#]	0.1 ^{###}	0.5	0.1
Minerals								
Calcium (mg)	480	146***	460	83 ^{††}	465	57 ^{###}	473	116
Iron (mg)	3.6	0.9***	3.7 [†]	0.5 [†]	4.1 [#]	0.4 ^{###}	3.7	0.8
Magnesium (mg)	113	33***	111	19 ^{††}	120	14 ^{###}	114	26
Phosphorus (mg)	547	156***	556	91 ^{††}	582	67 ^{###}	556	126
Potassium (mg)	1,016	314***	1,017	193 [†]	1,069	141 ^{###}	1,028	256
Sodium (mg)	873	225***	946	128	1,030 [#]	110 ^{###}	920	184
Zinc (mg)	3.7	1.0***	3.9	0.6 [†]	4.2	0.4 ^{###}	3.8	0.8

	Elementary Schools		Middle Schools		High Schools		All Schools	
	Mean Amount Selected	Mean Amount Wasted ^a	Mean Amount Selected	Mean Amount Wasted ^a	Mean Amount Selected	Mean Amount Wasted ^a	Mean Amount Selected	Mean Amount Wasted ^a
Other Dietary Components								
Dietary Fiber (g)	8	2 ^{***}	8 [†]	1	9	1 ^{###}	8	2
Cholesterol (mg)	44 ^{**}	10 [*]	59	7 [†]	57 [#]	5 ^{###}	50	8
Number of Trays	2,186	2,186	2,109	2,109	1,958	1,958	6,253	6,253
Number of Schools	56	56	56	56	53	53	165	165

Source: School Nutrition and Meal Cost Study, Plate Waste Observations, school year 2014-2015. School-level tabulations are weighted to be nationally representative of public, non-charter schools that offer the National School Lunch Program, serve reimbursable meals in cafeteria-based settings, and serve a minimum number of lunches per day (at least 175 lunches in elementary schools, 220 lunches in middle schools, and 87 lunches in high schools).

^aIf a tray did not contain a specific nutrient, it was excluded when estimating the amount wasted. Thus, it is possible for the mean amount wasted to be larger than the mean amount selected for a given nutrient if there was a sufficient number of trays that did not contain the nutrient.

Difference between elementary and middle schools is significantly different from zero at the ^{***}0.001 level, ^{**}0.01 level, or ^{*}0.05 level.

Difference between middle and high schools is significantly different from zero at the ^{††}0.01 level or [†]0.05 level.

Difference between elementary and high schools is significantly different from zero at the ^{###}0.001 level, ^{##}0.01 level, or [#]0.05 level.

AT = alpha-tocopherol; DFE = dietary folate equivalents; g = grams; mcg = micrograms; mg = milligrams; NSLP = National School Lunch Program; RAE = retinol activity equivalents.

[^]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.

Table F.4. Mean Proportion of Calories and Nutrients Wasted in NSLP Lunches

	Mean Proportion Wasted			
	Elementary Schools	Middle Schools	High Schools	All Schools
Calories	26.0 ^{***}	15.2 ^{††}	11.3 ^{###}	21.0
Macronutrients				
Total Fat	21.6 ^{***}	11.4	9.5 ^{###}	17.2
Saturated Fat	22.5 ^{***}	12.0	9.9 ^{###}	18.0
Monounsaturated Fat	21.4 ^{***}	10.9	9.3 ^{###}	17.0
Polyunsaturated Fat	20.1 ^{***}	10.9	9.0 ^{###}	16.1
Linoleic acid	19.9 ^{***}	10.8	9.0 ^{###}	16.0
Alpha-linolenic acid	21.5 ^{***}	12.0	9.5 ^{###}	17.3
Carbohydrate	28.3 ^{***}	18.0 ^{†††}	12.8 ^{###}	23.2
Protein	25.7 ^{***}	14.3 ^{†††}	10.1 ^{###}	20.4
Vitamins				
Vitamin A	36.1 ^{***}	21.7 ^{††}	16.6 ^{###}	29.4
Vitamin C	33.9 ^{***}	20.6 ^{††}	14.9 ^{###}	27.5
Vitamin D	31.1 ^{***}	18.7 ^{††}	12.0 ^{###}	24.8
Vitamin E	26.5 ^{***}	14.4 [†]	11.3 ^{###}	21.2
Vitamin B ₆	27.2 ^{***}	15.6 ^{†††}	10.8 ^{###}	21.7
Vitamin B ₁₂	30.9 ^{***}	18.2 ^{††}	13.0 ^{###}	24.8
Folate	28.8 ^{***}	17.4 ^{†††}	12.1 ^{###}	23.2
Niacin	22.7 ^{***}	12.2 ^{††}	8.9 ^{###}	17.9
Riboflavin	30.2 ^{***}	18.6 ^{†††}	12.7 ^{###}	24.4
Thiamin	26.2 ^{***}	14.9 ^{††}	10.6 ^{###}	20.9
Minerals				
Calcium	30.6 ^{***}	18.9 ^{†††}	12.8 ^{###}	24.7
Iron	25.4 ^{***}	14.6 ^{††}	10.4 ^{###}	20.3
Magnesium	28.7 ^{***}	17.4 ^{†††}	11.7 ^{###}	23.1
Phosphorus	28.4 ^{***}	16.7 ^{†††}	11.7 ^{###}	22.8
Potassium	30.7 ^{***}	18.8 ^{†††}	13.3 ^{###}	24.9
Sodium	25.2 ^{***}	13.5 [†]	10.5 ^{###}	20.0
Zinc	26.3 ^{***}	14.9 ^{†††}	10.4 ^{###}	20.9
Other Dietary Components				
Dietary Fiber	28.7 ^{***}	18.1 ^{†††}	13.1 ^{###}	23.5
Cholesterol	20.5 ^{***}	11.6 [†]	9.0 ^{###}	16.5
Number of Trays	2,186	2,109	1,958	6,253
Number of Schools	56	56	53	165

Source: School Nutrition and Meal Cost Study, Plate Waste Observations, school year 2014-2015. School-level tabulations are weighted to be nationally representative of public, non-charter schools that offer the National School Lunch Program, serve reimbursable meals in cafeteria-based settings, and serve a minimum number of lunches per day (at least 175 lunches in elementary schools, 220 lunches in middle schools, and 87 lunches in high schools).

Difference between elementary and middle schools is significantly different from zero at the ^{***}0.001 level.

Difference between middle and high schools is significantly different from zero at the ^{†††}0.001 level, ^{††}0.01 level, or [†]0.05 level.

Difference between elementary and high schools is significantly different from zero at the ^{###}0.001 level.

Table F.5. Mean Amounts of USDA Food Pattern Food Groups Selected and Wasted in SBP Breakfasts

	Elementary Schools		Middle Schools		High Schools		All Schools	
	Mean Amount Selected	Mean Amount Wasted ^a	Mean Amount Selected	Mean Amount Wasted ^a	Mean Amount Selected	Mean Amount Wasted ^a	Mean Amount Selected	Mean Amount Wasted ^a
Fruits (cups)	0.7	0.3**	0.7	0.2††	0.7	0.1###	0.7	0.2
Vegetables (cups) ^b	0.0 [^]	0.0 [^]						
Grains (oz)	1.5	0.3	1.7	0.2	1.7	0.2##	1.6	0.2
Whole grains (oz)	1.0	0.2	1.0	0.1†	0.9	0.1###	0.9	0.2
Dairy (cups)	1.0***	0.5***	0.8	0.3†††	0.8###	0.2###	0.9	0.4
Protein Foods (oz) ^c	0.3	0.1	0.4	0.1	0.4	0.0	0.3	0.1
Oils (tsp)	0.7	0.1	0.7	0.1	0.7	0.1###	0.7	0.1
Empty Calories (kcal)	95	25***	88	15†††	88	9###	92	20
Calories from solid fats (kcal)	27	6	32	5	36	3##	30	5
Calories from added sugars (kcal)	67*	20***	56	11†††	52##	6###	62	15
Number of Trays	1,257	1,257	1,301	1,301	1,043	1,043	3,601	3,601
Number of Schools	51	51	54	54	49	49	154	154

Source: School Nutrition and Meal Cost Study, Plate Waste Observations, school year 2014-2015. School-level tabulations are weighted to be nationally representative of public, non-charter schools that offer the National School Lunch Program, serve reimbursable meals in cafeteria-based settings, and serve a minimum number of lunches per day (at least 175 lunches in elementary schools, 220 lunches in middle schools, and 87 lunches in high schools).

Notes: The USDA Food Pattern food groups are largely consistent with the meal components used in planning SBP breakfasts, with two exceptions: (1) fluid milk is considered a separate meal component, and (2) other dairy foods such as yogurt and cheese are counted as meat alternates.

The fruits group includes both whole fruit (any fresh, canned, dried, or frozen fruit) and 100% fruit juice.

^aIf a tray did not contain a specific food group, it was excluded when estimating the amount wasted. Thus, it is possible for the mean amount wasted to be larger than the mean amount selected for a given food group if there was a sufficient number of trays that did not contain the food group.

^bIncludes legumes credited as vegetables on the Menu Survey. Amounts for vegetable subgroups could not be reliably estimated because so few trays included these foods.

^cIncludes legumes credited as a meat alternate on the Menu Survey.

Difference between elementary and middle schools is significantly different from zero at the ***0.001 level, **0.01 level, or *0.05 level.

Difference between middle and high schools is significantly different from zero at the †††0.001 level, ††0.01 level, or †0.05 level.

Difference between elementary and high schools is significantly different from zero at the ###0.001 level or ##0.01 level.

cups = cup equivalents; oz = ounce equivalents; SBP = School Breakfast Program; tsp = teaspoons.

[^]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.

Table F.6. Mean Proportion of USDA Food Pattern Food Groups Wasted in SBP Breakfasts

	Mean Proportion Wasted			
	Elementary Schools	Middle Schools	High Schools	All Schools
Fruits	34.4**	24.9 ^{†††}	12.7 ^{###}	27.9
Vegetables ^a	10.7 [^]	9.4 [^]	6.1 [^]	8.8
Grains	17.0*	11.9 [†]	8.2 ^{###}	14.2
Whole grains	17.4*	12.2 [†]	7.8 ^{###}	14.5
Dairy	45.1 ^{***}	32.7 ^{†††}	19.3 ^{###}	37.3
Protein Foods ^b	12.5	8.9	6.2 ^{###}	10.4
Oils	15.5*	10.5	8.1 ^{###}	13.0
Empty Calories	26.6 ^{***}	17.1 ^{†††}	10.8 ^{###}	21.5
Calories from solid fats	22.5*	16.3 ^{††}	9.0 ^{###}	18.4
Calories from added sugars	28.0 ^{***}	18.2 ^{††}	11.9 ^{###}	22.7
Number of Trays	1,257	1,301	1,043	3,601
Number of Schools	51	54	49	154

Source: School Nutrition and Meal Cost Study, Plate Waste Observations, school year 2014-2015. School-level tabulations are weighted to be nationally representative of public, non-charter schools that offer the National School Lunch Program, serve reimbursable meals in cafeteria-based settings, and serve a minimum number of lunches per day (at least 175 lunches in elementary schools, 220 lunches in middle schools, and 87 lunches in high schools).

Notes: The USDA Food Pattern food groups are largely consistent with the meal components used in planning SBP breakfasts, with two exceptions: (1) fluid milk is considered a separate meal component, and (2) other dairy foods such as yogurt and cheese are counted as meat alternates.

The fruits group includes both whole fruit (any fresh, canned, dried, or frozen fruit) and 100% fruit juice.

^aIncludes legumes credited as vegetables on the Menu Survey. Proportions for vegetable subgroups could not be reliably estimated because so few trays included these foods.

^bIncludes legumes credited as a meat alternate on the Menu Survey.

Difference between elementary and middle schools is significantly different from zero at the ***0.001 level, **0.01 level, or *0.05 level.

Difference between middle and high schools is significantly different from zero at the ^{†††}0.001 level, ^{††}0.01 level, or [†]0.05 level.

Difference between elementary and high schools is significantly different from zero at the ^{###}0.001 level.

SBP = School Breakfast Program.

[^]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.

Table F.7. Mean Amounts of Calories and Nutrients Selected and Wasted in SBP Breakfasts

	Elementary Schools		Middle Schools		High Schools		All Schools	
	Mean Amount Selected	Mean Amount Wasted ^a	Mean Amount Selected	Mean Amount Wasted ^a	Mean Amount Selected	Mean Amount Wasted ^a	Mean Amount Selected	Mean Amount Wasted ^a
Calories	409	116***	403	75†††	397	44###	405	93
Macronutrients								
Total Fat (g)	9	2**	10	1†	10	1###	9	2
Saturated Fat (g)	3	1**	3	1†	4	0###	3	1
Monounsaturated Fat (g)	3	1*	3	0†	3	0###	3	1
Polyunsaturated Fat (g)	2	0	3	0†	3	0###	3	0
Linoleic acid (g)	2	0	3	0†	2	0###	2	0
Alpha-linolenic acid (g)	0.3	0.0	0.3	0.0†	0.3	0.0###	0.3	0.0
Carbohydrate (g)	71	21***	68	14†††	65#	8###	69	17
Protein (g)	15	5***	14	3†††	14	2###	14	4
Vitamins								
Vitamin A (mcg RAE)	207*	77***	173	47†††	163##	24###	191	60
Vitamin C (mg)	28	9	33	7††	30	4###	29	7
Vitamin D (mcg)	4.8	1.4*	4.7^	1.0	7.9^	0.8#^	5.5	1.2
Vitamin E (mg AT)	0.9	0.2*	1.0	0.1†	1.0	0.1###	0.9	0.2
Vitamin B ₆ (mg)	0.5	0.1**	0.5	0.1††	0.5	0.0###	0.5	0.1
Vitamin B ₁₂ (mcg)	1.8*	0.6***	1.5	0.4†††	1.4###	0.2###	1.7	0.5
Folate (mcg DFE)	98	22**	99	14††	90	9###	96	18
Niacin (mg)	5	1***	4	1††	4	0###	4	1
Riboflavin (mg)	0.7**	0.3***	0.6	0.2†††	0.6###	0.1###	0.7	0.2
Thiamin (mg)	0.4	0.1***	0.4	0.1†††	0.4	0.0###	0.4	0.1
Minerals								
Calcium (mg)	400*	153***	343	90†††	343##	54###	378	120
Iron (mg)	3.8	0.8**	3.6	0.5††	3.4	0.3###	3.7	0.6
Magnesium (mg)	74	25***	70	15†††	66##	9###	72	20
Phosphorus (mg)	384	139***	346	83†††	341#	49###	368	109
Potassium (mg)	708	270***	663	168†††	620##	91###	681	213
Sodium (mg)	442	105***	473	69†	481	48###	456	86
Zinc (mg)	3.2	0.9***	2.8	0.5†††	2.5##	0.3###	3.0	0.7

	Elementary Schools		Middle Schools		High Schools		All Schools	
	Mean Amount Selected	Mean Amount Wasted ^a	Mean Amount Selected	Mean Amount Wasted ^a	Mean Amount Selected	Mean Amount Wasted ^a	Mean Amount Selected	Mean Amount Wasted ^a
Other Dietary Components								
Dietary Fiber (g)	4	1 ^{**}	4	1 ^{††}	4	1 ^{###}	4	1
Cholesterol (mg)	27	7	35	6	47 [#]	4 [#]	33	6
Number of Trays	1,257	1,257	1,301	1,301	1,043	1,043	3,601	3,601
Number of Schools	51	51	54	54	49	49	154	154

Source: School Nutrition and Meal Cost Study, Plate Waste Observations, school year 2014-2015. School-level tabulations are weighted to be nationally representative of public, non-charter schools that offer the National School Lunch Program, serve reimbursable meals in cafeteria-based settings, and serve a minimum number of lunches per day (at least 175 lunches in elementary schools, 220 lunches in middle schools, and 87 lunches in high schools).

^aIf a tray did not contain a specific nutrient, it was excluded when estimating the amount wasted. Thus, it is possible for the mean amount wasted to be larger than the mean amount selected for a given nutrient if there was a sufficient number of trays that did not contain the nutrient.

Difference between elementary and middle schools is significantly different from zero at the ^{***}0.001 level, ^{**}0.01 level, or ^{*}0.05 level.

Difference between middle and high schools is significantly different from zero at the ^{†††}0.001 level, ^{††}0.01 level, or [†]0.05 level.

Difference between elementary and high schools is significantly different from zero at the ^{###}0.001 level, ^{##}0.01 level, or [#]0.05 level.

AT = alpha-tocopherol; DFE = dietary folate equivalents; g = grams; mcg = micrograms; mg = milligrams; RAE = retinol activity equivalents; SBP = School Breakfast Program.

[^]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.

Table F.8. Mean Proportion of Calories and Nutrients Wasted in SBP Breakfasts

	Mean Proportion Wasted			
	Elementary Schools	Middle Schools	High Schools	All Schools
Calories	28.5***	19.0†††	11.3###	23.0
Macronutrients				
Total Fat	21.5**	14.9††	9.2###	17.6
Saturated Fat	26.0**	17.5††	10.4###	21.1
Monounsaturated Fat	21.0**	14.3††	9.0###	17.2
Polyunsaturated Fat	16.3*	12.1†	8.0###	13.7
Linoleic acid	16.2*	12.1†	8.0###	13.7
Alpha-linolenic acid	17.0*	12.8††	8.2###	14.3
Carbohydrate	29.3***	20.0†††	11.7###	23.8
Protein	34.2***	22.7†††	13.5###	27.6
Vitamins				
Vitamin A	36.9***	26.8†††	15.5###	30.4
Vitamin C	29.7***	20.2†††	9.9###	23.7
Vitamin D	41.0**	30.3†††	17.5###	33.9
Vitamin E	21.7**	15.3††	9.2###	17.8
Vitamin B ₆	25.1***	17.4†††	9.9###	20.4
Vitamin B ₁₂	35.4***	25.3††	15.6###	29.2
Folate	22.2***	15.0††	9.4###	18.1
Niacin	19.4***	12.2†	8.3###	15.7
Riboflavin	34.8***	24.0†††	14.1###	28.4
Thiamin	24.0***	16.1†††	9.9###	19.5
Minerals				
Calcium	38.4***	26.5†††	15.4###	31.2
Iron	20.6***	13.4†††	8.4###	16.7
Magnesium	33.2***	22.1†††	12.9###	26.8
Phosphorus	36.3***	24.6†††	14.5###	29.4
Potassium	38.0***	25.3†††	14.6###	30.6
Sodium	24.0***	15.8††	9.9###	19.5
Zinc	27.9***	17.8††	11.6###	22.5
Other Dietary Components				
Dietary Fiber	26.8***	18.4†††	11.7###	22.0
Cholesterol	29.4**	20.6††	10.6###	23.7
Number of Trays	1,257	1,301	1,043	3,601
Number of Schools	51	54	49	154

Source: School Nutrition and Meal Cost Study, Plate Waste Observations, school year 2014-2015. School-level tabulations are weighted to be nationally representative of public, non-charter schools that offer the National School Lunch Program, serve reimbursable meals in cafeteria-based settings, and serve a minimum number of lunches per day (at least 175 lunches in elementary schools, 220 lunches in middle schools, and 87 lunches in high schools).

Difference between elementary and middle schools is significantly different from zero at the ***0.001 level, **0.01 level, or *0.05 level.

Difference between middle and high schools is significantly different from zero at the †††0.001 level, ††0.01 level, or †0.05 level.

Difference between elementary and high schools is significantly different from zero at the ###0.001 level.

Table F.9. Mean Percentage of USDA Food Pattern Food Groups Wasted in NSLP Lunches, by Gender

	Mean Percentage Wasted								
	Elementary Schools		Middle Schools		High Schools		All Schools		All Students
	Males	Females	Males	Females	Males	Females	Males	Females	
Fruits	27.6	29.0	19.7***	26.2	15.7**	21.1	21.2***	25.9	23.5
Vegetables	32.5	34.0	16.2**	20.9	13.3***	19.7	20.5***	25.3	22.9
Dark green	34.3***	36.1	23.5***	27.9	19.5***	20.8	26.6***	29.0	27.9
Red and orange	36.5***	38.2	11.9***	18.0	12.3**	18.0	18.6***	24.6	21.5
Legumes ^a	41.7***	45.1	16.9***	25.0	29.6***	36.5	31.2***	36.6	33.7
Starchy	24.8***	28.1	13.7***	19.1	14.6***	19.2	18.0***	22.7	20.5
Other	34.3***	35.1	19.4***	24.1	12.7**	20.7	22.2***	27.2	24.7
Grains	20.7	22.1	9.0***	14.2	6.4***	13.3	12.1***	16.9	14.5
Whole grains	20.1	21.8	8.9***	14.0	6.0***	12.1	11.9***	16.5	14.1
Dairy	28.6***	36.4	16.7***	23.6	9.8***	20.0	18.5***	27.6	22.9
Protein Foods ^b	18.4	19.8	7.4***	12.9	5.3***	11.0	10.2***	14.9	12.5
Oils	19.3	21.2	8.1***	13.9	6.6***	12.6	11.3***	16.2	13.7
Empty Calories	25.0***	30.4	13.3***	19.7	8.6***	17.1	15.6***	22.9	19.2
Calories from solid fats	21.7	23.7	9.4***	14.9	7.2***	14.3	12.7***	18.0	15.3
Calories from added sugars	25.4***	32.2	15.2***	22.3	9.4***	17.9	16.6***	24.8	20.6
Number of Trays	1,026	1,128	1,052	1,010	1,031	891	3,109	3,029	6,138
Number of Schools	56	56	56	56	53	53	165	165	165

Source: School Nutrition and Meal Cost Study, Plate Waste Observations, school year 2014-2015. Tray-level tabulations are unweighted and include clustered standard errors to account for clustering of trays within schools. Schools included in this unweighted analysis are public, non-charter schools that offer the National School Lunch Program, serve reimbursable meals in cafeteria-based settings, and serve a minimum number of lunches per day (at least 175 lunches in elementary schools, 220 lunches in middle schools, and 87 lunches in high schools). Sample excludes 115 trays with missing data on gender.

Notes: The USDA Food Pattern food groups are largely consistent with the meal components used in planning NSLP lunches, with two exceptions: (1) fluid milk is considered a separate meal component, and (2) other dairy foods such as yogurt and cheese are counted as meat alternates.

The fruits group includes both whole fruit (any fresh, canned, dried, or frozen fruit) and 100% fruit juice.

^aIncludes legumes credited as vegetables on the Menu Survey.

^bIncludes legumes credited as a meat alternate on the Menu Survey.

Difference between males and females is significantly different from zero at the ***0.001 level, **0.01 level, or *0.05 level.

NSLP = National School Lunch Program.

Table F.10. Mean Percentage of Calories and Nutrients Wasted in NSLP Lunches, by Gender

	Mean Percentage Wasted								All Students
	Elementary Schools		Middle Schools		High Schools		All Schools		
	Males	Females	Males	Females	Males	Females	Males	Females	
Calories	24.5***	28.2	13.1***	18.7	8.9***	16.9	15.4***	21.7	18.5
Macronutrients									
Total Fat	21.1*	23.3	9.6***	14.9	7.2***	14.6	12.6***	18.0	15.3
Saturated Fat	21.9**	24.7	10.0***	15.7	7.4***	15.0	13.1***	18.8	15.9
Monounsaturated Fat	20.9*	23.0	9.3***	14.6	7.1***	14.5	12.4***	17.7	15.0
Polyunsaturated Fat	20.3*	22.4	9.1***	14.4	7.2***	14.1	12.2***	17.3	14.7
Linoleic acid	20.2*	22.4	9.0***	14.3	7.2***	14.0	12.1***	17.2	14.6
Alpha-linolenic acid	21.1*	23.0	10.2***	15.6	7.9***	14.9	13.0***	18.2	15.6
Carbohydrate	26.1***	30.3	15.4***	21.1	10.1***	18.3	17.2***	23.7	20.4
Protein	24.3***	28.6	12.1***	18.1	7.9***	15.9	14.7***	21.4	18.0
Vitamins									
Vitamin A	31.6***	38.6	18.4***	25.5	12.5***	21.6	20.8***	29.3	25.0
Vitamin C	28.8	30.6	18.0***	22.9	12.2***	19.2	19.7***	24.7	22.2
Vitamin D	28.2***	36.0	15.1***	23.4	8.3***	17.4	17.2***	26.4	21.7
Vitamin E	24.3**	26.9	12.1***	17.9	9.1***	16.1	15.1***	20.7	17.9
Vitamin B ₆	25.5***	28.7	13.4***	19.2	9.3***	16.9	16.1***	22.1	19.0
Vitamin B ₁₂	28.0***	35.4	15.6***	22.4	9.2***	17.7	17.7***	26.0	21.8
Folate	25.5***	28.8	14.7***	20.3	9.7***	17.8	16.6***	22.8	19.6
Niacin	22.3*	24.7	10.3***	15.6	7.3***	14.3	13.3***	18.6	15.9
Riboflavin	27.6***	33.5	15.6***	22.3	9.6***	18.5	17.6***	25.4	21.4
Thiamin	24.8***	28.3	13.1***	18.5	8.6***	16.6	15.4***	21.6	18.5
Minerals									
Calcium	27.8***	34.5	16.1***	22.8	9.6***	19.0	17.8***	26.0	21.9
Iron	23.8***	27.3	12.4***	17.9	8.3***	15.9	14.8***	20.8	17.8
Magnesium	26.3***	31.3	14.8***	20.8	9.3***	17.7	16.8***	23.8	20.2
Phosphorus	26.2***	31.7	14.0***	20.3	8.9***	17.7	16.3***	23.8	20.0
Potassium	27.8***	33.1	16.0***	22.4	10.6***	19.0	18.1***	25.4	21.7
Sodium	23.9***	27.0	11.4***	16.8	8.2***	15.8	14.5***	20.3	17.3
Zinc	24.9***	29.5	12.6***	18.6	8.3***	16.3	15.2***	22.0	18.6

	Mean Percentage Wasted								
	Elementary Schools		Middle Schools		High Schools		All Schools		All Students
	Males	Females	Males	Females	Males	Females	Males	Females	
Other Dietary Components									
Dietary Fiber	26.0***	29.5	15.2***	20.8	10.7***	18.3	17.3***	23.3	20.2
Cholesterol	21.7**	24.2	9.5***	15.6	6.8***	14.0	12.6***	18.3	15.4
Number of Trays	1,026	1,128	1,052	1,010	1,031	891	3,109	3,029	6,138
Number of Schools	56	56	56	56	53	53	165	165	165

Source: School Nutrition and Meal Cost Study, Plate Waste Observations, school year 2014-2015. Tray-level tabulations are unweighted and include clustered standard errors to account for clustering of trays within schools. Schools included in this unweighted analysis are public, non-charter schools that offer the National School Lunch Program, serve reimbursable meals in cafeteria-based settings, and serve a minimum number of lunches per day (at least 175 lunches in elementary schools, 220 lunches in middle schools, and 87 lunches in high schools). Sample excludes 115 trays with missing data on gender.

Difference between males and females is significantly different from zero at the ***0.001 level, **0.01 level, or *0.05 level.

NSLP = National School Lunch Program.

Table F.11. Relationships between Plate Waste in NSLP Lunches and Key Characteristics of the Lunches: Regression-Adjusted Mean Percentage of Calories and Key USDA Food Pattern Food Groups Wasted

	Yes/ No	Elementary Schools			Middle Schools		
		Calories	Fruits and Vegetables	Dairy	Calories	Fruits and Vegetables	Dairy
Mean Percentage Wasted in NSLP Lunches		26.3	30.6	32.5	15.7	22.5	20.0
Overall Nutritional Quality of NSLP Lunches Prepared							
Total HEI-2010 Score Is at or above the Median Score (82.3)	Y	31.6	34.4*	46.7	25.2*	31.0*	32.7*
	N	31.4	29.1	41.5	22.8	25.7	28.8
Compliance of Daily and Weekly Lunch Menus with NSLP Nutrition Standards							
Met Daily Quantity Requirement for Meats/Meat Alternates	Y	†	†	†	25.1	29.9	35.8*
	N	†	†	†	22.9	26.8	25.7
Met Weekly Quantity Requirement for Meats/Meat Alternates	Y	32.6	36.2*	45.6	22.8*	28.0	28.5*
	N	30.4	27.3	42.6	25.2	28.7	33.1
Met Daily Quantity Requirement for Vegetables	Y	33.4	35.5*	44.9	25.1	32.8*	31.0
	N	29.6	28.0	43.4	22.9	23.9	30.6
Met Weekly Quantity Requirement for Vegetables	Y	28.5	31.2	41.4	21.5*	23.1*	31.4
	N	34.5	32.3	46.9	26.5	33.5	30.1
Met Daily Quantity Requirement for Grains	Y	32.1	30.2	48.9*	24.0	26.6*	31.2
	N	30.9	33.3	39.3	24.0	30.1	30.3
Met Requirement that at Least Half of Weekly Grains Are Whole Grain-Rich	Y	33.8	38.0*	45.0	21.8*	26.2	24.9*
	N	29.2	25.4	43.2	26.2	30.5	36.7
Met Minimum Calorie Level	Y	29.5	23.5*	40.3	22.5	24.6*	27.5*
	N	33.5	40.0	47.9	25.5	32.1	34.0
Met Maximum Calorie Level	Y	31.0	25.2*	46.0	†	26.2*	30.0
	N	32.0	38.3	42.2	†	30.5	31.6
Met Target 1 Sodium Limit	Y	28.4*	26.5*	37.9*	22.9*	†	†
	N	34.6	37.0	50.3	25.1	†	†

	Yes/ No	Elementary Schools			Middle Schools		
		Calories	Fruits and Vegetables	Dairy	Calories	Fruits and Vegetables	Dairy
Types of Foods Offered in Lunch Menus							
Number of Entrée Choices Offered on Plate Waste Observation Day							
1 to 3 (<i>reference category</i>)		35.0	35.6	42.8	26.6	33.4	31.9
4 to 5		34.2	41.5	43.8	21.4*	23.3*	29.7
6 or more		28.8*	22.0*	44.4	‡	‡	‡
All Daily Menus Offered Raw Vegetables	Y	31.6	29.8	48.0*	22.7*	28.9	25.8*
	N	31.4	33.7	40.2	25.3	27.8	35.7
Median Number of Vegetable Choices Offered per Day							
2 or less (<i>reference category</i>)		31.3	31.4	47.7	21.3	29.5	17.8
3 to 4		31.7	32.0	40.5	25.8	29.3	32.3
5 or more		‡	‡	‡	22.2	27.4	29.3
More than Half of Daily Menus Offered Dark Green Vegetables or Legumes	Y	30.4	31.1	46.3	23.1	25.7*	29.0
	N	32.6	32.4	41.9	24.9	31.0	32.6
More than Half of Daily Menus Offered Red and Orange Vegetables	Y	32.5	30.7	42.6	24.3	28.7	31.3
	N	30.5	32.8	45.6	23.7	28.0	30.2
Salad Bar (Entrée or Side) Offered on Plate Waste Observation Day	Y	31.5	28.2	41.9	24.5	27.7	31.6
	N	31.5	35.3	46.3	23.5	29.0	30.0
Sandwich/Deli Bar or Other Entrée Food Bar Offered on Plate Waste Observation Day	Y	†	†	†	23.5	27.1	29.6
	N	†	†	†	24.5	29.6	31.9
No Daily Menus Offered French Fries or Similar Potato Products	Y	29.6*	28.2*	42.5	23.8	28.4	32.0
	N	33.4	35.3	45.7	24.2	28.3	29.6
More than Half of Daily Menus Offered Pizza or Pizza Products	Y	35.7*	35.2*	49.2*	24.2	27.4	28.5
	N	27.2	28.3	39.0	23.8	29.2	33.1
At Least One Daily Menu Offered Breaded Meat (as Separate Choice or as Part of a Sandwich)	Y	35.3*	39.4*	49.7*	21.6*	27.9	25.2*
	N	27.7	24.1	38.5	26.4	28.8	36.4
Number of Trays		2,186	2,186	2,186	2,109	2,109	2,109
Number of Schools		56	56	56	56	56	56

	Yes/ No	High Schools			All Schools		
		Calories	Fruits and Vegetables	Dairy	Calories	Fruits and Vegetables	Dairy
Mean Percentage Wasted in NSLP Lunches		12.6	17.8	14.3	18.5	23.9	22.8
Overall Nutritional Quality of NSLP Lunches Prepared							
Total HEI-2010 Score Is at or above the Median Score (82.3)	Y	16.2	29.9*	20.6	19.0	29.7	22.4
	N	14.9	26.0	18.4	18.7	27.0	21.3
Compliance of Daily and Weekly Lunch Menus with NSLP Nutrition Standards							
Met Daily Quantity Requirement for Meats/Meat Alternates	Y	†	29.3	18.7	17.1*	26.1	20.2
	N	†	26.7	20.4	20.6	30.7	23.4
Met Weekly Quantity Requirement for Meats/Meat Alternates	Y	15.2	†	†	19.1	29.3	21.3
	N	15.9	†	†	18.5	27.5	22.3
Met Daily Quantity Requirement for Vegetables	Y	†	27.9	20.9	20.1*	31.8*	22.9
	N	†	28.1	18.2	17.5	25.0	20.7
Met Weekly Quantity Requirement for Vegetables	Y	15.8	†	†	16.8*	24.3*	20.4
	N	15.3	†	†	20.9	32.4	23.3
Met Daily Quantity Requirement for Grains	Y	14.6	24.0*	19.9	19.2	27.9	22.9
	N	16.5	31.9	19.2	18.4	28.8	20.7
Met Requirement that at Least Half of Weekly Grains Are Whole Grain-Rich	Y	17.7	29.2	17.8	18.5	28.7	20.8
	N	13.4	26.8	21.3	19.1	28.1	22.9
Met Minimum Calorie Level	Y	19.2*	33.1*	22.2*	19.1	26.7	22.1
	N	11.9	22.8	16.9	18.5	30.1	21.6
Met Maximum Calorie Level	Y	16.2	30.9	19.2	18.6	26.8	23.0
	N	14.9	25.1	19.9	19.1	30.0	20.7
Met Target 1 Sodium Limit	Y	16.6	30.0	20.2	17.5*	25.9	19.4*
	N	14.5	25.9	18.9	20.1	30.9	24.2
Types of Foods Offered in Lunch Menus							
Number of Entrée Choices Offered on Plate Waste Observation Day							
1 to 3 (<i>reference category</i>)		17.1	31.1	15.6	22.1	33.0	22.0
4 to 5		16.8	30.6	19.9	18.7*	28.3	20.6
6 or more		14.3	25.4	19.2	19.0	28.4	23.0

	Yes/ No	High Schools			All Schools		
		Calories	Fruits and Vegetables	Dairy	Calories	Fruits and Vegetables	Dairy
All Daily Menus Offered Raw Vegetables	Y	13.4*	25.4	18.6	18.1	26.6*	21.1
	N	17.7	30.5	20.5	19.5	30.2	22.6
Median Number of Vegetable Choices Offered per Day							
2 or less (<i>reference category</i>)		12.9	22.3	17.8	18.5	27.1	21.8
3 to 4		14.0	23.9	19.3	18.8	27.2	21.9
5 or more		17.1	32.1	19.8	18.8	29.5	21.8
More than Half of Daily Menus Offered Dark Green Vegetables or Legumes	Y	15.1	28.8	20.9	18.5	27.5	22.0
	N	16.0	27.2	18.2	19.1	29.2	21.6
More than Half of Daily Menus Offered Red and Orange Vegetables	Y	16.7	30.0	19.2	18.8	28.8	21.0
	N	14.4	26.0	19.9	18.8	28.0	22.6
Salad Bar (Entrée or Side) Offered on Plate Waste Observation Day	Y	†	†	†	18.5	26.4	20.0
	N	†	†	†	19.1	30.4	23.7
Sandwich/Deli Bar or Other Entrée Food Bar Offered on Plate Waste Observation Day	Y	16.8	31.0*	18.1	18.3	29.2	21.3
	N	14.3	24.9	21.0	19.3	27.6	22.4
No Daily Menus Offered French Fries or Similar Potato Products	Y	16.7	28.9	21.4	18.7	27.2	22.6
	N	14.4	27.1	17.6	18.9	29.6	21.0
More than Half of Daily Menus Offered Pizza or Pizza Products	Y	14.5	26.7	18.9	18.2	26.1*	21.3
	N	16.6	29.3	20.2	19.4	30.6	22.4
At Least One Daily Menu Offered Breaded Meat (as Separate Choice or as Part of a Sandwich)	Y	14.4	24.2	19.8	18.7	28.9	22.1
	N	16.7	31.7	19.3	18.9	27.9	21.6
Number of Trays		1,958	1,958	1,958	6,253	6,253	6,253
Number of Schools		53	53	53	165	165	165

Source: School Nutrition and Meal Cost Study, Plate Waste Observations and Menu Survey, school year 2014-2015. Tray-level tabulations are unweighted and include clustered standard errors to account for clustering of trays within schools. Schools included in this unweighted analysis are public, non-charter schools that offer the National School Lunch Program, serve reimbursable meals in cafeteria-based settings, and serve a minimum number of lunches per day (at least 175 lunches in elementary schools, 220 lunches in middle schools, and 87 lunches in high schools).

Notes: Estimates are regression-adjusted means that control for institutional and demographic characteristics of each school and their SFA. Variables with rows labeled "Y" and "N" report adjusted mean percentage of each outcome (calories, fruits and vegetables, and dairy) wasted for schools that do and do not

meet the variable criteria, respectively. Otherwise, regression-adjusted means are reported for each category within a variable. See Appendix E for more details on characteristic descriptions and selection methods.

Estimates for fruits and vegetables combine plate waste for the USDA Food Pattern fruits and vegetables groups.

*Denotes the difference within each outcome (mean percentage of calories, fruits and vegetables, and dairy wasted) between schools with and without a dichotomous characteristic is statistically different from zero at the 0.05 level. For variables containing multiple categories, * denotes that the difference in mean percentage within each outcome wasted between schools in the corresponding category and schools in the reference category is statistically different from zero at the 0.05 level.

HEI = Healthy Eating Index; NSLP = National School Lunch Program; SFA = school food authority.

† Variable was excluded from the model due to low within-sample variation or high correlation with another characteristic in the model.

‡ Category was combined with the above category due to sparseness of observations.

Table F.12. Regression Coefficient Estimates for the Relationships between the Percentage of Calories Wasted in NSLP Lunches and Key Characteristics of the Lunches

	Regression Coefficient (Standard Error)			
	Elementary Schools	Middle Schools	High Schools	All Schools
Overall Nutritional Quality of NSLP Lunches Prepared				
Total HEI-2010 Score Is at or Above the Median Score (82.3)	0.2 (2.0)	2.5** (0.9)	1.3 (1.5)	0.3 (1.0)
Compliance of Daily and Weekly Lunch Menus with NSLP Nutrition Standards				
Met Daily Quantity Requirement for Grains	1.2 (2.1)	-0.0 (0.9)	-1.9 (2.7)	0.8 (0.8)
Met Daily Quantity Requirement for Meats/Meat Alternates	†	2.2 (1.8)	†	-3.5* (1.5)
Met Daily Quantity Requirement for Vegetables	2.2 (1.9)	-2.5* (1.1)	-0.7 (1.3)	0.6 (1.0)
Met Weekly Quantity Requirement for Meats/Meat Alternates	3.7 (2.9)	2.2 (1.2)	†	2.6* (1.3)
Met Weekly Quantity Requirement for Vegetables	-6.0 (4.0)	-4.9** (1.7)	0.5 (1.4)	-4.1* (1.6)
Met Requirement That At Least Half of Weekly Grains Are Whole Grain-Rich	4.6 (3.8)	-4.4** (1.6)	4.3 (2.8)	-0.6 (1.5)
Met Minimum Calorie Level	-4.0 (4.3)	-3.0 (1.6)	7.4** (2.1)	0.5 (1.2)
Met Maximum Calorie Level	-0.9 (1.4)	†	1.3 (2.8)	-0.5 (1.2)
Met Target 1 Sodium Limit	-6.1* (2.4)	-2.2* (0.9)	2.0 (2.1)	-2.6* (1.2)
Types of Foods Offered in Lunch Menus				
Number of Entrée Choices Offered on Plate Waste Observation Day				
1 to 3 (<i>reference category</i>)	--0--	--0--	--0--	--0--
4 to 5	-0.8 (2.3)	-5.1*** (0.9)	-0.3 (3.0)	-3.4* (1.3)
6 or more	-6.2* (2.7)	‡	-2.8 (2.5)	-3.1 (1.6)
All Daily Menus Offered Raw Vegetables	0.2 (2.2)	-2.6* (1.0)	-4.3* (1.9)	-1.4 (1.0)
Median Number of Vegetable Choices Offered on Daily Menus				
2 or less (<i>reference category</i>)	--0--	--0--	--0--	--0--
3 to 4	0.3 (2.3)	4.5** (1.6)	1.0 (1.9)	0.3 (1.2)
5 or more	‡	0.8 (2.8)	4.2 (3.4)	0.3 (1.6)
More than Half of Daily Menus Offered Dark Green Vegetables or Legumes	-2.2 (1.5)	-1.8 (1.0)	-0.8 (2.3)	-0.6 (1.1)

	Regression Coefficient (Standard Error)			
	Elementary Schools	Middle Schools	High Schools	All Schools
More than Half of Daily Menus Offered Red and Orange Vegetables	2.0 (2.5)	0.5 (1.3)	2.2 (2.2)	0.0 (1.0)
Any Salad Bar (Entrée or Side) Offered on Plate Waste Observation Day	0.0 (4.0)	1.1 (1.3)	†	-0.6 (1.7)
Sandwich/Deli Bar or Other Entrée Bar Offered on Plate Waste Observation Day	†	-1.0 (1.7)	2.6 (2.0)	-1.0 (1.8)
No Daily Menus Offered French Fries or Similar Potato Products	-3.9** (1.4)	-0.5 (0.8)	2.2 (1.7)	-0.3 (1.0)
More than Half of Daily Menus Offered Pizza or Pizza Products	8.5*** (2.4)	0.3 (1.0)	-2.1 (1.8)	-1.2 (1.2)
At Least One Daily Menu Offered Breaded Meat (as Separate Choice or as Part of a Sandwich)	7.5*** (2.1)	-4.8*** (1.4)	-2.3 (3.0)	-0.2 (1.9)
Institutional and Demographic Characteristics of Schools and SFAs				
SFA Size				
2,500 to 9,999 students (<i>reference category</i>)	--0--	--0--	--0--	--0--
10,000 or more students	5.6** (1.6)	-3.4* (1.3)	-0.9 (1.7)	0.9 (1.1)
School Size				
Fewer than 500 students (<i>reference category</i>)	--0--	--0--	--0--	--0--
500 to 999 students	-2.8 (2.1)	-0.1 (0.9)	†	-1.0 (1.5)
1,000 or more students	-1.1 (4.3)	-1.2 (1.3)	0.5 (1.6)	-2.6 (1.7)
FNS Region				
Northeast and Mid-Atlantic (<i>reference category</i>)	--0--	--0--	--0--	--0--
Southeast	-6.8** (2.5)	2.7 (1.7)	1.5 (2.5)	-1.0 (1.5)
Midwest	2.1 (2.7)	1.5 (1.2)	0.1 (1.7)	1.3 (1.1)
Southwest	3.2 (3.0)	0.4 (1.4)	-0.2 (2.9)	0.3 (1.6)
Mountain Plains and West	1.7 (2.7)	0.7 (1.3)	-2.0 (2.0)	2.2 (1.2)
School Urbanicity				
Urban (<i>reference category</i>)	--0--	--0--	--0--	--0--
Suburban	2.5 (2.9)	-3.5* (1.4)	0.8 (2.0)	0.2 (1.4)
Rural	8.8* (3.6)	-4.9 (2.5)	-0.8 (2.2)	1.3 (2.0)
Student Gender				
Female (<i>reference category</i>)	--0--	--0--	--0--	--0--
Male	-3.7*** (0.8)	-5.8*** (1.0)	-7.6*** (0.7)	-5.4*** (0.5)

	Regression Coefficient (Standard Error)			
	Elementary Schools	Middle Schools	High Schools	All Schools
Share of Minority Students in SFA				
Less than 40 percent (<i>reference category</i>)	--0--	--0--	--0--	--0--
40 to 59 percent	1.4 (3.7)	2.5 (1.5)	-0.3 (1.5)	1.4 (1.3)
60 to 100 percent	8.1* (3.4)	2.1 (2.0)	2.2 (2.4)	5.0** (1.8)
Share of Students Approved for Free or Reduced- Price Meals				
Less than 40 percent (<i>reference category</i>)	--0--	--0--	--0--	--0--
40 percent or more	-1.8 (1.8)	-3.4** (1.2)	-0.7 (2.0)	-2.3* (1.0)
Number of Trays	2,186	2,109	1,958	6,253
Number of Schools	56	56	53	165

Source: School Nutrition and Meal Cost Study, Plate Waste Observations, and Menu Survey, school year 2014-2015. Tray-level tabulations are unweighted and include clustered standard errors to account for clustering of trays within schools. Schools included in this unweighted analysis are public, non-charter schools that offer the National School Lunch Program, serve reimbursable meals in cafeteria-based settings, and serve a minimum number of lunches per day (at least 175 lunches in elementary schools, 220 lunches in middle schools, and 87 lunches in high schools).

Notes: Estimates are regression coefficients for each labeled variable on the left included in the column-specific model. Standard errors are reported in parentheses.

See Appendix E for more details on characteristic descriptions and selection methods.

Relationship between characteristic and mean percentage of calories wasted is significantly different from zero at the *** 0.001 level, ** 0.01 level, or * 0.05 level.

--0-- denotes omitted reference categories, for which coefficient estimates are not produced.

FNS = Food Nutrition Service; HEI = Healthy Eating Index; NSLP = National School Lunch Program; SFA = school food authority.

† Variable was excluded from the model due to low within-sample variation or high correlation with another characteristic in the model.

‡ Category was combined with the above category due to sparseness of observations.

Table F.13. Regression Coefficient Estimates for the Relationships between the Percentage of Fruits and Vegetables Wasted in NSLP Lunches and Key Characteristics of the Lunches

	Regression Coefficient (Standard Error)			
	Elementary Schools	Middle Schools	High Schools	All Schools
Overall Nutritional Quality of NSLP Lunches Prepared				
Total HEI-2010 Score Is at or Above the Median Score (82.3)	5.3* (2.1)	5.2* (2.1)	3.9* (1.8)	2.7 (1.6)
Compliance of Daily and Weekly Lunch Menus with NSLP Nutrition Standards				
Met Daily Quantity Requirement for Grains	-3.1 (3.1)	-3.5* (1.6)	-7.9** (2.9)	-0.9 (1.5)
Met Daily Quantity Requirement for Meats/Meat Alternates	†	3.1 (3.6)	2.5 (1.9)	-4.6 (2.8)
Met Daily Quantity Requirement for Vegetables	8.8*** (2.3)	-0.7 (2.3)	†	1.8 (2.3)
Met Weekly Quantity Requirement for Meats/Meat Alternates	7.4* (3.1)	8.8** (2.9)	-0.2 (1.8)	6.8*** (1.9)
Met Weekly Quantity Requirement for Vegetables	-1.1 (5.6)	-10.4** (3.8)	†	-8.1** (2.4)
Met Requirement That At Least Half of Weekly Grains Are Whole Grain-Rich	12.6** (3.7)	-4.3 (3.2)	2.4 (4.2)	0.6 (2.3)
Met Minimum Calorie Level	-16.5** (5.1)	-7.6** (2.8)	10.3*** (2.6)	-3.4 (1.9)
Met Maximum Calorie Level	-13.1*** (2.9)	-4.3* (1.9)	5.8 (3.6)	-3.2 (2.7)
Met Target 1 Sodium Limit	-10.6** (3.1)	†	4.1 (2.7)	-5.0 (2.9)
Types of Foods Offered in Lunch Menus				
Number of Entrée Choices Offered on Plate Waste Observation Day				
1 to 3 (<i>reference category</i>)	--0--	--0--	--0--	--0--
4 to 5	5.9 (3.3)	-10.2* (3.8)	-0.5 (4.6)	-4.7 (2.4)
6 or more	-13.6** (4.2)	‡	-5.7 (3.7)	-4.6 (2.7)
All Daily Menus Offered Raw Vegetables	-3.9 (2.9)	1.0 (2.5)	-5.1 (2.9)	-3.6* (1.5)
Median Number of Vegetable Choices Offered on Daily Menus				
2 or less (<i>reference category</i>)	--0--	--0--	--0--	--0--
3 to 4	0.6 (3.3)	-0.2 (3.8)	1.6 (2.6)	0.1 (1.6)
5 or more	‡	-2.1 (4.5)	9.7* (4.4)	2.5 (2.5)
More than Half of Daily Menus Offered Dark Green Vegetables or Legumes	-1.2 (2.4)	-5.4* (2.1)	1.6 (3.1)	-1.7 (1.5)

	Regression Coefficient (Standard Error)			
	Elementary Schools	Middle Schools	High Schools	All Schools
More than Half of Daily Menus Offered Red and Orange Vegetables	-2.1 (3.0)	0.7 (2.6)	4.1 (2.9)	0.8 (1.8)
Any Salad Bar (Entrée or Side) Offered on Plate Waste Observation Day	-7.1 (4.6)	-1.2 (2.5)	†	-4.1 (2.2)
Sandwich/Deli Bar or Other Entrée Bar Offered on Plate Waste Observation Day	†	-2.5 (3.8)	6.1* (2.8)	1.6 (3.2)
No Daily Menus Offered French Fries or Similar Potato Products	-7.1** (2.2)	0.1 (2.3)	1.7 (2.1)	-2.5 (1.5)
More than Half of Daily Menus Offered Pizza or Pizza Products	6.9* (3.0)	-1.8 (2.9)	-2.6 (2.6)	-4.5* (1.8)
At Least One Daily Menu Offered Breaded Meat (as Separate Choice or as Part of a Sandwich)	15.3*** (3.2)	-1.0 (4.5)	-7.5 (3.8)	1.0 (3.2)
Institutional and Demographic Characteristics of Schools and SFAs				
SFA Size				
2,500 to 9,999 students (<i>reference category</i>)	--0--	--0--	--0--	--0--
10,000 or more students	0.1 (2.5)	-4.5 (2.6)	-3.0 (2.4)	-1.1 (1.5)
School Size				
Fewer than 500 students (<i>reference category</i>)	--0--	--0--	--0--	--0--
500 to 999 students	0.5 (2.9)	1.3 (2.3)	†	2.4 (1.8)
1,000 or more students	-2.0 (5.1)	0.3 (2.4)	-0.5 (1.7)	-0.9 (2.0)
FNS Region				
Northeast and Mid-Atlantic (<i>reference category</i>)	--0--	--0--	--0--	--0--
Southeast	-8.2 (4.3)	-3.0 (2.8)	4.1 (3.1)	-2.6 (2.4)
Midwest	3.4 (3.7)	2.7 (2.3)	2.0 (2.4)	0.7 (1.9)
Southwest	-2.1 (4.4)	-2.0 (2.8)	0.7 (3.9)	-2.4 (2.3)
Mountain Plains and West	4.3 (4.6)	0.6 (2.9)	3.8 (3.0)	5.6** (2.0)
School Urbanicity				
Urban (<i>reference category</i>)	--0--	--0--	--0--	--0--
Suburban	10.5*** (2.8)	-4.1 (2.3)	1.0 (2.7)	3.1 (1.9)
Rural	18.4*** (3.6)	-1.6 (3.9)	2.6 (3.1)	7.7** (2.8)
Student Gender				
Female (<i>reference category</i>)	--0--	--0--	--0--	--0--
Male	-1.5 (1.1)	-4.6** (1.4)	-5.8*** (1.2)	-3.6*** (0.7)

	Regression Coefficient (Standard Error)			
	Elementary Schools	Middle Schools	High Schools	All Schools
Share of Minority Students in SFA				
Less than 40 percent (<i>reference category</i>)	--0--	--0--	--0--	--0--
40 to 59 percent	14.1*** (3.3)	3.3 (2.3)	1.5 (1.8)	4.3** (1.6)
60 to 100 percent	18.5*** (3.1)	1.5 (3.1)	3.5 (3.0)	8.1** (2.6)
Share of Students Approved for Free or Reduced- Price Meals				
Less than 40 percent (<i>reference category</i>)	--0--	--0--	--0--	--0--
40 percent or more	-1.9 (2.5)	-0.4 (2.4)	5.2 (2.6)	-3.0 (1.5)
Number of Trays	2,186	2,109	1,958	6,253
Number of Schools	56	56	53	165

Source: School Nutrition and Meal Cost Study, Plate Waste Observations, and Menu Survey, school year 2014-2015. Tray-level tabulations are unweighted and include clustered standard errors to account for clustering of trays within schools. Schools included in this unweighted analysis are public, non-charter schools that offer the National School Lunch Program, serve reimbursable meals in cafeteria-based settings, and serve a minimum number of lunches per day (at least 175 lunches in elementary schools, 220 lunches in middle schools, and 87 lunches in high schools).

Notes: Estimates are regression coefficients for each labeled variable on the left included in the column-specific model. Standard errors are reported in parentheses.

See Appendix E for more details on characteristic descriptions and selection methods.

Estimates for fruits and vegetables combine plate waste for the USDA Food Pattern fruits and vegetables groups.

Relationship between characteristic and mean percentage of fruits and vegetables wasted is significantly different from zero at the *** 0.001 level, ** 0.01 level, or * 0.05 level.

--0-- denotes omitted reference categories, for which coefficient estimates are not produced.

† Variable was excluded from the model due to low within-sample variation or high correlation with another characteristic in the model.

‡ Category was combined with the above category due to sparseness of observations.

Table F.14. Regression Coefficient Estimates for the Relationships between the Percentage of Dairy Wasted in NSLP Lunches and Key Characteristics of the Lunches

	Regression Coefficient (Standard Error)			
	Elementary Schools	Middle Schools	High Schools	All Schools
Overall Nutritional Quality of NSLP Lunches Prepared				
Total HEI-2010 Score Is at or Above the Median Score (82.3)	5.3 (3.0)	3.9* (1.6)	2.2 (1.9)	1.1 (1.6)
Compliance of Daily and Weekly Lunch Menus with NSLP Nutrition Standards				
Met Daily Quantity Requirement for Grains	9.6* (3.7)	0.9 (1.9)	0.7 (2.7)	2.2 (1.4)
Met Daily Quantity Requirement for Meats/Meat Alternates	†	10.1* (3.9)	-1.7 (1.7)	-3.2 (2.5)
Met Daily Quantity Requirement for Vegetables	3.0 (2.7)	-4.6* (2.0)	†	-1.0 (1.8)
Met Weekly Quantity Requirement for Meats/Meat Alternates	1.5 (4.0)	0.5 (2.3)	2.7 (1.6)	2.2 (1.9)
Met Weekly Quantity Requirement for Vegetables	-5.5 (6.0)	1.3 (3.2)	†	-2.9 (2.1)
Met Requirement That At Least Half of Weekly Grains Are Whole Grain-Rich	1.8 (6.2)	-11.8*** (2.7)	-3.6 (2.9)	-2.1 (1.9)
Met Minimum Calorie Level	-7.7 (6.2)	-6.5** (2.0)	5.4* (2.6)	0.5 (1.8)
Met Maximum Calorie Level	3.8 (2.6)	-1.6 (1.5)	-0.6 (3.1)	2.3 (2.0)
Met Target 1 Sodium Limit	-12.5*** (3.5)	†	1.4 (2.8)	-4.8* (2.0)
Types of Foods Offered in Lunch Menus				
Number of Entrée Choices Offered on Plate Waste Observation Day				
1 to 3 (<i>reference category</i>)	--0--	--0--	--0--	--0--
4 or 5	0.9 (4.1)	-2.2 (2.4)	4.3 (2.7)	-1.4 (1.9)
6 or more	1.6 (4.9)	‡	3.6 (2.5)	1.0 (2.2)
All Daily Menus Offered Raw Vegetables	7.7* (3.0)	-9.9*** (2.0)	-2.0 (2.4)	-1.5 (1.8)
Median Number of Vegetable Choices Offered on Daily Menus				
2 or less (<i>reference category</i>)	--0--	--0--	--0--	--0--
3 to 4	-7.1 (4.2)	14.5*** (3.7)	1.4 (2.2)	0.1 (2.3)
5 or more	‡	11.5* (4.8)	2.0 (3.3)	-0.1 (2.8)
More than Half of Daily Menus Offered Dark Green Vegetables or Legumes	4.4 (3.0)	-3.6 (2.3)	2.6 (2.2)	0.4 (1.8)

	Regression Coefficient (Standard Error)			
	Elementary Schools	Middle Schools	High Schools	All Schools
More than Half of Daily Menus Offered Red and Orange Vegetables	-3.0 (3.7)	1.1 (2.1)	-0.7 (2.4)	-1.6 (1.8)
Any Salad Bar (Entrée or Side) Offered on Plate Waste Observation Day	-4.3 (6.4)	1.6 (2.0)	†	-3.7 (2.7)
Sandwich/Deli Bar or Other Entrée Bar Offered on Plate Waste Observation Day	†	-2.3 (3.0)	-2.8 (2.0)	-1.1 (2.9)
No Daily Menus Offered French Fries or Similar Potato Products	-3.2 (2.2)	2.4 (1.6)	3.8 (2.2)	1.6 (1.6)
More than Half of Daily Menus Offered Pizza or Pizza Products	10.2** (3.5)	-4.7 (2.4)	-1.3 (1.9)	-1.1 (1.8)
At Least One Daily Menu Offered Breaded Meat (as Separate Choice or as Part of a Sandwich)	11.2** (3.5)	-11.2*** (2.8)	0.5 (2.9)	0.5 (3.4)
Institutional and Demographic Characteristics of Schools and SFAs				
SFA Size				
2,500 to 9,999 students (<i>reference category</i>)	--0--	--0--	--0--	--0--
10,000 or more students	5.0 (3.0)	-5.9** (1.8)	-7.7** (2.2)	0.2 (1.6)
School Size				
Fewer than 500 students (<i>reference category</i>)	--0--	--0--	--0--	--0--
500 to 999 students	0.3 (3.6)	1.2 (2.6)	-7.4*** (2.0)	-2.2 (2.4)
1,000 or more students	0.8 (6.3)	2.4 (3.0)	†	-4.6 (2.8)
FNS Region				
Northeast and Mid-Atlantic (<i>reference category</i>)	--0--	--0--	--0--	--0--
Southeast	-0.1 (5.2)	7.2* (3.0)	7.3* (3.1)	2.1 (2.9)
Midwest	8.4* (4.1)	2.7 (2.5)	3.8 (2.1)	2.5 (2.3)
Southwest	3.4 (5.3)	1.1 (2.8)	1.8 (3.1)	0.2 (2.4)
Mountain Plains and West	7.1 (5.3)	1.4 (2.3)	-1.4 (2.2)	3.9 (2.1)
School Urbanicity				
Urban (<i>reference category</i>)	--0--	--0--	--0--	--0--
Suburban	4.7 (4.7)	-10.1*** (2.5)	-4.0 (2.4)	-1.8 (2.3)
Rural	5.3 (5.9)	-17.2*** (3.0)	-7.3* (3.4)	-3.5 (3.2)
Student Gender				
Female (<i>reference category</i>)	--0--	--0--	--0--	--0--
Male	-7.1*** (1.4)	-7.4*** (1.7)	-9.5*** (1.3)	-7.9*** (0.9)

	Regression Coefficient (Standard Error)			
	Elementary Schools	Middle Schools	High Schools	All Schools
Share of Minority Students in SFA				
Less than 40 percent (<i>reference category</i>)	--0--	--0--	--0--	--0--
40 to 59 percent	3.6 (5.3)	-0.5 (2.5)	1.1 (1.9)	1.9 (2.2)
60 to 100 percent	7.8 (4.7)	-5.2 (3.4)	0.8 (3.5)	2.7 (2.6)
Share of Students Approved for Free or Reduced- Price Meals				
Less than 40 percent (<i>reference category</i>)	--0--	--0--	--0--	--0--
40 percent or more	-8.4* (3.4)	-4.8* (2.3)	3.2 (3.0)	-4.5* (1.7)
Number of Trays	2,186	2,109	1,958	6,253
Number of Schools	56	56	53	165

Source: School Nutrition and Meal Cost Study, Plate Waste Observation, and Menu Survey, school year 2014-2015. Tray-level tabulations are unweighted and include clustered standard errors to account for clustering of trays within schools. Schools included in this unweighted analysis are public, non-charter schools that offer the National School Lunch Program, serve reimbursable meals in cafeteria-based settings, and serve a minimum number of lunches per day (at least 175 lunches in elementary schools, 220 lunches in middle schools, and 87 lunches in high schools).

Notes: Estimates are regression coefficients for each labeled variable on the left included in the column-specific model. Standard errors are reported in parentheses.

See Appendix E for more details on characteristic descriptions and selection methods.

Relationship between characteristic and mean percentage of dairy wasted is significantly different from zero at the *** 0.001 level, ** 0.01 level, or * 0.05 level.

--0-- denotes omitted reference categories, for which coefficient estimates are not produced.

FNS = Food Nutrition Service; HEI = Healthy Eating Index; NSLP = National School Lunch Program; SFA = school food authority.

† Variable was excluded from the model due to low within-sample variation or high correlation with another characteristic in the model.

‡ Category was combined with the above category due to sparseness of observations.

Table F.15. Relationships between the Plate Waste in NSLP Lunches and Key Characteristics of School Foodservice Operations: Regression-Adjusted Mean Percentage of Calories and Key USDA Food Pattern Food Groups Wasted

	Yes/ No	Elementary Schools			Middle Schools		
		Calories	Fruits and Vegetables	Dairy	Calories	Fruits and Vegetables	Dairy
Mean Percentage Wasted in NSLP Lunches		26.3	30.6	32.5	15.7	22.5	20.0
Food Purchasing Characteristics							
SFA Uses Alliance for a Healthier Generation or Other Similar Tools for Selecting and Purchasing Healthy Foods	Y	26.8*	25.1*	23.3*	21.1	21.3	24.6*
	N	31.0	34.0	31.7	19.5	22.4	21.1
SFA Participates in a Food Purchasing Cooperative	Y	29.7	28.6	29.8	20.1	21.1	22.4
	N	28.1	30.5	25.2	20.5	22.6	23.3
SFA Is Engaged in a Pouring Rights Contract	Y	27.4	30.3	29.1	18.8*	20.2	20.6
	N	30.4	28.8	25.9	21.8	23.6	25.0
Schools in SFA Offer Brand-Name or Chain Restaurant Foods	Y	28.4	34.4*	27.9	19.0	18.8*	21.6
	N	29.4	24.7	27.1	21.6	24.9	24.0
School Participates in Farm to School Program	Y	29.8	29.7	27.6	18.8	18.7	21.5
	N	28.0	29.3	27.4	21.8	25.0	24.2
Menu Planning Characteristics							
School Uses Cycle Menus	Y	†	†	†	20.2	28.4*	21.4
	N	†	†	†	20.4	15.3	24.2
SFA Conducts Nutrient Analysis of Menus	Y	29.5	31.6	25.0	†	†	†
	N	28.3	27.4	30.0	†	†	†
Number of Challenges in Meeting the Updated Nutrition Standards that SFA Rated as 3 or Higher on a Scale of 1 (Not a Challenge) to 5 (Significant Challenge)							
4 or less (<i>reference category</i>)		29.5	33.6	27.7	17.3	29.1	19.2
5 to 7		30.0	28.8	27.9	21.9*	26.4	25.1*
8		27.8	30.2	27.2	18.7	17.3*	20.5

	Yes/ No	Elementary Schools			Middle Schools		
		Calories	Fruits and Vegetables	Dairy	Calories	Fruits and Vegetables	Dairy
SFA Perception of New Meal Requirements'							
Helpfulness in Improving the Nutritional Quality of Meals							
Not at all helpful or somewhat helpful (<i>reference category</i>)		30.0	35.6	27.8	18.3	21.9	16.4
Very helpful		29.1	29.5	32.7	20.8	16.9	21.3
SFA was already improving the nutritional quality of meals prior to the new meal requirements		28.6	29.6	22.3	19.8	26.8	24.4*
Characteristics of the School Meal Programs							
School Participates in the Fresh Fruit and Vegetable Program	Y	29.5	31.4	28.7	n.a.	n.a.	n.a.
	N	28.3	27.6	26.4	n.a.	n.a.	n.a.
School Provides Afterschool Snacks or Suppers	Y	30.0	30.0	31.8*	20.5	19.8	24.3
	N	27.8	29.0	23.2	20.1	23.9	21.4
Meal Service Characteristics							
SFA Uses a Foodservice Management Company	Y	27.5	32.3	28.7	17.7*	17.9	19.4*
	N	30.3	26.7	26.3	22.9	25.8	26.2
School Uses Offer-Versus-Serve at Lunch	Y	25.5*	23.7*	25.1	21.2	19.6	26.1*
	N	32.3	35.4	29.9	19.4	24.1	19.5
School Has Policies and Procedures for Accommodating Students with Food Allergies or Special Dietary Needs	Y	†	†	†	19.2	19.3	20.2
	N	†	†	†	21.4	24.4	25.4
Number of HealthierUS School Challenge Smarter Lunchroom Techniques Used							
Zero or 1 (<i>reference category</i>)		29.0	33.3	36.7	21.2	13.1	29.9
2 to 3		28.9	26.4	28.4*	20.0	20.9*	20.6*
4 to 7		28.9	32.7	26.6*	20.6	22.8*	25.1

	Yes/ No	Elementary Schools			Middle Schools		
		Calories	Fruits and Vegetables	Dairy	Calories	Fruits and Vegetables	Dairy
Price Charged for Paid Lunches							
School Offered Free Lunch to All Students		30.6*	†	28.0*	20.6	26.0	21.8
\$2.25 or less (<i>reference category</i>)		23.6	25.2	18.0	18.1	20.3	22.1
\$2.26 to \$2.50		23.4	26.4	14.7	19.0	15.2	24.2
\$2.51 or more		27.3	32.6	30.3*	19.0	22.7	21.8
School Cost per Lunch Is at or above Median (\$3.66)	Y	28.7	32.7	24.1*	20.3	21.8	22.2
	N	29.1	26.3	31.0	20.3	21.9	23.4
Number of Trays		2,186	2,186	2,186	2,109	2,109	2,109
Number of Schools		56	56	56	56	56	56

	Yes/ No	High Schools			All Schools		
		Calories	Fruits and Vegetables	Dairy	Calories	Fruits and Vegetables	Dairy
Mean Percentage Wasted in NSLP Lunches		12.6	17.8	14.3	18.5	23.9	22.8
Food Purchasing Characteristics							
SFA Uses Alliance for a Healthier Generation or Other Similar Tools for Selecting and Purchasing Healthy Foods	Y	8.2*	8.7*	15.6	18.0	20.3	24.2
	N	3.2	4.4	16.4	19.1	22.3	26.6
SFA Participates in a Food Purchasing Cooperative	Y	4.2*	3.3*	14.4	18.8	21.4	25.3
	N	7.2	9.9	17.6	18.4	21.2	25.4
SFA Is Engaged in a Pouring Rights Contract	Y	7.1	8.5*	14.8	17.6	21.5	24.3
	N	4.3	4.6	17.2	19.6	21.1	26.4
Schools in SFA Offer Brand-Name or Chain Restaurant Foods	Y	5.1	6.7	17.9	18.0	20.3	24.7
	N	6.3	6.4	14.1	19.2	22.3	26.0
School Participates in Farm to School Program	Y	2.6*	2.0*	13.7*	18.3	20.8	25.2
	N	8.8	11.1	18.3	18.8	21.8	25.5
Menu Planning Characteristics							
School Uses Cycle Menus	Y	†	13.3*	†	19.0	24.9*	23.6
	N	†	-0.2 ^a	†	18.2	17.7	27.1
SFA Conducts Nutrient Analysis of Menus	Y	6.7	†	16.7	†	†	†
	N	4.7	†	15.3	†	†	†
Number of Challenges in Meeting the Updated Nutrition Standards that SFA Rated as 3 or Higher on a Scale of 1 (Not a Challenge) to 5 (Significant Challenge)							
4 or less (<i>reference category</i>)		5.5	10.1	15.8	17.1	23.8	20.4
5 to 7		4.9	6.0	14.2	19.8	22.4	26.0*
8		6.5	7.1	17.7	17.4	20.2	24.7

	Yes/ No	High Schools			All Schools		
		Calories	Fruits and Vegetables	Dairy	Calories	Fruits and Vegetables	Dairy
SFA Perception of New Meal Requirements'							
Helpfulness in Improving the Nutritional Quality of Meals							
Not at all helpful or somewhat helpful (reference category)		7.0	12.7	16.2	18.4	23.7	23.6
Very helpful		6.5	7.3	15.6	17.9	20.0	26.3
SFA was already improving the nutritional quality of meals prior to the new meal requirements		4.9	5.8*	16.4	19.3	22.6	24.4
Characteristics of the School Meal Programs							
School Participates in the Fresh Fruit and Vegetable Program	Y	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	N	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
School Provides Afterschool Snacks or Suppers	Y	4.5	5.3	18.2*	18.6	19.6	26.8
	N	6.9	7.9	13.8	18.6	23.0	23.9
Meal Service Characteristics							
SFA Uses a Foodservice Management Company	Y	5.3	5.1	16.0	17.2	19.5	23.7
	N	6.1	8.1	16.0	19.9	23.1	27.0
School Uses Offer-Versus-Serve at Lunch	Y	†	†	†	†	†	†
	N	†	†	†	†	†	†
School Has Policies and Procedures for Accommodating Students with Food Allergies or Special Dietary Needs	Y	6.1	5.6	14.7	18.1	19.8	23.7
	N	5.3	7.6	17.3	19.1	22.8	27.0
Number of HealthierUS School Challenge Smarter Lunchroom Techniques Used							
Zero or 1 (reference category)		7.6	8.9	14.8	18.7	20.3	27.7
2 to 3		10.0	10.7	19.6*	19.5	22.0	25.6
4 to 7		1.4*	2.4*	12.4	17.7	20.6	25.1

	Yes/ No	High Schools			All Schools		
		Calories	Fruits and Vegetables	Dairy	Calories	Fruits and Vegetables	Dairy
Price Charged for Paid Lunches							
School Offered Free Lunch to All Students		7.8*	6.9	19.9*	21.2*	23.2	27.9*
\$2.25 or less (<i>reference category</i>)		-0.5 ^a	1.8	11.7	16.5	21.6	22.1
\$2.26 to \$2.50		2.8*	6.3*	11.7	16.6	20.6	21.9
\$2.51 or more		0.2	1.7	12.1	15.9	20.4	23.0
School Cost per Lunch Is at or above Median (\$3.66)		5.5	7.4	14.9	18.4	22.4	24.8
		5.9	5.7	17.1	18.7	20.2	26.0
Number of Trays		1,958	1,958	1,958	6,253	6,253	6,253
Number of Schools		53	53	53	165	165	165

Source: School Nutrition and Meal Cost Study, Plate Waste Observations, School Food Authority Director Survey, School Nutrition Manager Survey, Cafeteria Observation Guide, School Nutrition Manager Cost Interview, and SFA Director and Business Manager Onsite and Follow-Up Cost Interview, school year 2014-2015. Tray-level tabulations are unweighted and include clustered standard errors to account for clustering of trays within schools. Schools included in this unweighted analysis are public, non-charter schools that offer the National School Lunch Program, serve reimbursable meals in cafeteria-based settings, and serve a minimum number of lunches per day (at least 175 lunches in elementary schools, 220 lunches in middle schools, and 87 lunches in high schools).

Notes: Estimates are regression-adjusted means that control for institutional and demographic characteristics of each school and their SFA. Variables with rows labeled “Y” and “N” report adjusted mean percentage of each outcome (calories, fruits and vegetables, and dairy) wasted for schools that do and do not meet the variable criteria, respectively. Otherwise, regression-adjusted means are reported for each category within a variable. See Appendix E for more details on characteristic descriptions and selection methods.

Estimates for fruits and vegetables combine plate waste for the USDA Food Pattern fruits and vegetables groups.

^aRegression-adjusted means below 0 percent or above 100 percent have been truncated within the range of 0 to 100 percent. Estimates outside of this range were sometimes produced for characteristics shared by schools that were outliers in terms of the outcome of interest, and should not be interpreted as schools that had 0 or 100 percent plate waste for the corresponding outcome.

*Denotes the difference within each outcome (mean percentage of calories, fruits and vegetables, and dairy wasted) between schools with and without a dichotomous characteristic is statistically different from zero at the 0.05 level. For variables containing multiple categories, * denotes that the difference in mean percentage within each outcome wasted between schools in the corresponding category and schools in the reference category is statistically different from zero at the 0.05 level.

NSLP = National School Lunch Program; SFA = school food authority.

† Variable was excluded from the model due to low within-sample variation or high correlation with another characteristic in the model.

n.a. = Characteristic did not apply to any schools within the specific school type.

Table F.16. Regression Coefficient Estimates of the Relationships between the Percentage of Calories Wasted in NSLP Lunches and Key Characteristics of School Foodservice Operations

	Regression Coefficient (Standard Error)			
	Elementary Schools	Middle Schools	High Schools	All Schools
Food Purchasing Characteristics				
SFA Uses Alliance for a Healthier Generation or Other Similar Tools for Selecting and Purchasing Healthy Foods	-4.2* (2.0)	1.6 (1.1)	4.9** (1.7)	-1.1 (1.2)
SFA Participates in a Food Purchasing Cooperative	1.6 (2.2)	-0.4 (1.4)	-3.1* (1.5)	0.4 (1.2)
SFA Is Engaged in a Pouring Rights Contract	-3.0 (2.8)	-3.0* (1.5)	2.9 (1.6)	-2.1 (1.0)
Schools in SFA Offer Brand-Name or Chain Restaurant Foods	-0.9 (2.5)	-2.6 (1.5)	-1.2 (1.5)	-1.2 (1.3)
School Participates in Farm to School Program	1.8 (3.4)	-2.9 (2.7)	-6.1** (1.9)	-0.5 (1.8)
Menu Planning Characteristics				
School Uses Cycle Menus	†	-0.2 (2.5)	†	0.8 (2.0)
SFA Conducts Nutrient Analysis of Menus	1.3 (2.9)	†	2.1 (2.0)	†
Number of Challenges Related to Meeting the Updated Nutrition Standards that SFA Rated as 3 of 5 or higher				
4 or less (<i>reference category</i>)	--0--	--0--	--0--	--0--
5 to 7	0.5 (2.7)	4.6** (1.6)	-0.5 (1.8)	2.7 (1.5)
8	-1.7 (3.5)	1.4 (2.2)	1.0 (1.6)	0.3 (2.0)
SFA Perception of New Meal Requirements' Helpfulness in Improving the Nutritional Quality of Meals				
Not at all helpful and somewhat helpful (<i>reference category</i>)	--0--	--0--	--0--	--0--
Very helpful	-0.8 (3.2)	2.5 (2.6)	-0.5 (1.8)	-0.6 (2.1)
SFA was already improving the nutritional quality of meals prior to the new meal requirements	-1.4 (2.9)	1.4 (1.9)	-2.1 (1.7)	0.9 (1.9)
Characteristics of School Meal Programs				
School Participates in the Fresh Fruit and Vegetable Program	1.2 (1.4)	n.a.	n.a.	n.a.
School Provides Afterschool Snacks or Suppers	2.1 (2.8)	0.3 (1.5)	-2.4 (2.0)	0.0 (1.3)

	Regression Coefficient (Standard Error)			
	Elementary Schools	Middle Schools	High Schools	All Schools
Meal Service Characteristics				
SFA Uses a Foodservice Management Company	-2.8 (3.4)	-5.2* (2.0)	-0.8 (1.7)	-2.7 (1.6)
School Uses Offer-Versus-Serve at Lunch	-6.9* (3.2)	1.8 (2.3)	†	†
School Has Policies and Procedures for Accommodating Students with Food Allergies and Special Dietary Needs	†	-2.2 (2.5)	0.9 (1.3)	-1.0 (1.4)
Number of HealthierUS School Challenge Smarter Lunchroom Techniques Used				
Zero to 1 (<i>reference category</i>)	--0--	--0--	--0--	--0--
2 to 3	-0.1 (2.4)	-1.2 (1.3)	2.4 (1.3)	0.8 (1.1)
4 to 7	-0.1 (4.0)	-0.5 (1.9)	-6.2*** (1.8)	-1.1 (1.2)
Price Charged for Paid Lunches				
School Offered Free Lunch to All Students	7.0** (2.4)	2.5 (2.3)	8.4** (2.6)	4.6*** (1.3)
\$2.25 or less (<i>reference category</i>)	--0--	--0--	--0--	--0--
\$2.26 to \$2.50	-0.1 (2.0)	0.9 (1.6)	3.3* (1.6)	0.1 (0.9)
More than \$2.50	3.8 (3.4)	0.9 (1.3)	0.7 (1.6)	-0.6 (1.4)
School Cost per Lunch Is at or above Median (\$3.66)	-0.3 (2.5)	-0.0 (1.3)	-0.4 (1.3)	-0.3 (1.0)
Institutional and Demographic Characteristics of Schools and SFAs				
SFA Size				
2,500 to 9,999 students (<i>reference category</i>)	--0--	--0--	--0--	--0--
10,000 or more students	1.6 (2.2)	-2.1* (1.0)	-1.8 (1.4)	-0.7 (1.0)
School Size				
Fewer than 500 students (<i>reference category</i>)	--0--	--0--	--0--	--0--
500 to 999 students	-3.3 (2.4)	-0.3 (1.9)	†	-1.5 (1.4)
1,000 or more students	-6.0 (5.0)	-2.5 (1.9)	3.8* (1.8)	-1.8 (1.6)
FNS Region				
Northeast and Mid-Atlantic (<i>reference category</i>)	--0--	--0--	--0--	--0--
Southeast	-2.6 (2.7)	6.5** (1.9)	-2.8 (1.7)	1.7 (1.6)
Midwest	0.4 (2.9)	5.3* (2.2)	-3.4 (1.9)	2.4 (1.2)
Southwest	2.8 (3.1)	3.8* (1.7)	-5.7** (2.0)	2.5 (1.7)
Mountain Plains and West	3.1 (2.3)	4.9** (1.5)	-2.0 (1.7)	4.0** (1.5)

	Regression Coefficient (Standard Error)			
	Elementary Schools	Middle Schools	High Schools	All Schools
School Urbanicity				
Urban (<i>reference category</i>)	--0--	--0--	--0--	--0--
Suburban	-1.7 (2.9)	-2.3 (1.5)	2.5 (1.4)	-0.6 (1.6)
Rural	3.4 (3.8)	-5.7** (1.7)	-0.4 (2.1)	-1.3 (2.0)
Student Gender				
Female (<i>reference category</i>)	--0--	--0--	--0--	--0--
Male	-3.8*** (0.8)	-5.5*** (1.0)	-7.5*** (0.7)	-5.4*** (0.5)
Share of Minority Students in SFA				
Less than 40 percent (<i>reference category</i>)	--0--	--0--	--0--	--0--
40 to 59 percent	-2.6 (3.9)	4.3* (1.9)	-3.0 (2.2)	2.2 (1.5)
60 to 100 percent	1.4 (2.8)	1.7 (1.7)	2.8 (2.4)	2.9 (1.7)
Share of Students Approved for Free or Reduced-Price Meals				
Less than 40 percent (<i>reference category</i>)	--0--	--0--	--0--	--0--
40 percent or more	1.1 (2.1)	-3.0* (1.3)	0.0 (1.6)	-1.1 (1.0)
Number of Trays	2,186	2,109	1,958	6,253
Number of Schools	56	56	53	165

Source: School Nutrition and Meal Cost Study, Plate Waste Observations, School Food Authority Director Survey, School Nutrition Manager Survey, Cafeteria Observation Guide, School Nutrition Manager Cost Interview, and SFA Director and Business Manager Onsite and Follow-Up Cost Interview, school year 2014-2015. Tray-level tabulations are unweighted and include clustered standard errors to account for clustering of trays within schools. Schools included in this unweighted analysis are public, non-charter schools that offer the National School Lunch Program, serve reimbursable meals in cafeteria-based settings, and serve a minimum number of lunches per day (at least 175 lunches in elementary schools, 220 lunches in middle schools, and 87 lunches in high schools).

Notes: Estimates are regression coefficients for each labeled variable on the left included in the column-specific model. Standard errors are reported in parentheses.

See Appendix E for more details on characteristic descriptions and selection methods.

Relationship between characteristic and mean percentage of calories wasted is significantly different from zero at the *** 0.001 level, ** 0.01 level, or * 0.05 level.

--0-- denotes omitted reference categories, for which coefficient estimates are not produced.

FNS = Food Nutrition Service; NSLP = National School Lunch Program; SFA = school food authority.

† Variable was excluded from the model due to low within-sample variation or high correlation with another characteristic in the model.

n.a. = Characteristic did not apply to any schools within the specific school type.

Table F.17. Regression Coefficient Estimates of the Relationships between the Percentage of Fruits and Vegetables Wasted in NSLP Lunches and Key Characteristics of School Foodservice Operations

	Regression Coefficient (Standard Error)			
	Elementary Schools	Middle Schools	High Schools	All Schools
Food Purchasing Characteristics				
SFA Uses Alliance for a Healthier Generation or Other Similar Tools for Selecting and Purchasing Healthy Foods	-8.9** (3.0)	-1.1 (2.3)	4.3* (2.0)	-2.0 (2.1)
SFA Participates in a Food Purchasing Cooperative	-1.9 (3.5)	-1.5 (2.3)	-6.6*** (1.8)	0.2 (1.7)
SFA Is Engaged in a Pouring Rights Contract	1.5 (3.6)	-3.4 (2.8)	4.0* (1.7)	0.4 (1.8)
Schools in SFA Offer Brand-Name or Chain Restaurant Foods	9.7* (4.5)	-6.2* (2.6)	0.4 (2.0)	-1.9 (2.1)
School Participates in Farm to School Program	0.4 (5.4)	-6.4 (4.2)	-9.1*** (2.2)	-1.1 (2.6)
Menu Planning Characteristics				
School Uses Cycle Menus	†	13.1** (4.7)	13.5*** (3.5)	7.2* (3.4)
SFA Conducts Nutrient Analysis of Menus	4.2 (5.6)	†	†	†
Number of Challenges Related to Meeting the Updated Nutrition Standards that SFA Rated as 3 of 5 or higher				
4 or less (<i>reference category</i>)	--0--	--0--	--0--	--0--
5 to 7	-4.8 (4.9)	-2.8 (3.4)	-4.1 (2.6)	-1.4 (2.8)
8	-3.4 (5.6)	-11.8** (3.6)	-3.0 (2.6)	-3.6 (3.5)
SFA Perception of New Meal Requirements' Helpfulness in Improving the Nutritional Quality of Meals				
Not at all helpful and somewhat helpful (<i>reference category</i>)	--0--	--0--	--0--	--0--
Very helpful	-6.1 (5.1)	-5.0 (3.9)	-5.4 (2.7)	-3.7 (3.8)
SFA was already improving the nutritional quality of meals prior to the new meal requirements	-6.1 (4.4)	5.0 (3.0)	-6.9** (2.3)	-1.1 (3.0)
Characteristics of School Meal Programs				
School Participates in the Fresh Fruit and Vegetable Program	3.8 (3.3)	n.a.	n.a.	n.a
School Provides Afterschool Snacks or Suppers	1.0 (3.6)	-4.1 (3.6)	-2.6 (2.2)	-3.4 (2.5)

	Regression Coefficient (Standard Error)			
	Elementary Schools	Middle Schools	High Schools	All Schools
Meal Service Characteristics				
SFA Uses a Foodservice Management Company	5.5 (4.5)	-8.0 (4.1)	-3.0 (2.1)	-3.6 (2.6)
School Uses Offer-Versus-Serve at Lunch	-11.7* (5.7)	-4.5 (4.3)	†	†
School Has Policies and Procedures for Accommodating Students with Food Allergies and Special Dietary Needs	†	-5.1 (5.1)	-2.0 (1.4)	-3.0 (1.7)
Number of HealthierUS School Challenge Smarter Lunchroom Techniques Used				
Zero to 1 (<i>reference category</i>)	--0--	--0--	--0--	--0--
2 to 3	-6.9 (4.2)	7.8** (2.9)	1.8 (1.8)	1.6 (1.5)
4 to 7	-0.7 (6.3)	9.7* (4.3)	-6.5* (2.5)	0.3 (2.2)
Price Charged for Paid Lunches				
School Offered Free Lunch to All Students	†	5.7 (3.8)	5.1 (2.8)	1.6 (2.4)
\$2.25 or less (<i>reference category</i>)	--0--	--0--	--0--	--0--
\$2.26 to \$2.50	1.2 (3.4)	-5.0 (3.4)	4.5* (1.7)	-1.0 (2.0)
More than \$2.50	7.4 (5.1)	2.5 (3.0)	-0.1 (2.0)	-1.2 (2.0)
School Cost per Lunch Is at or above Median (\$3.66)	6.4 (4.7)	-0.1 (2.9)	1.7 (1.5)	2.1 (1.8)
Institutional and Demographic Characteristics of Schools and SFAs				
SFA Size				
2,500 to 9,999 students (<i>reference category</i>)	--0--	--0--	--0--	--0--
10,000 or more students	-3.5 (3.5)	-3.6* (1.6)	-5.0*** (1.2)	-4.2** (1.3)
School Size				
Fewer than 500 students (<i>reference category</i>)	--0--	--0--	--0--	--0--
500 to 999 students	1.4 (3.6)	-1.0 (3.8)	†	1.0 (2.5)
1,000 or more students	-10.1 (7.2)	-1.7 (4.1)	3.7 (2.3)	-0.1 (2.6)

	Regression Coefficient (Standard Error)			
	Elementary Schools	Middle Schools	High Schools	All Schools
FNS Region				
Northeast and Mid-Atlantic (<i>reference category</i>)	--0--	--0--	--0--	--0--
Southeast	-1.0 (5.3)	2.1 (3.5)	3.4 (2.0)	3.2 (2.8)
Midwest	-9.5 (6.1)	7.1 (4.1)	0.9 (2.5)	2.7 (2.2)
Southwest	-8.8 (6.2)	1.3 (3.5)	-4.7* (2.2)	-0.8 (2.5)
Mountain Plains and West	1.4 (4.6)	8.2* (4.0)	4.4* (2.0)	7.6** (2.4)
School Urbanicity				
Urban (<i>reference category</i>)	--0--	--0--	--0--	--0--
Suburban	1.0 (3.6)	3.7 (3.3)	5.7** (1.9)	0.9 (2.2)
Rural	10.6 (6.6)	2.3 (4.4)	3.2 (2.5)	2.2 (3.2)
Student Gender				
Female (<i>reference category</i>)	--0--	--0--	--0--	--0--
Male	-1.3 (1.2)	-4.5** (1.4)	-5.6*** (1.2)	-3.6*** (0.7)
Share of Minority Students in SFA				
Less than 40 percent (<i>reference category</i>)	--0--	--0--	--0--	--0--
40 to 59 percent	-3.9 (6.0)	0.7 (3.5)	-3.6 (2.3)	2.5 (2.6)
60 to 100 percent	3.4 (5.3)	5.3 (3.1)	5.9* (2.4)	5.2* (2.5)
Share of Students Approved for Free or Reduced-Price Meals				
Less than 40 percent (<i>reference category</i>)	--0--	--0--	--0--	--0--
40 percent or more	-1.7 (2.7)	-6.3* (2.4)	2.6 (1.7)	-1.1 (1.5)
Number of Trays	2,186	2,109	1,958	6,253
Number of Schools	56	56	53	165

Source: School Nutrition and Meal Cost Study, Plate Waste Observations, School Food Authority Director Survey, School Nutrition Manager Survey, Cafeteria Observation Guide, School Nutrition Manager Cost Interview, and SFA Director and Business Manager Onsite and Follow-Up Cost Interview, school year 2014-2015. Tray-level tabulations are unweighted and include clustered standard errors to account for clustering of trays within schools. Schools included in this unweighted analysis are public, non-charter schools that offer the National School Lunch Program, serve reimbursable meals in cafeteria-based settings, and serve a minimum number of lunches per day (at least 175 lunches in elementary schools, 220 lunches in middle schools, and 87 lunches in high schools).

Notes: Estimates are regression coefficients for each labeled variable on the left included in the column-specific model. Standard errors are reported in parentheses.

See Appendix E for more details on characteristic descriptions and selection methods.

Estimates for fruits and vegetables combine plate waste for the USDA Food Pattern fruits and vegetables groups.

Relationship between characteristic and mean percentage of fruits and vegetables wasted is significantly different from zero at the *** 0.001 level, ** 0.01 level, or * 0.05 level.

--0-- denotes omitted reference categories, for which coefficient estimates are not produced.

FNS = Food Nutrition Service; NSLP = National School Lunch Program; SFA = school food authority.

† Variable was excluded from the model due to low within-sample variation or high correlation with another characteristic in the model.

n.a. = Characteristic did not apply to any schools within the specific school type.

Table F.18. Regression Coefficient Estimates of the Relationships between the Percentage of Dairy Wasted in NSLP Lunches and Key Characteristics of School Foodservice Operations

	Regression Coefficient (Standard Error)			
	Elementary Schools	Middle Schools	High Schools	All Schools
Food Purchasing Characteristics				
SFA Uses Alliance for a Healthier Generation or Other Similar Tools for Selecting and Purchasing Healthy Foods	-8.4** (2.6)	3.5* (1.6)	-0.8 (1.8)	-2.4 (1.7)
SFA Participates in a Food Purchasing Cooperative	4.6 (2.7)	-0.9 (1.9)	-3.2 (1.6)	-0.0 (1.5)
SFA Is Engaged in a Pouring Rights Contract	3.1 (3.1)	-4.3 (2.6)	-2.3 (1.7)	-2.1 (1.4)
Schools in SFA Offer Brand-Name or Chain Restaurant Foods	0.8 (3.7)	-2.4 (1.9)	3.8 (2.4)	-1.3 (2.2)
School Participates in Farm to School Program	0.1 (3.2)	-2.7 (3.3)	-4.6** (1.3)	-0.3 (1.9)
Menu Planning Characteristics				
School Uses Cycle Menus	†	-2.7 (4.6)	†	-3.5 (3.4)
SFA Conducts Nutrient Analysis of Menus	-5.0 (3.3)	†	1.4 (2.3)	†
Number of Challenges Related to Meeting the Updated Nutrition Standards that SFA Rated as 3 of 5 or higher				
4 or less (<i>reference category</i>)	--0--	--0--	--0--	--0--
5 to 7	0.2 (3.0)	5.9* (2.3)	-1.6 (1.8)	5.6* (2.4)
8	-0.5 (3.7)	1.3 (4.4)	1.9 (1.7)	4.4 (3.3)
SFA Perception of New Meal Requirements' Helpfulness in Improving the Nutritional Quality of Meals				
Not at all helpful and somewhat helpful (<i>reference category</i>)	--0--	--0--	--0--	--0--
Very helpful	5.0 (3.8)	4.9 (5.1)	-0.7 (1.8)	2.7 (3.7)
SFA was already improving the nutritional quality of meals prior to the new meal requirements	-5.5 (3.1)	8.0* (3.1)	0.2 (1.7)	0.8 (2.7)
Characteristics of School Meal Programs				
School Participates in the Fresh Fruit and Vegetable Program	2.3 (2.3)	n.a.	n.a.	n.a
School Provides Afterschool Snacks or Suppers	8.6** (3.0)	2.9 (2.2)	4.4** (1.5)	2.9 (2.1)

	Regression Coefficient (Standard Error)			
	Elementary Schools	Middle Schools	High Schools	All Schools
Meal Service Characteristics				
SFA Uses a Foodservice Management Company	2.5 (4.5)	-6.7* (3.2)	0.1 (1.9)	-3.4 (2.3)
School Uses Offer-Versus-Serve at Lunch	-4.8 (3.2)	6.6* (2.7)	†	†
School Has Policies and Procedures for Accommodating Students with Food Allergies and Special Dietary Needs	†	-5.1 (3.3)	-2.5 (1.5)	-3.3 (2.1)
Number of HealthierUS School Challenge Smarter Lunchroom Techniques Used				
Zero to 1 (<i>reference category</i>)	--0--	--0--	--0--	--0--
2 to 3	-8.2** (2.9)	-9.3*** (2.4)	4.8** (1.4)	-2.1 (1.6)
4 to 7	-10.1* (3.9)	-4.8 (3.1)	-2.4 (2.5)	-2.6 (2.1)
Price Charged for Paid Lunches				
School Offered Free Lunch to All Students	10.0** (2.9)	-0.3 (3.1)	8.3** (2.7)	5.8** (2.0)
\$2.25 or less (<i>reference category</i>)	--0--	--0--	--0--	--0--
\$2.26 to \$2.50	-3.3 (2.2)	2.1 (2.3)	-0.0 (1.5)	-0.2 (1.5)
More than \$2.50	12.4** (4.1)	-0.3 (2.5)	0.4 (1.9)	0.9 (2.1)
School Cost per Lunch Is at or above Median (\$3.66)	-6.9* (3.1)	-1.2 (1.6)	-2.2 (2.3)	-1.2 (1.6)
Institutional and Demographic Characteristics of Schools and SFAs				
SFA Size				
2,500 to 9,999 students (<i>reference category</i>)	--0--	--0--	--0--	--0--
10,000 or more students	1.5 (2.4)	-0.9 (1.5)	-4.3 (2.2)	-0.7 (1.4)
School Size				
Fewer than 500 students (<i>reference category</i>)	--0--	--0--	--0--	--0--
500 to 999 students	-2.9 (2.6)	0.2 (2.5)	-6.8*** (1.4)	-2.3 (2.2)
1,000 or more students	-17.6** (6.0)	-2.9 (2.7)	†	-3.1 (2.6)

	Regression Coefficient (Standard Error)			
	Elementary Schools	Middle Schools	High Schools	All Schools
FNS Region				
Northeast and Mid-Atlantic (<i>reference category</i>)	--0--	--0--	--0--	--0--
Southeast	2.2 (3.4)	10.7** (3.6)	4.1* (1.9)	4.0 (2.6)
Midwest	-8.1* (3.6)	6.2 (3.3)	1.1 (2.0)	1.6 (1.8)
Southwest	-2.9 (3.8)	4.5 (3.4)	-3.5 (2.4)	0.7 (2.7)
Mountain Plains and West	0.7 (2.5)	5.6* (2.5)	-1.7 (2.0)	3.5 (1.8)
School Urbanicity				
Urban (<i>reference category</i>)	--0--	--0--	--0--	--0--
Suburban	0.1 (3.2)	-5.5* (2.4)	-0.7 (2.7)	-1.6 (2.3)
Rural	2.2 (4.6)	-13.8*** (2.9)	-2.8 (2.3)	-4.6 (3.1)
Student Gender				
Female (<i>reference category</i>)	--0--	--0--	--0--	--0--
Male	-7.2*** (1.3)	-6.9*** (1.7)	-9.2*** (1.3)	-7.8*** (0.8)
Share of Minority Students in SFA				
Less than 40 percent (<i>reference category</i>)	--0--	--0--	--0--	--0--
40 to 59 percent	1.1 (4.3)	1.9 (2.8)	-1.0 (2.6)	4.3 (2.6)
60 to 100 percent	-2.1 (3.7)	-3.9 (2.6)	2.0 (3.6)	0.1 (2.6)
Share of Students Approved for Free or Reduced-Price Meals				
Less than 40 percent (<i>reference category</i>)	--0--	--0--	--0--	--0--
40 percent or more	-2.8 (2.6)	-6.7*** (1.8)	0.9 (2.8)	-2.3 (1.7)
Number of Trays	2,186	2,109	1,958	6,253
Number of Schools	56	56	53	165

Source: School Nutrition and Meal Cost Study, Plate Waste Observations, School Food Authority Director Survey, School Nutrition Manager Survey, Cafeteria Observation Guide, School Nutrition Manager Cost Interview, and SFA Director and Business Manager Onsite and Follow-Up Cost Interview, school year 2014-2015. Tray-level tabulations are unweighted and include clustered standard errors to account for clustering of trays within schools. Schools included in this unweighted analysis are public, non-charter schools that offer the National School Lunch Program, serve reimbursable meals in cafeteria-based settings, and serve a minimum number of lunches per day (at least 175 lunches in elementary schools, 220 lunches in middle schools, and 87 lunches in high schools).

Notes: Estimates are regression coefficients for each labeled variable on the left included in the column-specific model. Standard errors are reported in parentheses.

See Appendix E for more details on characteristic descriptions and selection methods.

Relationship between characteristic and mean percentage of dairy wasted is significantly different from zero at the *** 0.001 level, ** 0.01 level, or * 0.05 level.

--0-- denotes omitted reference categories, for which coefficient estimates are not produced.

FNS = Food Nutrition Service; NSLP = National School Lunch Program; SFA = school food authority.

† Variable was excluded from the model due to low within-sample variation or high correlation with another characteristic in the model.

n.a. = Characteristic did not apply to any schools within the specific school type.

Table F.19. Relationships between Plate Waste in NSLP Lunches and Key Characteristics of the School Food Environment: Regression-Adjusted Mean Percentage of Calories and Key USDA Food Pattern Food Groups Wasted

	Yes /No	Elementary Schools			Middle Schools		
		Calories	Fruits and Vegetables	Dairy	Calories	Fruits and Vegetables	Dairy
Mean Percentage Wasted in NSLP Lunches		26.3	30.6	32.5	15.7	22.5	20.0
Wellness Policies and Practices							
SFA Has Nutrition Standards for School Meals that Exceed Federal Standards	Y	20.2	31.1*	26.0	11.8	20.4	24.9
	N	22.1	23.6	28.2	12.6	23.4	23.7
SFA Has Plan for Informing Public About Wellness Policy Content and Implementation	Y	22.9	29.2	29.9	13.0	25.8*	25.4
	N	19.4	25.5	24.3	11.4	18.1	23.1
School Has School-Level Wellness Policy in Addition to District Wellness Policy	Y	18.9	24.8	24.8	11.9	20.9	24.3
	N	23.4	29.9	29.4	12.6	22.9	24.3
SFA Wellness Policy Includes Nutrition Promotion	Y	21.8	23.4	29.7	11.6	18.3*	21.9
	N	20.6	31.3	24.5	12.9	25.6	26.7
School Conducted a Nutrition Education Activity in the Classroom or Foodservice Area	Y	20.8	25.9	26.6	12.4	22.4	22.0*
	N	21.5	28.8	27.6	12.0	21.4	26.6
School Operates a School Garden	Y	22.5	29.8	26.8	†	†	†
	N	19.8	24.9	27.4	†	†	†
Competitive Foods							
School Does Not Sell Competitive Foods during Mealtimes	Y	22.2	24.8	30.4*	13.2	23.8	26.5
	N	20.2	29.9	23.8	11.3	20.0	22.1
School Sells Foods Other than Milk on an A la Carte Basis	Y	20.6	24.0	28.0	13.6	25.2*	27.5*
	N	21.8	30.7	26.2	10.8	18.6	21.1
School Sells Foods and Beverages in Vending Machine	Y	18.6*	14.5*	23.7	11.6	21.4	24.8
	N	23.8	40.2	30.5	12.8	22.5	23.7
School Sells Foods and Beverages in School Store and/or Snack Bar	Y	20.0	33.6*	23.2	14.3*	27.0*	24.1
	N	22.4	21.1	31.0	10.1	16.9	24.5
SFA Has Standards for Competitive Foods that Exceed Smart Snacks in Schools Standards	Y	21.5	28.2	27.3	12.9	21.8	25.7
	N	20.8	26.4	26.9	11.5	22.1	22.9

	Yes /No	Elementary Schools			Middle Schools		
		Calories	Fruits and Vegetables	Dairy	Calories	Fruits and Vegetables	Dairy
Meal Service Practices							
Length of Lunch Period							
Less than 30 minutes (<i>reference category</i>)		33.2	25.3	49.8	22.5	28.1	21.7
30 to 44 minutes		29.0	23.0	45.0	16.5*	22.3	22.5
45 minutes or more		24.9	30.6	31.2*	17.3	28.9	29.4
Time Lunch Period Starts							
Before 11:30 a.m. (<i>reference category</i>)		25.0	29.7	31.4	11.9	23.1	24.4
Between 11:30 a.m. to 11:59 a.m.		21.4*	26.2*	28.4	13.3	23.2	24.8
12:00 p.m. and after		21.0*	28.5	25.9*	11.1	20.6	23.7
School Has Multiple Lunch Periods	Y	18.1	32.0	19.9*	12.1	23.0	26.0
	N	24.3	22.7	34.3	12.4	20.9	22.6
School Has Other Activities Scheduled during Lunch Period	Y	23.2	28.4	29.4	12.9	23.1	23.4
	N	19.2	26.3	24.8	11.6	20.8	25.2
School Allows Students to Go out to Recess before the Official End of Their Lunch Period	Y	24.5	28.6	35.9*	11.5	22.3	25.4
	N	17.8	26.1	18.4	12.9	21.6	23.2
School Has An Open Campus Policy	Y	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	N	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
School Has More than One Line or Station that Offers Reimbursable Lunches or Components of Reimbursable Lunches	Y	19.9	28.0	27.1	12.3	21.7	23.4
	N	22.5	26.7	27.1	2.1	22.1	25.2
Number of Trays		2,186	2,186	2,186	2,109	2,109	2,109
Number of Schools		56	56	56	56	56	56

	Yes /No	High Schools			All Schools		
		Calories	Fruits and Vegetables	Dairy	Calories	Fruits and Vegetables	Dairy
Mean Percentage Wasted in NSLP Lunches		12.6	17.8	14.3	18.5	23.9	22.8
Wellness Policies and Practices							
SFA Has Nutrition Standards for School Meals that Exceed Federal Standards	Y	10.1	21.1	9.6	17.6	31.2	20.9
	N	9.1	21.3	11.8	19.0	29.7	21.5
SFA Has Plan for Informing Public About Wellness Policy Content and Implementation	Y	9.5	22.7	12.2*	18.8	31.8	22.0
	N	9.8	19.7	9.3	17.7	29.1	20.4
School Has School-Level Wellness Policy in Addition to District Wellness Policy	Y	10.4	21.5	11.4	18.0	30.8	21.7
	N	8.8	20.8	10.1	18.6	30.1	20.8
SFA Wellness Policy Includes Nutrition Promotion	Y	11.1*	21.1	11.1	18.7	28.3	22.0
	N	8.2	21.3	10.4	17.9	32.6	20.4
School Conducted a Nutrition Education Activity in the Classroom or Foodservice Area	Y	7.6*	17.4*	10.3	17.2*	29.0*	19.4*
	N	11.7	24.9	11.2	19.4	31.9	23.0
School Operates a School Garden	Y	†	†	†	19.4	32.3	†
	N	†	†	†	17.2	28.6	†
Competitive Foods							
School Does Not Sell Competitive Foods during Mealtimes	Y	6.3*	16.4*	9.2	18.2	30.2	21.8
	N	12.9	25.9	12.2	18.3	30.7	20.6
School Sells Foods Other than Milk on an A la Carte Basis	Y	†	†	†	17.3	30.3	20.5
	N	†	†	†	19.2	30.6	21.9
School Sells Foods and Beverages in Vending Machine	Y	10.5	21.0	12.8*	17.7	28.2*	20.5
	N	8.7	21.4	8.7	18.9	32.7	21.9
School Sells Foods and Beverages in School Store and/or Snack Bar	Y	8.5	20.8	10.2	18.4	32.3*	20.5
	N	10.8	21.6	11.3	18.2	28.6	22.0
SFA Has Standards for Competitive Foods that Exceed Smart Snacks in Schools Standards	Y	9.1	21.4	11.9	19.3*	31.8	22.9
	N	10.1	21.0	9.6	17.3	29.1	19.5

	Yes /No	High Schools			All Schools		
		Calories	Fruits and Vegetables	Dairy	Calories	Fruits and Vegetables	Dairy
Meal Service Practices							
Length of Lunch Period							
Less than 30 minutes (<i>reference category</i>)		11.1	14.1	9.2	19.6	29.2	20.9
30 to 44 minutes		10.1	18.6	9.1	18.8	28.6	22.3
45 minutes or more		13.0	25.1*	11.5	20.4	34.0	22.1
Time Lunch Period Starts							
Before 11:30 a.m. (<i>reference category</i>)		11.0	22.3	13.2	19.7	31.9	22.5
Between 11:30 a.m. and 11:59 p.m.		9.9	22.4	9.6	18.5	30.4	21.0
12:00 p.m. and after		9.4	20.0	11.9	18.1*	30.5	21.4
School Has Multiple Lunch Periods	Y	9.8	22.4	10.5	18.7	32.7	21.1
	N	9.5	20.0	10.9	17.9	28.2	21.3
School Has Other Activities Scheduled during Lunch Period	Y	8.2*	20.9	10.2	17.7	29.9	20.6
	N	11.0	21.4	11.3	18.9	30.9	21.8
School Allows Students to Go out to Recess before the Official End of Their Lunch Period	Y	n.a.	n.a.	n.a.	19.1	30.7	23.0
	N	n.a.	n.a.	n.a.	17.5	30.2	19.4
School Has An Open Campus Policy	Y	7.6*	18.4*	9.1*	n.a.	n.a.	n.a.
	N	11.7	24.0	12.4	n.a.	n.a.	n.a.
School Has More than One Line or Station that Offers Reimbursable Lunches or Components of Reimbursable Lunches	Y	8.7	20.9	9.9	17.9	30.0	20.9
	N	10.6	21.5	11.5	18.7	30.8	21.5
Number of Trays		1,958	1,958	1,958	6,253	6,253	6,253
Number of Schools		53	53	53	165	165	165

Source: School Nutrition and Meal Cost Study, Plate Waste Observations, School Food Authority Director Survey, School Nutrition Manager Survey, Principal Survey, Vending Machine and Other Sources of Foods and Beverages Checklist, A la Carte Checklist, and Cafeteria Observation Guide, school year 2014-2015. Tray-level tabulations are unweighted and include clustered standard errors to account for clustering of trays within schools. Schools included in this unweighted analysis are public, non-charter schools that offer the National School Lunch Program, serve reimbursable meals in cafeteria-based settings, and serve a minimum number of lunches per day (at least 175 lunches in elementary schools, 220 lunches in middle schools, and 87 lunches in high schools).

Notes: Estimates are regression-adjusted means that control for institutional and demographic characteristics of each school and their SFA. Variables with rows labeled "Y" and "N" report adjusted mean percentage of each outcome (calories, fruits and vegetables, and dairy) wasted for schools that do and do not

meet the variable criteria, respectively. Otherwise, regression-adjusted means are reported for each category within a variable. See Appendix E for more details on characteristic descriptions and selection methods.

Estimates for fruits and vegetables combine plate waste for the USDA Food Pattern fruits and vegetables groups.

*Denotes the difference within each outcome (mean percentage of calories, fruits and vegetables, and dairy wasted) between schools with and without a dichotomous characteristic is statistically different from zero at the 0.05 level. For variables containing multiple categories, * denotes that the difference in mean percentage within each outcome wasted between schools in the corresponding category and schools in the reference category is statistically different from zero at the 0.05 level.

NSLP = National School Lunch Program; SFA = school food authority.

† Variable was excluded from the model due to low within-sample variation or high correlation with another characteristic in the model.

n.a. = Characteristic did not apply to any schools within the specific school type.

Table F.20. Regression Coefficient Estimates of the Relationships between the Percentage of Calories Wasted in NSLP Lunches and Key Characteristics of the School Food Environment

	Regression Coefficient (Standard Error)			
	Elementary Schools	Middle Schools	High Schools	All Schools
Wellness Policies and Practices				
SFA Has Nutrition Standards for School Meals that Exceed Federal Standards	-1.9 (2.1)	-0.9 (1.7)	1.0 (1.9)	-1.4 (1.3)
SFA Has Plan for Informing Public About Wellness Policy Content and Implementation	3.5 (2.9)	1.6 (1.8)	-0.3 (1.4)	1.1 (1.3)
School Has School-Level Wellness Policy in Addition to District Wellness Policy	-4.5 (2.4)	-0.7 (1.5)	1.6 (1.2)	-0.6 (1.1)
SFA Wellness Policy as Implemented Includes Nutrition Promotion	1.2 (2.9)	-1.3 (1.6)	2.9* (1.2)	0.8 (1.5)
School Conducted a Nutrition Education Activity in the Classroom or Foodservice Area	-0.7 (2.0)	0.3 (1.0)	-4.1** (1.2)	-2.3* (0.9)
School Operates a School Garden	2.7 (4.4)	†	†	2.2 (2.5)
Competitive Foods				
School Does Not Sell Competitive Foods during Mealtimes	2.0 (2.4)	1.9 (1.7)	-6.6* (3.2)	-0.1 (1.5)
School Sells Foods Other than Milk on an A la Carte Basis	-1.2 (2.8)	2.8 (1.8)	†	-1.9 (1.3)
School Sells Foods and Beverages in Vending Machine	-5.2* (2.1)	-1.2 (1.1)	1.8 (2.0)	-1.2 (1.1)
School Sells Foods and Beverages in School Store and/or Snack Bar	-2.4 (2.6)	4.2* (1.8)	-2.3 (1.2)	0.2 (0.9)
SFA Has Standards for Competitive Foods that Exceed Smart Snacks in Schools Standards	0.7 (2.7)	1.4 (1.4)	-1.0 (1.1)	2.0* (1.0)
Meal Service Practices				
Length of Lunch Period				
Less than 30 minutes (<i>reference category</i>)	--0--	--0--	--0--	--0--
30 to 44 minutes	-4.2 (3.4)	-6.1** (1.9)	-1.0 (1.5)	-0.8 (1.2)
45 minutes or more	-8.3 (5.1)	-5.2 (4.2)	1.9 (2.5)	0.8 (2.0)
Time Lunch Period Starts				
Before 11:30 a.m. (<i>reference category</i>)	--0--	--0--	--0--	--0--
Between 11:30 a.m. to 11:59 a.m.	-3.6** (1.3)	1.4 (1.2)	-1.1 (1.1)	-1.3 (0.7)
12:00 p.m. and after	-4.0* (1.7)	-0.8 (1.1)	-1.6 (1.1)	-1.6* (0.8)
School Has Multiple Lunch Periods	-6.1 (5.2)	-0.3 (1.6)	0.3 (2.4)	0.8 (1.5)
School Has Other Activities Scheduled during Lunch Period	4.0 (2.3)	1.3 (1.7)	-2.8* (1.4)	-1.2 (1.0)

	Regression Coefficient (Standard Error)			
	Elementary Schools	Middle Schools	High Schools	All Schools
School Allows Students to Go out to Recess before the Official End of Their Lunch Period	6.7 (4.2)	-1.4 (1.9)	n.a.	1.7 (1.8)
School Has An Open Campus Policy	n.a.	n.a.	-4.1** (1.3)	n.a
School Has More than One Line or Station that Offers Reimbursable Lunches or Components of Reimbursable Lunches	-2.6 (2.2)	0.2 (1.7)	-1.9 (1.4)	-0.9 (1.0)
Institutional and Demographic Characteristics of Schools and SFAs				
SFA Size				
2,500 to 9,999 students (<i>reference category</i>)	--0--	--0--	--0--	--0--
10,000 or more students	5.2 (3.0)	1.3 (1.2)	-1.9 (1.4)	0.8 (1.2)
School Size				
Fewer than 500 students (<i>reference category</i>)	--0--	--0--	--0--	--0--
500 to 999 students	0.2 (1.7)	-2.5 (1.3)	†	-1.2 (1.2)
1,000 or more students	-7.0 (3.9)	-5.3*** (1.5)	3.0* (1.3)	-2.1 (1.6)
FNS Region				
Northeast and Mid-Atlantic (<i>reference category</i>)	--0--	--0--	--0--	--0--
Southeast	-3.5 (2.8)	6.4*** (1.6)	3.9* (1.7)	2.2 (1.3)
Midwest	2.1 (3.1)	-1.4 (2.4)	4.0 (2.1)	3.4* (1.3)
Southwest	1.6 (3.2)	0.4 (2.1)	2.6 (1.8)	2.9* (1.4)
Mountain Plains and West	6.1* (2.5)	0.8 (1.8)	2.6 (1.8)	5.3*** (1.4)
School Urbanicity				
Urban (<i>reference category</i>)	--0--	--0--	--0--	--0--
Suburban	-0.5 (3.7)	-0.5 (1.6)	-0.1 (1.5)	-0.0 (1.2)
Rural	6.6 (5.0)	-3.1 (2.1)	-1.1 (2.1)	-0.9 (1.8)
Student Gender				
Female (<i>reference category</i>)	--0--	--0--	--0--	--0--
Male	-3.6*** (0.8)	-5.3*** (1.0)	-7.4*** (0.7)	-5.4*** (0.5)
Share of Minority Students in SFA				
Less than 40 percent (<i>reference category</i>)	--0--	--0--	--0--	--0--
40 to 59 percent	-1.9 (3.9)	3.9* (1.6)	-1.3 (1.6)	1.7 (1.5)
60 to 100 percent	1.2 (3.3)	6.1* (2.5)	3.5* (1.7)	3.9* (1.6)

	Regression Coefficient (Standard Error)			
	Elementary Schools	Middle Schools	High Schools	All Schools
Share of Students Approved for Free or Reduced-Price Meals				
Less than 40 percent (<i>reference category</i>)	--0--	--0--	--0--	--0--
40 percent or more	-2.4 (2.9)	-2.9* (1.3)	-1.7 (1.3)	-0.7 (1.1)
Number of Trays	2,186	2,109	1,958	6,253
Number of Schools	56	56	53	165

Source: School Nutrition and Meal Cost Study, Plate Waste Observations, School Food Authority Director Survey, School Nutrition Manager Survey, Principal Survey, Vending Machine and Other Sources of Foods and Beverages Checklist, A la Carte Checklist, and Cafeteria Observation Guide, school year 2014-2015. Tray-level tabulations are unweighted and include clustered standard errors to account for clustering of trays within schools. Schools included in this unweighted analysis are public, non-charter schools that offer the National School Lunch Program, serve reimbursable meals in cafeteria-based settings, and serve a minimum number of lunches per day (at least 175 lunches in elementary schools, 220 lunches in middle schools, and 87 lunches in high schools).

Notes: Estimates are regression coefficients for each labeled variable on the left included in the column-specific model. Standard errors are reported in parentheses.

See Appendix E for more details on characteristic descriptions and selection methods.

Relationship between characteristic and mean percentage of calories wasted is significantly different from zero at the *** 0.001 level, ** 0.01 level, or * 0.05 level.

--0-- denotes omitted reference categories, for which coefficient estimates are not produced.

FNS = Food Nutrition Service; NSLP = National School Lunch Program; SFA = school food authority.

† Variable was excluded from the model due to low within-sample variation or high correlation with another characteristic in the model.

n.a. = Characteristic did not apply to any schools within the specific school type.

Table F.21. Regression Coefficient Estimates of the Relationships between the Percentage of Fruits and Vegetables Wasted in NSLP Lunches and Key Characteristics of the School Food Environment

	Regression Coefficient (Standard Error)			
	Elementary Schools	Middle Schools	High Schools	All Schools
Wellness Policies and Practices				
SFA Has Nutrition Standards for School Meals that Exceed Federal Standards	7.4* (3.1)	-3.0 (2.6)	-0.2 (2.9)	1.6 (2.2)
SFA Has Plan for Informing Public About Wellness Policy Content and Implementation	3.6 (4.5)	7.7* (3.3)	2.9 (2.5)	2.7 (2.0)
School Has School-Level Wellness Policy in Addition to District Wellness Policy	-5.1 (3.7)	-2.0 (2.8)	0.7 (2.2)	0.7 (1.6)
SFA Wellness Policy as Implemented Includes Nutrition Promotion	-8.0 (4.0)	-7.3* (3.3)	-0.3 (2.1)	-4.2 (2.3)
School Conducted a Nutrition Education Activity in the Classroom or Foodservice Area	-2.9 (2.6)	1.0 (1.9)	-7.5*** (1.8)	-2.9* (1.4)
School Operates a School Garden	4.8 (5.5)	†	†	3.7 (4.0)
Competitive Foods				
School Does Not Sell Competitive Foods during Mealtimes	-5.1 (3.9)	3.8 (3.3)	-9.5* (3.8)	-0.6 (2.6)
School Sells Foods Other than Milk on an A la Carte Basis	-6.8 (4.1)	6.6* (3.2)	†	-0.4 (2.3)
School Sells Foods and Beverages in Vending Machine	-25.7*** (3.7)	-1.1 (2.0)	-0.5 (2.2)	-4.5* (1.8)
School Sells Foods and Beverages in School Store and/or Snack Bar	12.6** (3.9)	10.1** (2.9)	-0.8 (2.1)	3.7* (1.5)
SFA Has Standards for Competitive Foods that Exceed Smart Snacks in Schools Standards	1.8 (3.7)	-0.3 (2.7)	0.4 (1.9)	2.7 (1.3)
Meal Service Practices				
Length of Lunch Period				
Less than 30 minutes (<i>reference category</i>)	--0--	--0--	--0--	--0--
30 to 44 minutes	-2.2 (5.2)	-5.8 (3.0)	4.4 (2.5)	-0.6 (2.1)
45 minutes or more	5.3 (7.1)	0.9 (7.9)	10.9** (4.0)	4.8 (3.1)
Time Lunch Period Starts				
Before 11:30 a.m. (<i>reference category</i>)	--0--	--0--	--0--	--0--
Between 11:30 a.m. to 11:59 a.m.	-3.5* (1.7)	0.2 (1.9)	0.1 (1.7)	-1.5 (1.0)
12:00 p.m. and after	-1.2 (2.2)	-2.5 (2.1)	-2.3 (1.6)	-1.4 (1.2)
School Has Multiple Lunch Periods	9.3 (7.2)	2.1 (2.9)	2.4 (2.4)	4.5 (2.8)
School Has Other Activities Scheduled during Lunch Period	2.1 (4.0)	2.3 (2.8)	-0.5 (2.1)	-1.0 (1.5)

	Regression Coefficient (Standard Error)			
	Elementary Schools	Middle Schools	High Schools	All Schools
School Allows Students to Go out to Recess before the Official End of Their Lunch Period	2.5 (5.8)	0.7 (4.4)	n.a.	0.5 (3.1)
School Has An Open Campus Policy	n.a.	n.a.	-5.6** (1.9)	n.a.
School Has More than One Line or Station that Offers Reimbursable Lunches or Components of Reimbursable Lunches	1.2 (3.9)	-0.4 (2.2)	-0.6 (2.1)	-0.8 (1.8)
Institutional and Demographic Characteristics of Schools and SFAs				
SFA Size				
2,500 to 9,999 students (<i>reference category</i>)	--0--	--0--	--0--	--0--
10,000 or more students	-5.7 (4.2)	4.4 (2.4)	-1.3 (1.5)	-2.0 (1.6)
School Size				
Fewer than 500 students (<i>reference category</i>)	--0--	--0--	--0--	--0--
500 to 999 students	0.7 (2.5)	-2.5 (1.9)	†	2.1 (2.0)
1,000 or more students	-5.4 (6.1)	-3.9 (2.5)	2.4 (1.8)	2.1 (2.2)
FNS Region				
Northeast and Mid-Atlantic (<i>reference category</i>)	--0--	--0--	--0--	--0--
Southeast	-0.0 (4.1)	3.9 (2.7)	8.9*** (2.1)	2.1 (2.2)
Midwest	-12.9* (5.6)	-1.4 (3.9)	10.0*** (2.1)	3.3 (2.3)
Southwest	-0.9 (4.5)	0.6 (4.1)	7.5*** (1.8)	1.7 (2.3)
Mountain Plains and West	7.8* (3.6)	3.3 (3.1)	11.0*** (2.8)	9.9*** (2.0)
School Urbanicity				
Urban (<i>reference category</i>)	--0--	--0--	--0--	--0--
Suburban	2.4 (4.4)	0.7 (3.1)	-0.9 (2.2)	2.1 (1.9)
Rural	2.7 (6.5)	5.8 (4.4)	-3.2 (3.6)	3.7 (3.1)
Student Gender				
Female (<i>reference category</i>)	--0--	--0--	--0--	--0--
Male	-1.0 (1.1)	-4.3** (1.4)	-5.5*** (1.2)	-3.6*** (0.7)
Share of Minority Students in SFA				
Less than 40 percent (<i>reference category</i>)	--0--	--0--	--0--	--0--
40 to 59 percent	7.8 (5.6)	0.1 (3.1)	0.3 (2.4)	3.8 (1.9)
60 to 100 percent	1.1 (4.1)	9.1* (4.3)	3.1 (2.4)	5.2* (2.3)

	Regression Coefficient (Standard Error)			
	Elementary Schools	Middle Schools	High Schools	All Schools
Share of Students Approved for Free or Reduced-Price Meals				
Less than 40 percent (<i>reference category</i>)	--0--	--0--	--0--	--0--
40 percent or more	0.3 (4.0)	1.3 (2.3)	1.0 (2.4)	1.1 (1.6)
Number of Trays	2,186	2,109	1,958	6,253
Number of Schools	56	56	53	165

Source: School Nutrition and Meal Cost Study, Plate Waste Observations, School Food Authority Director Survey, School Nutrition Manager Survey, Principal Survey, Vending Machine and Other Sources of Foods and Beverages Checklist, A la Carte Checklist, and Cafeteria Observation Guide, school year 2014-2015. Tray-level tabulations are unweighted and include clustered standard errors to account for clustering of trays within schools. Schools included in this unweighted analysis are public, non-charter schools that offer the National School Lunch Program, serve reimbursable meals in cafeteria-based settings, and serve a minimum number of lunches per day (at least 175 lunches in elementary schools, 220 lunches in middle schools, and 87 lunches in high schools).

Notes: Estimates are regression coefficients for each labeled variable on the left included in the column-specific model. Standard errors are reported in parentheses.

See Appendix E for more details on characteristic descriptions and selection methods.

Estimates for fruits and vegetables combine plate waste for the USDA Food Pattern fruits and vegetables groups.

Relationship between characteristic and mean percentage of fruits and vegetables wasted is significantly different from zero at the *** 0.001 level, ** 0.01 level, or * 0.05 level.

--0-- denotes omitted reference categories, for which coefficient estimates are not produced.

FNS = Food Nutrition Service; NSLP = National School Lunch Program; SFA = school food authority.

† Variable was excluded from the model due to low within-sample variation or high correlation with another characteristic in the model.

n.a. = Characteristic did not apply to any schools within the specific school type.

Table F.22. Regression Coefficient Estimates of the Relationships between the Percentage of Dairy Wasted in NSLP Lunches and Key Characteristics of the School Food Environment

	Regression Coefficient (Standard Error)			
	Elementary Schools	Middle Schools	High Schools	All Schools
Wellness Policies and Practices				
SFA Has Nutrition Standards for School Meals that Exceed Federal Standards	-2.1 (4.0)	1.3 (3.5)	-2.2 (1.9)	-0.7 (2.6)
SFA Has Plan for Informing Public About Wellness Policy Content and Implementation	5.7 (4.1)	2.3 (3.2)	2.9* (1.2)	1.5 (1.9)
School Has School-Level Wellness Policy in Addition to District Wellness Policy	-4.6 (3.6)	0.0 (3.4)	1.3 (1.1)	0.9 (1.7)
SFA Wellness Policy as Implemented Includes Nutrition Promotion	5.2 (3.5)	-4.7 (2.5)	0.7 (1.7)	1.7 (2.0)
School Conducted a Nutrition Education Activity in the Classroom or Foodservice Area	-1.0 (2.4)	-4.6* (1.9)	-0.9 (1.1)	-3.6* (1.4)
School Operates a School Garden	-0.7 (3.9)	†	†	†
Competitive Foods				
School Does Not Sell Competitive Foods during Mealtimes	6.6* (2.6)	4.4 (3.6)	-3.0 (2.3)	1.3 (2.3)
School Sells Foods Other than Milk on an A la Carte Basis	1.8 (3.6)	6.5* (3.1)	†	-1.3 (2.2)
School Sells Foods and Beverages in Vending Machine	-6.8 (3.7)	1.1 (2.3)	4.1* (1.9)	-1.5 (1.5)
School Sells Foods and Beverages in School Store and/or Snack Bar	-7.9 (4.3)	-0.4 (2.5)	-1.0 (1.1)	-1.5 (1.4)
SFA Has Standards for Competitive Foods that Exceed Smart Snacks in Schools Standards	0.4 (3.4)	2.8 (2.2)	2.4 (1.4)	3.4 (1.7)
Meal Service Practices				
Length of Lunch Period				
Less than 30 minutes (<i>reference category</i>)	--0--	--0--	--0--	--0--
30 to 44 minutes	-4.8 (4.3)	0.8 (3.1)	-0.2 (2.4)	1.4 (1.9)
45 minutes or more	-18.6** (6.6)	7.7 (8.4)	2.3 (2.8)	1.2 (3.7)
Time Lunch Period Starts				
Before 11:30 a.m. (<i>reference category</i>)	--0--	--0--	--0--	--0--
Between 11:30 a.m. to 11:59 a.m.	-3.1 (2.0)	0.4 (2.5)	-3.6 (1.8)	-1.5 (1.3)
12:00 p.m. and after	-5.6* (2.2)	-0.7 (1.7)	-1.3 (2.0)	-1.1 (1.1)
School Has Multiple Lunch Periods	-14.5* (6.5)	3.4 (2.3)	-0.4 (2.2)	-0.2 (2.6)
School Has Other Activities Scheduled during Lunch Period	4.5 (4.6)	-1.8 (3.0)	-1.1 (1.6)	-1.2 (1.6)

	Regression Coefficient (Standard Error)			
	Elementary Schools	Middle Schools	High Schools	All Schools
School Allows Students to Go out to Recess before the Official End of Their Lunch Period	17.5** (5.3)	2.3 (2.8)	n.a.	3.6 (3.3)
School Has An Open Campus Policy	n.a.	n.a.	-3.4* (1.5)	n.a.
School Has More than One Line or Station that Offers Reimbursable Lunches or Components of Reimbursable Lunches	0.0 (2.3)	-1.7 (2.9)	-1.6 (2.0)	-0.6 (1.6)
Institutional and Demographic Characteristics of Schools and SFAs				
SFA Size				
2,500 to 9,999 students (reference category)	--0--	--0--	--0--	--0--
10,000 or more students	5.5 (3.2)	0.3 (2.1)	-8.4*** (1.6)	0.0 (1.9)
School Size				
Fewer than 500 students (reference category)	--0--	--0--	--0--	--0--
500 to 999 students	1.1 (2.2)	-1.4 (2.4)	-11.1*** (1.2)	-1.7 (2.0)
1,000 or more students	-8.1 (5.9)	-4.0 (3.3)	†	-3.2 (2.7)
FNS Region				
Northeast and Mid-Atlantic (reference category)	--0--	--0--	--0--	--0--
Southeast	-2.6 (4.3)	5.6 (2.9)	6.5** (1.9)	2.8 (2.5)
Midwest	9.0 (5.2)	4.2 (4.4)	4.4 (2.3)	4.6 (2.4)
Southwest	0.1 (4.0)	3.1 (4.0)	-0.9 (1.8)	1.1 (2.3)
Mountain Plains and West	10.6** (3.5)	1.8 (2.7)	1.4 (1.9)	6.3** (2.1)
School Urbanicity				
Urban (reference category)	--0--	--0--	--0--	--0--
Suburban	-0.9 (3.9)	-1.4 (2.6)	-5.9** (2.0)	-0.8 (2.1)
Rural	4.0 (6.1)	-10.3* (4.3)	-6.0** (1.9)	-5.0 (2.8)
Student Gender				
Female (reference category)	--0--	--0--	--0--	--0--
Male	-7.1*** (1.3)	-6.6*** (1.7)	-9.0*** (1.4)	-7.6*** (0.8)
Share of Minority Students in SFA				
Less than 40 percent (reference category)	--0--	--0--	--0--	--0--
40 to 59 percent	1.3 (4.3)	2.2 (2.5)	-0.5 (1.5)	3.4 (1.8)
60 to 100 percent	-2.0 (4.7)	1.4 (4.5)	1.9 (1.5)	2.8 (2.4)

	Regression Coefficient (Standard Error)			
	Elementary Schools	Middle Schools	High Schools	All Schools
Share of Students Approved for Free or Reduced- Price Meals				
Less than 40 percent (<i>reference category</i>)	--0--	--0--	--0--	--0--
40 percent or more	-5.9 (3.4)	-7.7** (2.2)	6.6*** (1.5)	-2.3 (1.5)
Number of Trays	2,186	2,109	1,958	6,253
Number of Schools	56	56	53	165

Source: School Nutrition and Meal Cost Study, Plate Waste Observations, School Food Authority Director Survey, School Nutrition Manager Survey, Principal Survey, Vending Machine and Other Sources of Foods and Beverages Checklist, A la Carte Checklist, and Cafeteria Observation Guide, school year 2014-2015. Tray-level tabulations are unweighted and include clustered standard errors to account for clustering of trays within schools. Schools included in this unweighted analysis are public, non-charter schools that offer the National School Lunch Program, serve reimbursable meals in cafeteria-based settings, and serve a minimum number of lunches per day (at least 175 lunches in elementary schools, 220 lunches in middle schools, and 87 lunches in high schools).

Notes: Estimates are regression coefficients for each labeled variable on the left included in the column-specific model. Standard errors are reported in parentheses.

See Appendix E for more details on characteristic descriptions and selection methods.

Relationship between characteristic and mean percentage of dairy wasted is significantly different from zero at the *** 0.001 level, ** 0.01 level, or * 0.05 level.

--0-- denotes omitted reference categories, for which coefficient estimates are not produced.

FNS = Food Nutrition Service; NSLP = National School Lunch Program; SFA = school food authority.

† Variable was excluded from the model due to low within-sample variation or high correlation with another characteristic in the model.

n.a. = Characteristic did not apply to any schools within the specific school type.

Table F.23. Mean Percentage of USDA Food Pattern Food Groups Wasted in SBP Breakfasts, by Gender

	Mean Percentage Wasted								
	Elementary Schools		Middle Schools		High Schools		All Schools		All Students
	Males	Females	Males	Females	Males	Females	Males	Females	
Fruits	31.0*	36.4	22.9*	29.8	11.1*	16.4	22.0*	28.9	25.1
Vegetables ^a	8.2*	21.0	9.2*	11.9	3.5** [^]	7.1 [^]	6.6*	13.4	9.6
Grains	17.5	19.8	10.9*	16.0	7.9*	13.0	12.1*	16.7	14.2
Whole grains	18.2	20.1	11.1*	15.6	7.1*	12.8	12.3*	16.7	14.3
Dairy	41.3*	47.7	25.9*	37.2	14.4*	24.7	27.3*	38.2	32.2
Protein Foods ^b	12.8*	16.2	8.4*	14.3	4.7*	10.0	8.4*	13.6	10.7
Oils	16.6	19.3	10.8*	16.0	7.0*	12.9	11.6*	16.4	13.7
Empty Calories	24.9*	29.7	15.2*	23.4	9.9*	15.3	16.7*	23.6	19.9
Calories from solid fats	24.3*	28.5	13.8*	21.6	9.3*	17.1	15.7*	23.0	19.0
Calories from added sugars	25.0*	29.3	15.8*	23.3	10.4*	14.9	17.1*	23.4	20.0
Number of Trays	619	617	724	560	590	431	1,933	1,608	3,541
Number of Schools	51	51	54	54	49	49	154	154	154

Source: School Nutrition and Meal Cost Study, Plate Waste Observations, school year 2014-2015. Tray-level tabulations are unweighted and include clustered standard errors to account for clustering of trays within schools. Schools included in this unweighted analysis are public, non-charter schools that offer the National School Lunch Program, serve reimbursable meals in cafeteria-based settings, and serve a minimum number of lunches per day (at least 175 lunches in elementary schools, 220 lunches in middle schools, and 87 lunches in high schools). Sample excludes 60 trays with missing data on gender.

Notes: The USDA Food Pattern food groups are largely consistent with the meal components used in planning SBP breakfasts, with two exceptions: (1) fluid milk is considered a separate meal component, and (2) other dairy foods such as yogurt and cheese are counted as meat alternates.

The fruits group includes both whole fruit (any fresh, canned, dried, or frozen fruit) and 100% fruit juice.

^aIncludes legumes credited as vegetables on the Menu Survey. Percentages for vegetable subgroups could not be reliably estimated because so few trays included these foods.

^bIncludes legumes credited as a meat alternate on the Menu Survey.

*Difference between males and females is significantly different from zero at the 0.05 level.

SBP = School Breakfast Program.

[^] 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.

Table F.24. Mean Percentage of Calories and Nutrients Wasted in SBP Breakfasts, by Gender

	Mean Percentage Wasted								
	Elementary Schools		Middle Schools		High Schools		All Schools		All Students
	Males	Females	Males	Females	Males	Females	Males	Females	
Calories	26.7*	31.7	17.0*	25.1	10.5*	16.7	18.1*	25.4	21.4
Macronutrients									
Total Fat	22.1*	26.8	13.3*	21.0	8.8*	15.3	14.8*	21.7	17.9
Saturated Fat	26.1*	31.5	15.0*	23.8	9.9*	17.3	17.0*	25.0	20.7
Monounsaturated Fat	21.4*	25.9	13.3*	20.8	8.9*	14.9	14.5*	21.2	17.6
Polyunsaturated Fat	18.4*	22.1	11.4*	17.6	7.5*	13.0	12.4*	18.1	15.0
Linoleic acid	18.4*	22.1	11.4*	17.6	7.5*	13.0	12.5*	18.1	15.0
Alpha-linolenic acid	19.0*	22.7	12.2*	19.1	7.6*	13.4	13.0*	19.0	15.7
Carbohydrate	27.1*	32.0	17.8*	26.1	10.9*	16.7	18.7*	25.9	22.0
Protein	31.5*	37.5	19.5*	28.4	11.7*	19.4	21.0*	29.5	24.8
Vitamins									
Vitamin A	34.3*	40.3	22.1*	32.6	12.6*	20.2	23.1*	32.3	27.2
Vitamin C	26.7*	31.6	20.1*	25.9	9.9*	14.4	19.1*	25.0	21.8
Vitamin D	38.3*	45.3	24.6*	34.2	14.0*	21.4	25.7*	35.1	29.9
Vitamin E	21.9*	25.3	13.7*	20.8	7.8*	13.9	14.6*	20.7	17.3
Vitamin B ₆	24.6*	28.9	15.7*	23.4	9.4*	14.9	16.6*	23.2	19.6
Vitamin B ₁₂	33.5*	39.2	21.0*	30.0	12.3*	19.3	22.4*	30.9	26.3
Folate	21.4*	25.4	14.0*	21.3	9.4*	14.1	15.0*	21.0	17.7
Niacin	18.7*	22.2	11.5*	17.7	8.1*	12.9	12.8*	18.2	15.2
Riboflavin	31.6*	37.3	19.8*	29.3	11.9*	18.7	21.2*	29.5	25.0
Thiamin	22.9*	26.7	14.6*	21.8	9.5*	14.9	15.7*	21.8	18.5
Minerals									
Calcium	34.7*	40.7	21.5*	31.6	13.0*	20.0	23.1*	32.0	27.2
Iron	19.8*	23.5	12.5*	19.5	8.5*	13.0	13.6*	19.3	16.2
Magnesium	30.4*	36.0	19.4*	28.5	11.7*	18.4	20.6*	28.7	24.2
Phosphorus	33.0*	38.9	20.5*	30.0	12.3*	19.6	22.0*	30.7	25.9
Potassium	34.0*	40.4	21.7*	31.4	12.7*	19.8	22.9*	31.7	26.9
Sodium	23.4*	27.6	14.4*	21.5	9.3*	15.7	15.7*	22.3	18.7
Zinc	27.0*	31.9	16.5*	24.7	10.6*	16.8	18.1*	25.3	21.4
Other Dietary Components									
Dietary Fiber	24.1*	27.9	16.6*	23.8	10.1*	15.7	17.0*	23.2	19.8
Cholesterol	31.8*	38.3	19.7*	28.9	11.1*	20.6	20.9*	30.4	25.2

	Mean Percentage Wasted								
	Elementary Schools		Middle Schools		High Schools		All Schools		All Students
	Males	Females	Males	Females	Males	Females	Males	Females	
Number of Trays	619	617	724	560	590	431	1,933	1,608	3,541
Number of Schools	51	51	54	54	49	49	154	154	154

Source: School Nutrition and Meal Cost Study, Plate Waste Observations, school year 2014-2015. Tray-level tabulations are unweighted and include clustered standard errors to account for clustering of trays within schools. Schools included in this unweighted analysis are public, non-charter schools that offer the National School Lunch Program, serve reimbursable meals in cafeteria-based settings, and serve a minimum number of lunches per day (at least 175 lunches in elementary schools, 220 lunches in middle schools, and 87 lunches in high schools). Sample excludes 60 trays with missing data on gender.

*Difference between males and females is significantly different from zero at the 0.05 level.

SBP = School Breakfast Program.

Table F.25. Relationships between Plate Waste in SBP Breakfasts and Key Characteristics of the Breakfasts: Regression-Adjusted Mean Percentage of Calories and Key USDA Food Pattern Food Groups Wasted

	Yes/No	Elementary Schools			Middle Schools		
		Calories	Fruits	Dairy	Calories	Fruits	Dairy
Mean Percentage Wasted in SBP Breakfasts		29.1	34.0	44.5	20.4	25.8	30.6
Overall Nutritional Quality of SBP Breakfasts Prepared							
Total HEI-2010 Score Is at or above the Median Score (71.4)	Y	19.0	24.0	12.8	21.6	30.5	29.8
	N	16.8	23.7	8.3	21.8	23.2	27.3
Compliance of Daily and Weekly Breakfast Menus with SBP Nutrition Standards							
Met Daily Quantity Requirement for Grains	Y	17.2	26.0	8.1	19.7	24.4	25.2
	N	18.5	21.7	13.0	23.7	29.3	31.9
Met Requirement That At Least Half of Grains Are Whole Grain-Rich	Y	†	†	†	21.8	28.2	23.8
	N	†	†	†	21.5	25.5	33.3
Met Minimum Calorie Level	Y	25.3*	29.8	23.0*	20.0	34.8*	26.7
	N	10.5	17.9	-1.9 ^a	23.3	18.9	30.5
Met Maximum Calorie Level	Y	19.4	23.3	13.5	21.9	31.6	29.7
	N	16.3	24.3	7.6	21.5	22.1	27.4
Met Target 1 Sodium Limit	Y	19.2	24.0	13.0	20.2	19.7*	30.9
	N	16.6	23.6	8.1	23.2	34.0	26.2
Types of Foods Offered in Breakfast Menus							
Number of Entrée Choices Offered on Plate Waste Observation Day							
None (<i>reference category</i>)		16.7	20.1	18.1	23.6	25.4	32.3
1		19.5	28.2*	14.3	23.2	25.3	35.4
2 or more		16.2	19.4	6.8*	20.1	28.3	21.7*
All Daily Menus Offered Cold Cereal	Y	18.4	26.7	13.6	22.2	26.9	31.3
	N	17.3	21.0	7.5	21.1	26.8	25.8
More than Half of Daily Menus Offered Breakfast Pastries or Muffins	Y	15.7*	19.5*	8.5	18.8*	25.9	25.6
	N	20.1	28.1	12.6	24.5	27.7	31.6

	Yes/No	Elementary Schools			Middle Schools		
		Calories	Fruits	Dairy	Calories	Fruits	Dairy
At Least One Daily Menu Offered Pizza or Pizza Products	Y	16.1	20.5	9.3	24.2*	30.3	32.0
	N	19.7	27.1	11.8	19.2	23.3	25.2
No Daily Menus Offered French Fries or Similar Potato Products	Y	19.9*	23.8	13.7	20.3	24.8	26.2
	N	15.8	23.9	7.4	23.0	28.9	30.9
Number of Trays		1,257	1,257	1,257	1,301	1,301	1,301
Number of Schools		51	51	51	54	54	54

	Yes/No	High Schools			All Schools		
		Calories	Fruits	Dairy	Calories	Fruits	Dairy
Mean Percentage Wasted in SBP Breakfasts		13.1	13.6	18.4	21.3	25.2	32.1
Overall Nutritional Quality of SBP Breakfasts Prepared							
Total HEI-2010 Score Is at or above the Median Score (71.4)	Y	16.5	17.6	31.8	16.3	21.8	20.5
	N	12.1	16.7	25.7	14.7	20.0	17.3
Compliance of Daily and Weekly Breakfast Menus with SBP Nutrition Standards							
Met Daily Quantity Requirement for Grains	Y	12.2	17.4	24.0	14.8	21.7	17.2
	N	16.5	16.9	33.5	16.2	20.1	20.7
Met Requirement That At Least Half of Grains Are Whole Grain-Rich	Y	†	†	†	15.6	20.2	16.4
	N	†	†	†	15.4	21.6	21.5
Met Minimum Calorie Level	Y	15.5	19.5	24.7	17.1	24.9*	22.0
	N	13.1	14.8	32.9	13.9	17.0	15.8
Met Maximum Calorie Level	Y	18.2*	14.2	35.3*	15.5	21.7	19.6
	N	10.5	20.1	22.2	15.5	20.2	18.2
Met Target 1 Sodium Limit	Y	12.6	16.3	25.3	15.7	18.9	20.9
	N	16.1	17.9	32.3	15.3	22.9	16.9
Types of Foods Offered in Breakfast Menus							
Number of Entrée Choices Offered on Plate Waste Observation Day							
None (<i>reference category</i>)		16.9	16.8	36.7	15.6	17.2	23.0
1		13.0	19.2	27.6*	16.3	21.4*	22.3
2 or more		15.7	15.1	29.9	14.7	20.4	15.5*
All Daily Menus Offered Cold Cereal	Y	14.9	19.5	29.2	15.8	22.2	20.8
	N	13.8	14.8	28.3	15.2	19.6	17.1
More than Half of Daily Menus Offered Breakfast Pastries or Muffins	Y	13.3	17.3	27.5	14.2*	19.6	18.0
	N	15.3	16.9	30.1	16.8	22.2	19.8
At Least One Daily Menu Offered Pizza or Pizza Products	Y	12.2	17.8	25.2	15.2	21.7	18.8
	N	16.5	16.5	32.3	15.8	20.1	19.0
	Y	17.3*	14.0	37.7*	15.8	20.0	19.4

	Yes/No	High Schools			All Schools		
		Calories	Fruits	Dairy	Calories	Fruits	Dairy
No Daily Menus Offered French Fries or Similar Potato Products	N	11.4	20.3	19.8	15.2	21.8	18.4
Number of Trays		1,043	1,043	1,043	3,601	3,601	3,601
Number of Schools		49	49	49	154	154	154

Source: School Nutrition and Meal Cost Study, Plate Waste Observations, and Menu Survey, school year 2014-2015. Tray-level tabulations are unweighted and include clustered standard errors to account for clustering of trays within schools. Schools included in this unweighted analysis are public, non-charter schools that offer the National School Lunch Program, serve reimbursable meals in cafeteria-based settings, and serve a minimum number of lunches per day (at least 175 lunches in elementary schools, 220 lunches in middle schools, and 87 lunches in high schools).

Notes: Estimates are regression-adjusted means that control for institutional and demographic characteristics of each school and their SFA. Variables with rows labeled “Y” and “N” report adjusted mean percentage of each outcome (calories, fruits, and dairy) wasted for schools that do and do not meet the variable criteria, respectively. Otherwise, regression-adjusted means are reported for each category within a variable. See Appendix E for more details on characteristic descriptions and selection methods.

^aRegression-adjusted means below 0 percent or above 100 percent have been truncated within the range of 0 to 100 percent. Estimates outside of this range were sometimes produced for characteristics shared by schools that were outliers in terms of the outcome of interest, and should not be interpreted as schools that had 0 or 100 percent plate waste for the corresponding outcome.

*Denotes the difference within each outcome (mean percentage of calories, fruits, and dairy wasted) between schools with and without a dichotomous characteristic is statistically different from zero at the 0.05 level. For variables containing multiple categories, * denotes that the difference in mean percentage within each outcome wasted between schools in the corresponding category and schools in the reference category is statistically different from zero at the 0.05 level.

HEI = Healthy Eating Index; SBP = School Breakfast Program; SFA = school food authority.

† Variable was excluded from the model due to low within-sample variation or high correlation with another characteristic in the model.

Table F.26. Regression Coefficient Estimates for the Relationships between the Percentage of Calories Wasted in SBP Breakfasts and Key Characteristics of the Breakfasts

	Regression Coefficient (Standard Error)			
	Elementary Schools	Middle Schools	High Schools	All Schools
Overall Nutritional Quality of SBP Breakfasts Prepared				
Total HEI-2010 Score Is at or Above the Median Score (71.4)	2.2 (2.0)	-0.2 (2.5)	4.4 (2.8)	1.5 (1.2)
Compliance of Daily and Weekly Breakfast Menus with SBP Nutrition Standards				
Met Daily Quantity Requirement for Grains	-1.3 (3.6)	-4.0 (2.2)	-4.2 (2.7)	-1.4 (1.3)
Met Requirement That At Least Half of Grains Are Whole Grain-Rich	†	0.3 (3.9)	†	0.2 (3.1)
Met Minimum Calorie Level	14.8*** (3.0)	-3.3 (6.4)	2.4 (4.6)	3.2 (3.0)
Met Maximum Calorie Level	3.1 (2.0)	0.4 (3.1)	7.7* (3.4)	0.1 (1.5)
Met Target 1 Sodium Limit	2.6 (2.1)	-3.0 (2.9)	-3.5 (2.7)	0.5 (1.4)
Types of Foods Offered in Breakfast Menus				
Number of Entrée Choices Offered on Plate Waste Observation Day				
None (<i>reference category</i>)	--0--	--0--	--0--	--0--
1	2.8 (2.6)	-0.4 (2.6)	-3.9 (2.6)	0.6 (1.5)
2 or more	-0.5 (2.5)	-3.5 (3.0)	-1.2 (4.1)	-0.9 (1.8)
All Daily Menus Offered Cold Cereal	1.1 (2.1)	1.1 (3.4)	1.1 (3.1)	0.6 (1.7)
More than Half of Daily Menus Offered Breakfast Pastries or Muffins	-4.4* (2.1)	-5.7* (2.7)	-2.0 (3.2)	-2.7* (1.3)
At Least One Daily Menu Offered Pizza or Pizza Products	-3.6 (2.0)	5.0** (1.8)	-4.4 (2.5)	-0.6 (1.3)
No Daily Menus Offered French Fries or Similar Potato Products	4.1* (1.9)	-2.7 (2.2)	6.0* (2.7)	0.7 (1.3)
Institutional and Demographic Characteristics of Schools and SFAs				
SFA Size				
2,500 to 9,999 students (<i>reference category</i>)	--0--	--0--	--0--	--0--
10,000 or more students	-0.3 (2.6)	-0.7 (2.5)	-3.7 (2.8)	-1.7 (1.6)
School Size				
Fewer than 500 students (<i>reference category</i>)	--0--	--0--	--0--	--0--
500 to 999 students	-4.4* (2.0)	-4.6 (3.5)	0.1 (3.3)	-2.5 (2.0)
1,000 or more students	-9.2 (5.0)	-2.6 (3.3)	n.a.	-1.7 (2.3)

	Regression Coefficient (Standard Error)			
	Elementary Schools	Middle Schools	High Schools	All Schools
FNS Region				
Northeast and Mid-Atlantic (<i>reference category</i>)	--0--	--0--	--0--	--0--
Southeast	11.7* (4.6)	1.4 (3.3)	13.7** (4.9)	7.5** (2.4)
Midwest	-0.5 (4.0)	-2.6 (4.3)	2.5 (4.5)	-1.9 (2.5)
Southwest	2.2 (3.6)	4.4 (3.9)	6.6 (3.7)	4.1 (2.2)
Mountain Plains and West	-1.6 (3.2)	0.2 (4.0)	4.7 (3.1)	0.7 (2.1)
School Urbanicity				
Urban (<i>reference category</i>)	--0--	--0--	--0--	--0--
Suburban	-5.4* (2.2)	3.5 (3.0)	-7.2* (3.4)	-1.9 (1.7)
Rural	1.6 (3.2)	1.7 (2.6)	-10.4** (3.3)	-3.0 (1.7)
Student Gender				
Female (<i>reference category</i>)	--0--	--0--	--0--	--0--
Male	-4.9*** (1.0)	-6.7*** (1.3)	-5.5*** (1.2)	-5.7*** (0.7)
Share of Minority Students in SFA				
Less than 40 percent (<i>reference category</i>)	--0--	--0--	--0--	--0--
40 to 59 percent	-5.0 (2.7)	-1.1 (2.5)	-2.4 (2.3)	-1.8 (1.7)
60 to 100 percent	-6.3* (2.7)	-1.0 (3.2)	-9.5* (3.8)	-3.5* (1.7)
Share of Students Approved for Free or Reduced-Price Meals				
Less than 40 percent (<i>reference category</i>)	--0--	--0--	--0--	--0--
40 percent or more	-7.9*** (2.0)	-3.6 (2.8)	-5.0 (3.1)	-5.2*** (1.4)
Number of Trays	1,257	1,301	1,043	3,601
Number of Schools	51	54	49	154

Source: School Nutrition and Meal Cost Study, Plate Waste Observations, and Menu Survey, school year 2014-2015. Tray-level tabulations are unweighted and include clustered standard errors to account for clustering of trays within schools. Schools included in this unweighted analysis are public, non-charter schools that offer the National School Lunch Program, serve reimbursable meals in cafeteria-based settings, and serve a minimum number of lunches per day (at least 175 lunches in elementary schools, 220 lunches in middle schools, and 87 lunches in high schools).

Notes: Estimates are regression coefficients for each labeled variable on the left included in the column-specific model. Standard errors are reported in parentheses.

See Appendix E for more details on characteristic descriptions and selection methods.

Relationship between characteristic and mean percentage of calories wasted is significantly different from zero at the *** 0.001 level, ** 0.01 level, or * 0.05 level.

--0-- denotes omitted reference categories, for which coefficient estimates are not produced.

FNS = Food Nutrition Service; HEI = Healthy Eating Index; SBP = School Breakfast Program; SFA = school food authority.

† Variable was excluded from the model due to low within-sample variation or high correlation with another characteristic in the model.

Table F.27. Regression Coefficient Estimates of the Relationship between the Percentage of Fruits Wasted in SBP Breakfasts and Key Characteristics of the Breakfasts

	Regression Coefficient (Standard Error)			
	Elementary Schools	Middle Schools	High Schools	All Schools
Overall Nutritional Quality of SBP Breakfasts Prepared				
Total HEI-2010 Score Is at or Above the Median Score (71.4)	0.3 (3.8)	7.3 (4.3)	0.8 (3.6)	1.8 (2.1)
Compliance of Daily and Weekly Breakfast Menus with SBP Nutrition Standards				
Met Daily Quantity Requirement for Grains	4.3 (5.4)	-4.9 (3.5)	0.5 (5.1)	1.6 (2.2)
Met Requirement That At Least Half of Grains Are Whole Grain-Rich	†	2.7 (7.6)	†	-1.4 (6.6)
Met Minimum Calorie Level	11.9 (6.5)	15.9* (6.1)	4.7 (6.1)	7.9* (3.2)
Met Maximum Calorie Level	-1.0 (4.2)	9.5 (5.0)	-5.9 (6.8)	1.5 (2.5)
Met Target 1 Sodium Limit	0.4 (5.1)	-14.3** (4.9)	-1.6 (4.1)	-4.0 (2.4)
Types of Foods Offered in Breakfast Menus				
Number of Entrée Choices Offered on Plate Waste Observation Day				
None (<i>reference category</i>)	--0--	--0--	--0--	--0--
1	8.1* (3.3)	-0.0 (4.6)	2.4 (3.5)	4.2* (1.9)
2 or more	-0.7 (6.1)	3.0 (5.3)	-1.7 (5.9)	3.2 (2.7)
All Daily Menus Offered Cold Cereal	5.7 (3.8)	0.2 (4.0)	4.7 (4.6)	2.6 (2.7)
More than Half of Daily Menus Offered Breakfast Pastries or Muffins	-8.5* (3.6)	-1.8 (3.5)	0.4 (4.4)	-2.6 (2.1)
At Least One Daily Menu Offered Pizza or Pizza Products	-6.7 (3.9)	7.0 (4.8)	1.3 (3.8)	1.7 (2.2)
No Daily Menus Offered French Fries or Similar Potato Products	-0.1 (3.8)	-4.1 (4.2)	-6.2 (3.6)	-1.8 (2.4)
Institutional and Demographic Characteristics of Schools and SFAs				
SFA Size				
2,500 to 9,999 students (<i>reference category</i>)	--0--	--0--	--0--	--0--
10,000 or more students	-7.4 (4.2)	-5.1 (4.5)	-4.7 (3.9)	-3.9 (2.3)

	Regression Coefficient (Standard Error)			
	Elementary Schools	Middle Schools	High Schools	All Schools
School Size				
Fewer than 500 students (<i>reference category</i>)	--0--	--0--	--0--	--0--
500 to 999 students	-6.8 (4.2)	-4.8 (5.0)	-9.2* (4.6)	-1.4 (3.1)
1,000 or more students	-15.6 (8.7)	-0.6 (6.3)	†	-0.0 (3.2)
FNS Region				
Northeast and Mid-Atlantic (<i>reference category</i>)	--0--	--0--	--0--	--0--
Southeast	11.9 (6.7)	1.9 (5.5)	14.4 (7.6)	9.4* (4.0)
Midwest	12.4 (7.1)	0.7 (7.6)	6.4 (4.9)	4.5 (4.4)
Southwest	7.2 (5.2)	16.9* (7.6)	6.8 (5.3)	10.5** (3.3)
Mountain Plains and West	3.4 (5.1)	5.6 (6.0)	5.7 (4.6)	5.1 (3.2)
School Urbanicity				
Urban (<i>reference category</i>)	--0--	--0--	--0--	--0--
Suburban	-13.1*** (3.7)	0.6 (6.0)	-2.0 (5.0)	-5.2 (3.2)
Rural	-6.3 (5.1)	-0.6 (7.7)	-0.3 (4.3)	-6.0 (3.5)
Student Gender				
Female (<i>reference category</i>)	--0--	--0--	--0--	--0--
Male	-5.2** (1.9)	-6.8** (2.1)	-5.1* (2.1)	-6.1*** (1.0)
Share of Minority Students in SFA				
Less than 40 percent (<i>reference category</i>)	--0--	--0--	--0--	--0--
40 to 59 percent	-5.4 (4.1)	-5.7 (4.6)	-1.4 (3.6)	-5.1 (2.6)
60 to 100 percent	-1.8 (5.6)	-7.1 (5.4)	-1.5 (5.7)	-7.9* (3.4)
Share of Students Approved for Free or Reduced-Price Meals				
Less than 40 percent (<i>reference category</i>)	--0--	--0--	--0--	--0--
40 percent or more	-1.0 (4.4)	1.2 (4.7)	0.2 (4.8)	-3.4 (2.7)
Number of Trays	1,257	1,301	1,043	3,601
Number of Schools	51	54	49	154

Source: School Nutrition and Meal Cost Study, Plate Waste Observations, and Menu Survey, school year 2014-2015. Tray-level tabulations are unweighted and include clustered standard errors to account for clustering of trays within schools. Schools included in this unweighted analysis are public, non-charter schools that

offer the National School Lunch Program, serve reimbursable meals in cafeteria-based settings, and serve a minimum number of lunches per day (at least 175 lunches in elementary schools, 220 lunches in middle schools, and 87 lunches in high schools).

Notes: Estimates are regression coefficients for each labeled variable on the left included in the column-specific model. Standard errors are reported in parentheses.

See Appendix E for more details on characteristic descriptions and selection methods.

Relationship between characteristic and mean percentage of fruits wasted is significantly different from zero at the *** 0.001 level, ** 0.01 level, or * 0.05 level.

--0-- denotes omitted reference categories, for which coefficient estimates are not produced.

FNS = Food Nutrition Service; HEI = Healthy Eating Index; SBP = School Breakfast Program; SFA = school food authority.

† Variable was excluded from the model due to low within-sample variation or high correlation with another characteristic in the model.

Table F.28. Regression Coefficient Estimates for the Relationships between the Percentage of Dairy Wasted in SBP Breakfasts and Key Characteristics of the Breakfasts

	Regression Coefficient (Standard Error)			
	Elementary Schools	Middle Schools	High Schools	All Schools
Overall Nutritional Quality of SBP Breakfasts Prepared				
Total HEI-2010 Score Is at or Above the Median Score (71.4)	4.5 (3.5)	2.5 (4.7)	6.1 (4.9)	3.2 (1.9)
Compliance of Daily and Weekly Breakfast Menus with SBP Nutrition Standards				
Met Daily Quantity Requirement for Grains	-4.8 (4.3)	-6.6 (3.4)	-9.4 (5.5)	-3.5 (2.3)
Met Requirement That At Least Half of Grains Are Whole Grain-Rich	†	-9.5 (4.8)	†	-5.1 (4.0)
Met Minimum Calorie Level	24.8*** (6.1)	-3.8 (10.6)	-8.2 (8.0)	6.2 (4.5)
Met Maximum Calorie Level	5.9 (3.7)	2.3 (5.7)	13.1** (4.8)	1.4 (2.1)
Met Target 1 Sodium Limit	4.8 (3.9)	4.7 (4.6)	-7.0 (4.5)	4.0 (2.1)
Types of Foods Offered in Breakfast Menus				
Number of Entrée Choices Offered on Plate Waste Observation Day				
None (<i>reference category</i>)	--0--	--0--	--0--	--0--
1	-3.8 (5.4)	3.1 (4.9)	-9.1* (4.2)	-0.7 (2.8)
2 or more	-11.2* (5.2)	-10.6* (4.0)	-6.8 (5.7)	-7.5* (2.9)
All Daily Menus Offered Cold Cereal	6.1 (4.0)	5.5 (5.1)	1.0 (6.9)	3.7 (2.7)
More than Half of Daily Menus Offered Breakfast Pastries or Muffins	-4.0 (3.9)	-6.0 (5.1)	-2.6 (4.8)	-1.8 (2.6)
At Least One Daily Menu Offered Pizza or Pizza Products	-2.5 (3.7)	6.8 (3.6)	-7.1 (4.7)	-0.2 (2.3)
No Daily Menus Offered French Fries or Similar Potato Products	6.3 (3.3)	-4.8 (4.2)	17.8** (5.6)	1.1 (1.9)
Institutional and Demographic Characteristics of Schools and SFAs				
SFA Size				
2,500 to 9,999 students (<i>reference category</i>)	--0--	--0--	--0--	--0--
10,000 or more students	0.8 (4.4)	0.4 (4.8)	-10.6* (4.6)	-2.2 (3.0)

	Regression Coefficient (Standard Error)			
	Elementary Schools	Middle Schools	High Schools	All Schools
School Size				
Fewer than 500 students (<i>reference category</i>)	--0--	--0--	--0--	--0--
500 to 999 students	-4.7 (3.2)	-0.4 (7.9)	-1.3 (5.2)	-1.1 (4.0)
1,000 or more students	-19.7* (7.6)	4.1 (6.1)	†	-1.3 (4.7)
FNS Region				
Northeast and Mid-Atlantic (<i>reference category</i>)	--0--	--0--	--0--	--0--
Southeast	12.9 (7.2)	-9.2 (5.9)	21.2* (8.8)	3.4 (3.4)
Midwest	-13.1* (6.5)	-8.6 (5.4)	5.8 (7.0)	-6.1 (4.0)
Southwest	-8.3 (5.9)	-1.7 (5.7)	13.0 (7.1)	-3.0 (3.3)
Mountain Plains and West	-7.2 (6.2)	-4.3 (6.7)	11.6* (5.7)	-0.8 (3.7)
School Urbanicity				
Urban (<i>reference category</i>)	--0--	--0--	--0--	--0--
Suburban	-4.2 (4.5)	6.7 (5.4)	-11.5* (5.7)	-0.0 (2.7)
Rural	5.3 (4.9)	7.9 (4.4)	-19.0** (6.5)	-0.8 (3.4)
Student Gender				
Female (<i>reference category</i>)	--0--	--0--	--0--	--0--
Male	-6.3*** (1.7)	-9.7*** (2.6)	-9.3*** (2.2)	-8.1*** (1.4)
Share of Minority Students in SFA				
Less than 40 percent (<i>reference category</i>)	--0--	--0--	--0--	--0--
40 to 59 percent	-0.9 (4.5)	1.3 (4.1)	-1.6 (3.1)	1.6 (2.9)
60 to 100 percent	-3.4 (4.8)	-5.6 (5.3)	-18.4** (6.5)	-1.9 (2.9)
Share of Students Approved for Free or Reduced-Price Meals				
Less than 40 percent (<i>reference category</i>)	--0--	--0--	--0--	--0--
40 percent or more	-11.1** (3.3)	-7.7 (4.5)	-2.6 (5.2)	-6.7* (2.8)
Number of Trays	1,257	1,301	1,043	3,601
Number of Schools	51	54	49	154

Source: School Nutrition and Meal Cost Study, Plate Waste Observations, and Menu Survey, school year 2014-2015. Tray-level tabulations are unweighted and include clustered standard errors to account for clustering of trays within schools. Schools included in this unweighted analysis are public, non-charter schools that

offer the National School Lunch Program, serve reimbursable meals in cafeteria-based settings, and serve a minimum number of lunches per day (at least 175 lunches in elementary schools, 220 lunches in middle schools, and 87 lunches in high schools).

Notes: Estimates are regression coefficients for each labeled variable on the left included in the column-specific model. Standard errors are reported in parentheses.

See Appendix E for more details on characteristic descriptions and selection methods.

Relationship between characteristic and mean percentage of dairy wasted is significantly different from zero at the *** 0.001 level, ** 0.01 level, or * 0.05 level.

--0-- denotes omitted reference categories, for which coefficient estimates are not produced.

FNS = Food Nutrition Service; HEI = Healthy Eating Index; SBP = School Breakfast Program; SFA = school food authority.

† Variable was excluded from the model due to low within-sample variation or high correlation with another characteristic in the model.

Table F.29. Relationships between Plate Waste in SBP Breakfasts and Key Characteristics of School Foodservice Operations: Regression-Adjusted Mean Percentage of Calories and Key USDA Food Pattern Food Groups Wasted

	Yes/No	Elementary Schools			Middle Schools		
		Calories	Fruits	Dairy	Calories	Fruits	Dairy
Mean Percentage Wasted in SBP Breakfasts		29.1	34.0	44.5	20.4	25.8	30.6
Food Purchasing Characteristics							
SFA Uses Alliance for a Healthier Generation or Other Similar Tools for Selecting and Purchasing Healthy Foods	Y	23.3	25.8*	29.7	20.3*	19.9	25.9
	N	25.5	34.6	35.4	15.5	15.6	21.6
SFA Participates in a Food Purchasing Cooperative	Y	25.7	33.2	36.2*	19.1	20.3	23.9
	N	23.1	27.2	28.9	16.7	15.2	23.7
SFA Is Engaged in a Pouring Rights Contract	Y	23.3	27.8	35.1	20.5*	22.6*	28.5
	N	25.5	32.5	30.0	15.4	12.9	19.1
Schools in SFA Offer Brand-Name or Chain Restaurant Foods	Y	22.1	29.2	32.4	18.3	21.0	24.2
	N	26.7	31.1	32.7	17.6	14.5	23.3
School Participates in Farm to School Program	Y	25.1	30.4	30.1	15.0	13.3	20.0
	N	23.7	29.9	35.0	20.8	22.1	27.6
Menu Planning Characteristics							
School Uses Cycle Menus	Y	24.6	26.2	27.9	15.3	14.1	†
	N	24.2	34.1	37.2	20.6	21.3	†
SFA Conducts Nutrient Analysis of Menus	Y	23.0	31.8	30.9	†	†	23.6
	N	25.8	28.6	34.2	†	†	24.0
Number of Challenges in Meeting the Updated Nutrition Standards that SFA Rated as 3 or Higher on a Scale of 1 (Not a Challenge) to 5 (Significant Challenge)							
4 or less (<i>reference category</i>)		21.0	12.6	25.9	8.1	8.8	21.1
5 to 7		24.4	31.2*	29.9	16.4*	9.5	24.1
8		20.7	29.1*	28.8	19.5*	26.0*	23.5

	Yes/No	Elementary Schools			Middle Schools		
		Calories	Fruits	Dairy	Calories	Fruits	Dairy
SFA Perception of New Meal Requirements'							
Helpfulness in Improving the Nutritional Quality of Meals							
Not at all helpful or somewhat helpful <i>(reference category)</i>		27.7	36.8	27.5	16.4	20.6	29.0
Very helpful		20.7*	35.3	31.0	24.5	27.6	23.4
SFA was already improving the nutritional quality of meals prior to the new meal requirements		24.5	25.0*	27.7	11.3	7.9*	24.2
Characteristics of the School Meal Programs							
School Participates in the Fresh Fruit and Vegetable Program	Y	24.1	28.0	33.7	n.a.	n.a.	n.a.
	N	24.7	32.3	31.4	n.a.	n.a.	n.a.
School Provides Afterschool Snacks or Suppers	Y	27.9*	30.6	36.6	18.8	17.9	22.9
	N	20.9	29.8	28.5	17.1	17.6	24.7
Meal Service Characteristics							
SFA Uses a Foodservice Management Company	Y	23.9	30.2	33.9	15.0	17.3	23.9
	N	24.9	30.1	31.2	20.9	18.2	23.7
School Uses Offer-Versus-Serve at Breakfast	Y	18.2***	24.6*	19.7**	15.6	8.1*	23.1
	N	30.6	35.7	45.3	20.2	27.4	24.5
School Accommodates Students with Food Allergies and Special Dietary Needs	Y	26.8	30.8	39.3*	23.5*	34.6*	25.8
	N	22.0	29.6	25.8	12.3	0.9	21.8
Number of HealthierUS School Challenge Smarter Lunchroom Techniques Used							
Zero or 1 <i>(reference category)</i>		27.2	34.9	39.1	20.6	21.9	23.3
2 to 3		26.4	34.2	32.7	17.3	18.9	18.0
4 to 7		22.4	26.1	32.4	18.5	16.6	29.6
Price Charged for Paid Breakfasts							
School Offered Free Breakfast to All Students		25.9	29.2	34.7	14.8	17.7	24.0
\$ Less than \$1.25 <i>(reference category)</i>		24.8	33.2	32.1	20.0	15.7	31.4
\$1.25 or more		22.9	31.1	30.4	21.1	17.8	23.6

	Yes/No	Elementary Schools			Middle Schools		
		Calories	Fruits	Dairy	Calories	Fruits	Dairy
School Cost per Breakfast Is at or above Median (\$2.31)	Y	22.2*	29.0	28.4*	20.7*	25.4*	22.8
	N	26.6	31.4	36.7	15.2	10.1	24.8
Number of Trays		1,257	1,257	1,257	1,301	1,301	1,301
Number of Schools		51	51	51	54	54	54

	Yes/No	High Schools			All Schools		
		Calories	Fruits	Dairy	Calories	Fruits	Dairy
Mean Percentage Wasted in SBP Breakfasts		13.1	13.6	18.4	21.3	25.2	32.1
Food Purchasing Characteristics							
SFA Uses Alliance for a Healthier Generation or Other Similar Tools for Selecting and Purchasing Healthy Foods	Y	18.4	23.8*	25.0	17.5	16.7	22.3
	N	16.2	37.9	15.9	16.8	20.0	20.8
SFA Participates in a Food Purchasing Cooperative	Y	18.2	32.7	21.0	17.7	19.6	23.0
	N	16.4	29.0	19.9	16.6	17.1	20.1
SFA Is Engaged in a Pouring Rights Contract	Y	18.8	33.4	21.1	17.7	18.9	23.4
	N	15.9	28.3	19.8	16.6	17.8	19.7
Schools in SFA Offer Brand-Name or Chain Restaurant Foods	Y	15.9	34.4	19.8	16.7	20.1	20.6
	N	18.7	27.3	21.1	17.6	16.6	22.4
School Participates in Farm to School Program	Y	12.3*	29.0	9.8*	14.9*	16.2	18.1*
	N	22.4	32.7	31.0	19.4	20.5	25.0
Menu Planning Characteristics							
School Uses Cycle Menus	Y	14.1	27.9	15.8	†	17.7	†
	N	20.5	33.8	25.1	†	19.0	†
SFA Conducts Nutrient Analysis of Menus	Y	16.6	†	16.4	15.5	†	16.6*
	N	18.0	†	24.5	18.8	†	26.5
Number of Challenges in Meeting the Updated Nutrition Standards that SFA Rated as 3 or Higher on a Scale of 1 (Not a Challenge) to 5 (Significant Challenge)							
4 or less (<i>reference category</i>)		10.5	19.8	9.7	12.9	9.6	16.9
5 to 7		16.7	30.5	15.2	17.6*	17.6*	21.1
8		18.0	31.2*	25.7	16.7*	19.1*	22.0
SFA Perception of New Meal Requirements' Helpfulness in Improving the Nutritional Quality of Meals							
Not at all helpful or somewhat helpful (<i>reference category</i>)		13.8	23.4	18.4	16.5	19.6	20.9

	Yes/No	High Schools			All Schools		
		Calories	Fruits	Dairy	Calories	Fruits	Dairy
Very helpful		22.0	39.6*	24.6	19.1	21.9	21.5
SFA was already improving the nutritional quality of meals prior to the new meal requirements		12.6	22.1	16.2	15.2	14.8	21.6
Characteristics of the School Meal Programs							
School Participates in the Fresh Fruit and Vegetable Program	Y	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	N	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
School Provides Afterschool Snacks or Suppers	Y	20.3	28.7	23.5	18.1	16.6	23.5
	N	14.4	33.0	17.4	16.2	20.1	19.5
Meal Service Characteristics							
SFA Uses a Foodservice Management Company	Y	16.4	31.9	20.7	16.3	19.2	21.4
	N	18.2	29.8	20.2	18.0	17.5	21.7
School Uses Offer-Versus-Serve at Breakfast	Y	13.9	18.8***	16.1	15.0*	13.7*	19.0
	N	20.8	42.8	24.8	19.3	23.0	24.1
School Accommodates Students with Food Allergies and Special Dietary Needs	Y	17.4	36.2*	23.5	17.5	22.0*	22.3
	N	17.2	25.5	17.4	16.8	14.7	20.8
Number of HealthierUS School Challenge Smarter Lunchroom Techniques Used							
Zero or 1 (<i>reference category</i>)		18.8	31.0	19.7	17.2	17.0	22.2
2 to 3		19.0	32.4	22.5	17.4	19.9	20.7
4 to 7		15.6	29.3	18.4	16.9	16.9	22.4
Price Charged for Paid Breakfasts							
School Offered Free Breakfast to All Students		14.0	25.0	19.5	16.0	17.9	19.3
	\$ Less than \$1.25 (<i>reference category</i>)	17.6	33.1	19.3	16.0	17.8	23.8
	\$1.25 or more	20.6	36.6	21.3	18.3	18.8	23.8
School Cost per Breakfast Is at or above Median (\$2.31)	Y	15.8	29.4	17.7	17.1	19.6	19.4
	N	18.9	32.3	23.2	17.2	17.1	23.7
Number of Trays		1,043	1,043	1,043	3,601	3,601	3,601

	High Schools			All Schools			
	Yes/No	Calories	Fruits	Dairy	Calories	Fruits	Dairy
Number of Schools		49	49	49	154	154	154

Source: School Nutrition and Meal Cost Study, Plate Waste Observations, School Food Authority Director Survey, School Nutrition Manager Survey, Cafeteria Observation Guide, School Nutrition Manager Cost Interview, and SFA Director and Business Manager Onsite and Follow-Up Cost Interview, school year 2014-2015. Tray-level tabulations are unweighted and include clustered standard errors to account for clustering of trays within schools. Schools included in this unweighted analysis are public, non-charter schools that offer the National School Lunch Program, serve reimbursable meals in cafeteria-based settings, and serve a minimum number of lunches per day (at least 175 lunches in elementary schools, 220 lunches in middle schools, and 87 lunches in high schools).

Notes: Estimates are regression-adjusted means that control for institutional and demographic characteristics of each school and their SFA. Variables with rows labeled “Y” and “N” report adjusted mean percentage of each outcome (calories, fruits, and dairy) wasted for schools that do and do not meet the variable criteria, respectively. Otherwise, regression-adjusted means are reported for each category within a variable. See Appendix E for more details on characteristic descriptions and selection methods.

*Denotes the difference within each outcome (mean percentage of calories, fruits, and dairy wasted) between schools with and without a dichotomous characteristic is statistically different from zero at the 0.05 level. For variables containing multiple categories, * denotes that the difference in mean percentage within each outcome wasted between schools in the corresponding category and schools in the reference category is statistically different from zero at the 0.05 level.

SBP = School Breakfast Program; SFA = school food authority.

† Variable was excluded from the model due to low within-sample variation or high correlation with another characteristic in the model.

n.a. = Characteristic did not apply to any schools within the specific school type.

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APPENDIX G

METHODS USED IN PROPENSITY SCORE WEIGHTING

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FIGURES

G.1	Standardized Biases for Student Characteristics between NSLP Participants and Nonparticipants, Before and After IPW	G.21
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This appendix describes the propensity score weighting methods used to analyze the dietary intakes of school meal program participants and nonparticipants presented in Chapters 7 through 15. Because students who participated in school meal programs likely differ from nonparticipants in both observable and unobservable ways, the dietary intakes of these two groups may have differed even if participants had obtained meals from sources other than school meal programs. Statistical adjustment of these underlying differences allows a comparison of the intakes of school meal program participants and nonparticipants who are otherwise similar according to many observable characteristics.

In the SNMCS analysis of dietary intakes, the study team used propensity score matching to adjust for differences in observable characteristics between participants and nonparticipants of the NSLP and SBP, similar to the dietary intake analyses of SNDA-III. This approach used a set of student-level characteristics to construct comparison groups of nonparticipants who were similar to participants. As with the regression-adjustment techniques, propensity score weighting can adjust for differences in only observable characteristics. Importantly, participants may also differ from nonparticipants along unobservable dimensions that influence dietary intakes. Therefore, neither regression-adjusted nor propensity score-matched comparisons between participants and nonparticipants should be definitively interpreted as causal effects of school meal program participation. Rather, these methods serve to adjust for observable factors likely to be related to dietary intakes, comparing intakes between more similar groups of participants and nonparticipants.

A. Propensity Score Matching Estimation—Overview

Propensity score matching is a well-established technique (Rosenbaum and Rubin 1983; Dehejia and Wahba 2002; Smith and Todd 2001) for adjusting for observable differences between two groups—a “program group” (in this case, NSLP or SBP participants) and a comparison group that did not participate in the program (NSLP or SBP nonparticipants). In general, to implement this technique, the researcher estimates a probit or logit model of program participation as a function of covariates that are thought to influence the participation decision and to be correlated with the outcomes of interest (in this case, dietary intakes). The results of this model are then used to predict a “propensity score,” reflecting the estimated probability that each individual, in both the program and comparison groups, participated in the program based on his or her observed characteristics.

The original approach developed in the propensity score matching literature is “nearest neighbor matching,” which matches each program group member with the comparison group member (or members) with the closest value of the propensity score (Rosenbaum and Rubin 1983). Alternative, more recently developed approaches include caliper matching, kernel matching, and local linear matching, each of which constructs a matched comparison group as a weighted average of all nonparticipants, with weights reflecting each nonparticipant’s similarity to program group members based on the estimated propensity score. Heckman, Ichimura, and Todd (1997) describes each of these approaches in greater detail. The SNMCS dietary intake analyses use a propensity score weighting approach to construct a matched comparison group of nonparticipants. Specifically, an approach known as inverse probability weighting (IPW) was implemented, which can also accommodate the complex survey design used for SNMCS data collection (Cook et al. 2009; DuGoff, Schuler, and Stuart 2014). In general, research using simulated data has shown that within complex survey designs, this approach results in minimal

amounts of estimate bias relative to other propensity score methods (DuGoff, Schuler, and Stuart 2014), though estimates may still fail to fully account for selection bias due to differences in unobservable characteristics between participants and nonparticipants (Heckman, Ichimura, and Todd 1997).

B. Inverse Probability Weighting in the SNMCS Analyses

To implement IPW for the SNMCS analysis, the study team estimated a logit model of school meal program participation using Stata statistical software, separately for NSLP and SBP participation, as well as for the school level used in each analysis (students in elementary, middle, high, or all schools). For research questions focused on consumers of competitive foods, the study team also estimated this model separately for the subset of sampled participants and nonparticipants that consumed competitive foods to account for any compositional differences between these groups and all students sampled. The covariates initially included in the propensity score model were chosen based on covariates in the SNDA-III study that correlated with students' intakes of several nutrients and were thought to influence participation. Using this model as a starting point maintains comparability of SNMCS propensity score estimates with those produced in SNDA-III. The set of student characteristics were then refined further by eliminating variables with little variation—defined as binary variables with a mean of less than 0.05 or more than 0.95. It also excluded variables with high levels of collinearity with other covariates—defined as a pairwise correlation greater than 0.75. When a pair of variables had a sufficiently high correlation, the one variable of the pair that was more highly correlated with program participation was preserved. Finally, some variables were removed or collapsed into coarser categories until it achieved sufficient balance in the propensity score model diagnostics discussed below.

After estimation of the logit model, the study team calculated propensity scores for program participation for each student using his or her predicted probability of participation.¹ Table G.1 presents the final set of characteristics used to predict participation and the corresponding coefficient estimates for the logit models of NSLP and SBP participation. The propensity scores for NSLP or SBP participation were then used to construct inverse probability weights for each student to estimate the average effect of program participation on participants' outcomes, relative to an otherwise similar group of nonparticipants. Specifically, program participants received an inverse probability weight of 1, while nonparticipants were weighted to be similar to the participant group, receiving an inverse probability weight equal to $\frac{e}{1-e}$, where e is the nonparticipant's propensity score. The final analysis weights for each student were then constructed as the product of the inverse probability weight and the initial sampling weight

¹ The propensity score was estimated as the predicted probability of participation, or $\Lambda(\chi_i\hat{\beta})$, where χ_i is a vector of observed values of covariates for individual i , $\hat{\beta}$ is a vector of estimated coefficients from the logit model, and $\Lambda(\chi_i\hat{\beta})$ is the logistic cumulative distribution function of $\chi_i\hat{\beta}$.

Table G.1. Logit Models of NSLP and SBP Participation for Estimating Propensity Scores

Variable	NSLP				SBP			
	Elementary	Middle	High	All Schools	Elementary	Middle	High	All Schools
FNS Region: Mid-Atlantic	-1.15 (0.62)	-2.36** (0.73)	-0.79 (0.54)	-1.08** (0.32)	-0.42 (0.49)	0.19 (0.65)	-1.21 (0.69)	-0.40 (0.32)
FNS Region: Southeast	-0.36 (0.62)	-1.96** (0.71)	-0.62 (0.50)	-0.72* (0.31)	-0.70 (0.48)	0.76 (0.60)	0.05 (0.55)	-0.10 (0.29)
FNS Region: Midwest	-0.57 (0.62)	-1.83* (0.71)	-0.17 (0.48)	-0.55 (0.30)	-0.51 (0.48)	-0.04 (0.62)	-0.42 (0.55)	-0.40 (0.30)
FNS Region: Southwest	-0.28 (0.62)	-1.99** (0.72)	-0.57 (0.48)	-0.75* (0.30)	-0.35 (0.46)	0.88 (0.60)	-0.64 (0.54)	-0.15 (0.29)
FNS Region: Mountain Plains	0.29 (0.63)	-2.23** (0.73)	-0.66 (0.52)	-0.56 (0.32)	-0.18 (0.49)	-0.02 (0.69)	0.62 (0.57)	0.20 (0.31)
FNS Region: West	-0.64 (0.61)	-2.67*** (0.71)	-0.94 (0.52)	-1.11*** (0.30)	-0.59 (0.46)	0.51 (0.59)	0.11 (0.59)	-0.12 (0.29)
Student Lives in Suburban Area	0.31 (0.26)	0.47* (0.23)	1.11*** (0.25)	0.59*** (0.13)	-0.41 (0.23)	-0.27 (0.26)	-0.58* (0.29)	-0.43** (0.14)
Student Lives in Rural Area	0.49 (0.33)	0.17 (0.25)	1.08*** (0.28)	0.60*** (0.16)	0.20 (0.28)	-0.03 (0.30)	0.03 (0.32)	0.12 (0.16)
Gender: Female	-0.40* (0.19)	-0.52** (0.17)	-0.25 (0.21)	-0.39*** (0.10)	-0.20 (0.17)	-0.56** (0.21)	-0.61* (0.26)	-0.41*** (0.11)
Race/Ethnicity: White, Non-Hispanic	-0.37 (0.27)	-0.79 (0.26)	-0.39 (0.27)	-0.49** (0.15)	-0.50* (0.25)	-0.52 (0.31)	-0.07 (0.35)	-0.39* (0.16)
Race/Ethnicity: Black, Non-Hispanic	0.15 (0.40)	-0.43 (0.35)	0.17 (0.33)	-0.01 (0.20)	0.04 (0.31)	0.59 (0.36)	0.72 (0.40)	0.40* (0.19)
Race/Ethnicity: Multiracial	-0.44 (0.36)	-0.55 (0.34)	-0.11 (0.35)	-0.42* (0.20)	-0.37 (0.36)	-0.13 (0.40)	-0.13 (0.45)	-0.25 (0.22)
Race/Ethnicity: Unknown		-0.70 (0.42)	0.09 (0.41)	-0.23 (0.27)		0.18 (0.46)	0.10 (0.52)	-0.10 (0.31)

Variable	NSLP				SBP			
	Elementary	Middle	High	All Schools	Elementary	Middle	High	All Schools
Age: 6 Years	0.13 (0.58)				0.13 (0.55)			
Age: 7 Years	0.58 (0.48)			0.33 (0.34)	0.62 (0.46)			0.67 (0.34)
Age: 8 Years	0.08 (0.43)			-0.04 (0.34)	0.81* (0.41)			0.93** (0.34)
Age: 9 Years	-0.27 (0.39)			-0.25 (0.34)	0.55 (0.37)			0.59 (0.35)
Age: 10 Years	0.35 (0.36)			0.48 (0.35)	0.68* (0.34)			0.79* (0.36)
Age: 11 Years		-0.90 (0.57)		0.06 (0.35)		0.21 (0.62)		0.32 (0.38)
Age: 12 Years		-1.00 (0.53)		-0.08 (0.36)		-0.44 (0.58)		0.12 (0.40)
Age: 13 Years		-0.44 (0.53)		0.32 (0.38)		-0.49 (0.58)		0.12 (0.42)
Age: 14 Years		-0.74 (0.54)		-0.02 (0.39)		-0.35 (0.59)		0.25 (0.43)
Age: 15 Years			-0.21 (0.29)	-0.27 (0.39)			0.17 (0.37)	0.42 (0.44)
Age: 16 Years			-0.52 (0.30)	-0.62 (0.40)			0.19 (0.37)	0.43 (0.44)
Age: 17 Years			-0.45 (0.30)	-0.56 (0.40)			-0.14 (0.38)	0.13 (0.45)
Age: 18 Years			-0.68 (0.36)	-0.74 (0.45)			0.00 (0.46)	0.26 (0.52)
Family Income*(between 130 and 185 percent FPL)	-0.19 (0.42)	-0.39 (0.31)	-0.12 (0.30)	-0.25 (0.18)	0.02 (0.29)	0.23 (0.32)	-0.02 (0.33)	0.07 (0.17)

Variable	NSLP				SBP			
	Elementary	Middle	High	All Schools	Elementary	Middle	High	All Schools
Family Income* (> 185 percent FPL)	-2.09*** (0.25)	-1.01*** (0.20)	-1.29*** (0.20)	-1.41*** (0.12)	-1.12*** (0.21)	-0.81** (0.24)	-1.16*** (0.24)	-1.05*** (0.13)
Family Income (unknown)				-0.51 (0.35)				-0.48 (0.39)
Primary Household Language Is Spanish	0.10 (0.33)	-0.18 (0.30)	0.62 (0.32)	0.17 (0.18)	-0.20 (0.26)	-0.18 (0.34)	0.04 (0.38)	-0.13 (0.18)
Student Eats the Same Amount Compared With Students of the Same Age	-0.22 (0.24)	-0.12 (0.25)	-0.32 (0.22)	-0.20 (0.13)	-0.54* (0.21)	-0.52 (0.28)	-0.55* (0.26)	-0.54*** (0.14)
Student Eats a Smaller Amount Compared With Students of the Same Age	-0.07 (0.33)	-0.36 (0.36)	-0.63 (0.34)	-0.33 (0.19)	-0.96** (0.31)	-0.33 (0.45)	-0.59 (0.42)	-0.72** (0.21)
Student Is a Somewhat Picky Eater	0.74** (0.26)	0.43 (0.29)	-0.07 (0.28)	0.31* (0.15)	0.22 (0.24)	0.32 (0.38)	-0.49 (0.33)	0.05 (0.17)
Student Is Not a Picky Eater	0.48 (0.28)	0.46 (0.31)	-0.10 (0.29)	0.22 (0.16)	0.01 (0.26)	0.46 (0.40)	-0.25 (0.34)	0.08 (0.18)
Student Did Not Eat Less in the Past 30 Days to Lose Weight		0.39* (0.19)	0.46* (0.20)	0.38** (0.13)		0.20 (0.22)	-0.01 (0.25)	0.08 (0.16)
No Information on Student's Dieting Habits (<i>excludes elementary grades</i>)				0.77** (0.24)				-0.17 (0.26)
Student's Height	0.02 (0.01)	-0.01 (0.01)	0.01 (0.01)	0.00 (0.01)	-0.01 (0.01)	-0.01 (0.01)	-0.02 (0.01)	-0.01 (0.01)
Student's Height Unknown	2.09 (1.86)	-2.91 (1.78)	1.51 (1.85)	0.15 (0.89)	-0.87 (1.66)	-0.98 (2.12)	-1.57 (2.30)	-1.61 (0.96)
Student's Self-Reported Health Is Excellent	-0.25 (0.57)	-0.70 (0.48)	0.59 (0.46)	-0.21 (0.28)	0.39 (0.44)	-0.19 (0.50)	0.17 (0.54)	0.11 (0.28)
Student's Self-Reported Health Is Very Good	-0.39 (0.57)	-0.20 (0.48)	0.73 (0.47)	-0.04 (0.29)	0.09 (0.44)	0.30 (0.51)	0.22 (0.55)	0.10 (0.29)
Student's Self-Reported Health Is Good	0.07 (0.60)	-0.62 (0.52)	-0.09 (0.50)	-0.33 (0.30)	0.29 (0.46)	-0.60 (0.58)	0.07 (0.58)	-0.06 (0.30)

Variable	NSLP				SBP			
	Elementary	Middle	High	All Schools	Elementary	Middle	High	All Schools
Student's Health Not Reported		-0.18 (0.62)	-0.21 (0.57)	-0.33 (0.37)		-0.21 (0.69)	-0.74 (0.67)	-0.33 (0.38)
Number of Students	748	714	703	2,165	748	714	703	2,165

Source: School Nutrition and Meal Cost Study, Child/Youth Interview, school year 2014–2015.

Notes: Estimates are propensity score coefficient estimates from a logit regressions of participation on student characteristics. Standard errors are in parentheses.

*Estimate is statistically significant at the 0.05 level.

**Estimate is statistically significant at the 0.01 level.

***Estimate is statistically significant at the 0.001 level.

FPL = Federal poverty level; FNS = Food and Nutrition Service; NSLP = National School Lunch Program; SBP = School Breakfast Program; SFA = school food authority; SNMCS = School Nutrition and Meal Cost Study.

(DuGoff, Schuler, and Stuart 2014). These final analysis weights were used to estimate dietary intake means and differences for participants and nonparticipants of the NSLP and SBP.²

C. Success of IPW in Constructing Comparison Groups of Nonparticipants

As this appendix mentions above, propensity score model diagnostics were used while iteratively refining the model and testing how IPW improved the balance between participants and the matched comparison group in terms of observable characteristics. First, the study team compared quintiles of the distribution of estimated probabilities of program participation—the propensity scores—between participants and nonparticipants as a summary measure of the similarity of these groups. Following Imbens (2004), the difference in mean propensity scores between program participants and nonparticipants were tested within each propensity score quintile. If significant differences were found in a quintile, that quintile was subdivided into deciles and mean differences were again tested. For NSLP, mean propensity scores were statistically different between the two groups in the second quintile but not statistically different after splitting this quintile into two quantiles. No significant differences in SBP propensity scores were found between the two groups in any quintile. Table G.2 presents the mean propensity scores, differences, and p-values for NSLP participants and nonparticipants in each of the final six propensity score quantiles tested. Table G.3 presents the analogous statistics for five propensity score quantiles for SBP participants and nonparticipants. As expected, the mean propensity score for NSLP or SBP participation in each quantile is slightly higher among participants, but these differences are small, hovering around 0.01. As the last columns of Tables G.2 and G.3 show, we cannot reject the null hypothesis that these differences between the participant and nonparticipant groups are different from zero at the 5 percent level, suggesting the propensity scores are reasonably balanced between the two groups.

Second, differences between the two groups in terms of the covariates used to estimate the propensity scores were compared, both before and after the implementation of IPW, to determine whether the participants and the matched comparison group of nonparticipants were balanced along these observable characteristics. A general rule of thumb is that differences in a covariate mean between two comparable groups are no larger than 25 percent of a standard deviation—often referred to as standardized bias in the literature—prior to weighting.³ Similarly, for covariates after IPW, a general rule is that this standardized bias is no larger than 10 percent. Table G.4 shows differences in standard deviations between NSLP participants and nonparticipants for each covariate in the final specification, both before and after IPW. Before IPW, only 3 of 40 covariates had absolute mean differences larger than 25 percent of a standard deviation. After IPW, all but 1 of the 40 covariates had absolute mean differences of 10 percent of a standard deviation or less, while the range for all covariates was between -8.9 and 10.8 standard deviations. These results suggest that IPW performed reasonably well in weighting the nonparticipants to look similar to the participant group along these observable characteristics.

² Standard errors for the mean intakes of the propensity score matched sample accounted for clustering and stratification, but did not account for variation due to the fact that the propensity score was estimated or the matching process itself.

³ For instance, the U.S. Department of Education’s What Works Clearinghouse systematic evidence review for considering groups to be equivalent uses a standardized difference of less than 0.25 standard deviations (What Works Clearinghouse 2017).

Figure G.1 graphically presents these measures before and after IPW, with each vertical line displaying the standardized bias for a particular covariate in the NSLP propensity score model before IPW (represented with a solid dot) and after IPW (represented with an “x”). Table G.5 and Figure G.2 display the analogous statistics for the SBP model, where 5 of 40 covariates had absolute mean differences larger than 25 percent of a standard deviation, with a range of -61.8 to 27.3 prior to IPW. After implementing IPW, however, all of the covariates had an absolute mean difference between participants and nonparticipants that was smaller than 4 percent of a standard deviation.

Table G.2. Diagnostic Tests to Assess the Quality of the Balance of the Propensity Score Distributions for NSLP Participants and Nonparticipants in the Dietary Intake Analysis

	Mean of Propensity Score		Student's T-test	
	Participants	Nonparticipants	Difference	p-value
Quantile 1	0.17	0.16	0.01	0.39
Quantile 2	0.26	0.25	0.01	0.45
Quantile 3	0.35	0.35	0.00	0.95
Quantile 4	0.50	0.50	0.00	0.36
Quantile 5	0.70	0.69	0.01	0.05
Quantile 6	0.87	0.86	0.01	0.05

Source: School Nutrition and Meal Cost Study, Child/Youth Interview, school year 2014–2015.

Notes: This table presents summary statistics on the distribution of the propensity scores of NSLP participation for NSLP participants and nonparticipants. Table G.1 shows the full set of covariates included in the propensity score model.

NSLP = National School Lunch Program.

Table G.3. Diagnostic Tests to Assess the Quality of the Balance of the Propensity Score Distributions for SBP Participants and Nonparticipants in the Dietary Intake Analysis

	Mean of Propensity Score		Student's T-test	
	Participants	Nonparticipants	Difference	p-value
Quantile 1	0.08	0.07	0.01	0.06
Quantile 2	0.15	0.14	0.01	0.03
Quantile 3	0.29	0.29	0.01	0.06
Quantile 4	0.48	0.48	0.01	0.39
Quantile 5	0.68	0.65	0.02	0.17

Source: School Nutrition and Meal Cost Study, Child/Youth Interview, school year 2014–2015.

Notes: This table presents summary statistics on the distribution of the propensity scores of SBP participation for SBP participants and nonparticipants. Table G.1 shows the full set of covariates included in the propensity score model.

SBP = School Breakfast Program.

Table G.4. Comparisons of Student Characteristics for NSLP Participants and Nonparticipants in the Dietary Intake Analysis, Before and After Inverse Probability Weighting

Variable	Contrast	Mean		Student's T-test		Standardized Bias	
		Participants	Nonparticipants	Difference	p-value	SB (percentage)	ASB Percentage Change
		(1)	(2)	(3)	(4)	(5)	(6)
FNS Region: Mid-Atlantic	Before IPW	0.09	0.12	-0.03	0.01	-10.7	
	After IPW	0.09	0.09	0.00	1.00	-0.8	92.5
FNS Region: Southeast	Before IPW	0.21	0.20	0.01	0.50	2.9	
	After IPW	0.21	0.21	0.00	1.00	0.4	87.9
FNS Region: Midwest	Before IPW	0.17	0.17	0.00	0.83	0.9	
	After IPW	0.17	0.19	-0.02	0.98	-4.0	-328.9
FNS Region: Southwest	Before IPW	0.17	0.16	0.01	0.47	3.2	
	After IPW	0.17	0.15	0.02	0.97	5.0	-55.5
FNS Region: Mountain Plains	Before IPW	0.12	0.11	0.01	0.47	3.2	
	After IPW	0.12	0.11	0.01	0.99	1.7	46.9
FNS Region: West	Before IPW	0.19	0.22	-0.03	0.14	-6.4	
	After IPW	0.19	0.19	0.00	0.99	1.6	75.5
Student Lives in Suburban Area	Before IPW	0.52	0.52	-0.01	0.79	-1.2	
	After IPW	0.52	0.53	-0.01	0.99	-1.7	-47.7
Student Lives in Rural Area	Before IPW	0.26	0.23	0.03	0.13	6.7	
	After IPW	0.26	0.25	0.01	0.99	2.3	66.1
Gender: Female	Before IPW	0.45	0.53	-0.08	0.00	-16.1	
	After IPW	0.45	0.46	-0.01	0.99	-2.4	85.2
Race/Ethnicity: White, Non-Hispanic	Before IPW	0.39	0.51	-0.13	0.00	-25.7	
	After IPW	0.39	0.37	0.02	0.98	3.8	85.3
Race/Ethnicity: Black, Non-Hispanic	Before IPW	0.15	0.09	0.05	0.00	16.5	
	After IPW	0.15	0.14	0.01	1.00	0.8	95.2
Race/ethnicity: Multiracial	Before IPW	0.08	0.10	-0.02	0.17	-5.9	
	After IPW	0.08	0.09	-0.01	0.99	-2.2	62.9

Variable	Contrast	Mean		Student's T-test		Standardized Bias	
		Participants	Nonparticipants	Difference	p-value	SB (percentage)	ASB Percentage Change
		(1)	(2)	(3)	(4)	(5)	(6)
Race/ethnicity: Unknown	Before IPW	0.07	0.10	-0.03	0.01	-10.8	
	After IPW	0.07	0.08	-0.01	0.99	-2.2	80.0
Age: 7 Years	Before IPW	0.09	0.04	0.05	0.00	19.6	
	After IPW	0.09	0.09	0.00	1.00	-0.6	97.2
Age: 8 Years	Before IPW	0.08	0.05	0.03	0.00	13.7	
	After IPW	0.08	0.09	-0.01	0.99	-1.6	88.1
Age: 9 Years	Before IPW	0.08	0.05	0.02	0.02	10.0	
	After IPW	0.08	0.07	0.01	0.98	4.1	58.6
Age: 10 Years	Before IPW	0.09	0.04	0.05	0.00	21.2	
	After IPW	0.09	0.07	0.02	0.96	8.3	60.9
Age: 11 Years	Before IPW	0.08	0.06	0.02	0.13	6.7	
	After IPW	0.08	0.07	0.01	0.98	4.5	33.0
Age: 12 Years	Before IPW	0.11	0.14	-0.02	0.14	-6.4	
	After IPW	0.11	0.14	-0.03	0.96	-6.8	-6.1
Age: 13 years	Before IPW	0.11	0.09	0.02	0.08	7.7	
	After IPW	0.11	0.13	-0.02	0.97	-5.7	25.7
Age: 14 Years	Before IPW	0.09	0.11	-0.02	0.11	-7.0	
	After IPW	0.09	0.09	0.00	1.00	-0.6	90.9
Age: 15 Years	Before IPW	0.08	0.12	-0.04	0.00	-13.3	
	After IPW	0.08	0.08	0.00	0.99	-1.3	90.4
Age: 16 Years	Before IPW	0.06	0.12	-0.06	0.00	-20.1	
	After IPW	0.06	0.07	-0.01	0.99	-1.7	91.6
Age: 17 Years	Before IPW	0.06	0.11	-0.05	0.00	-16.7	
	After IPW	0.06	0.06	0.00	0.99	2.0	88.0
Age: 18 Years	Before IPW	0.02	0.05	-0.03	0.00	-16.5	
	After IPW	0.02	0.02	0.00	0.99	-1.0	94.2

Variable	Contrast	Mean		Student's T-test		Standardized Bias	
		Participants	Nonparticipants	Difference	p-value	SB (percentage)	ASB Percentage Change
		(1)	(2)	(3)	(4)	(5)	(6)
Family Income*(between 130 and 185 percent FPL)	Before IPW	0.12	0.07	0.05	0.00	17.5	
	After IPW	0.12	0.11	0.01	0.98	4.6	74.0
Family Income*(> 185 percent FPL)	Before IPW	0.38	0.71	-0.33	0.00	-70.4	
	After IPW	0.38	0.40	-0.02	0.98	-3.3	95.3
Family Income (unknown)	Before IPW	0.02	0.02	0.00	0.85	-0.8	
	After IPW	0.02	0.02	0.00	0.99	1.2	-47.4
Primary Household Language Is Spanish	Before IPW	0.18	0.10	0.08	0.00	24.4	
	After IPW	0.18	0.18	0.00	1.00	0.3	98.7
Student Eats the Same Amount Compared With Students of the Same Age	Before IPW	0.53	0.52	0.01	0.59	2.4	
	After IPW	0.53	0.52	0.01	0.99	2.3	1.9
Student Eats a Smaller Amount Compared With Students of the Same Age	Before IPW	0.11	0.13	-0.02	0.12	-6.7	
	After IPW	0.11	0.10	0.01	0.98	3.1	53.5
Student Is a Somewhat Picky Eater	Before IPW	0.42	0.38	0.04	0.06	8.3	
	After IPW	0.42	0.43	-0.01	0.99	-1.4	83.0
Student Is Not a picky Eater	Before IPW	0.31	0.30	0.01	0.68	1.8	
	After IPW	0.31	0.28	0.03	0.97	6.3	-246.0
Student Did Not Eat Less in the Past 30 Days to Lose Weight	Before IPW	0.18	0.18	0.00	0.87	-0.7	
	After IPW	0.18	0.21	-0.03	0.95	-8.9	-1123.6
No Information on Student's Dieting Habits (excludes elementary grades)	Before IPW	0.43	0.23	0.20	0.00	43.6	
	After IPW	0.43	0.38	0.05	0.94	10.8	75.3
Student's Height	Before IPW	142.87	148.66	-5.79	0.00	-14.8	
	After IPW	142.87	144.37	-1.5	0.98	-3.8	74.1
Student's Height Unknown	Before IPW	0.06	0.05	0.00	0.80	1.1	
	After IPW	0.06	0.05	0.01	0.99	1.3	-19.8
Student's Self-Reported Health Is Excellent	Before IPW	0.41	0.43	-0.01	0.49	-3.0	
	After IPW	0.41	0.39	0.02	0.98	4.4	-47.5

Variable	Contrast	Mean		Student's T-test		Standardized Bias	
		Participants	Nonparticipants	Difference	p-value	SB (percentage)	ASB Percentage Change
		(1)	(2)	(3)	(4)	(5)	(6)
Student's Self-Reported Health Is Very Good	Before IPW	0.29	0.26	0.03	0.15	6.4	
	After IPW	0.29	0.30	-0.01	0.98	-3.9	39.2
Student's Self-Reported Health Is Good	Before IPW	0.13	0.12	0.01	0.38	3.8	
	After IPW	0.13	0.13	0.00	1.00	-0.7	80.4
Student's Health Not Reported	Before IPW	0.13	0.17	-0.04	0.01	-12.2	
	After IPW	0.13	0.13	0.00	0.99	-2.0	83.4

Source: School Nutrition and Meal Cost Study, Child/Youth Interview, school year 2014–2015.

Notes: This table examines the improvement in balance between the NSLP participants and nonparticipants achieved through IPW on individual characteristics included as predictors in the propensity score model. The means (or proportions) for each variable are presented for the two groups. In addition, the difference in the means (or proportions) is calculated as the standardized bias, which is the difference in terms of the percentage of one standard deviation of the covariate for the participant group. The proportions for categorical variable means do not total to 1 due to rounding and because base categories are not included. P-values in column (4) are from student's t-tests (chi-squared tests are unavailable with weighted samples). Standardized biases are presented as the percentage of one standard deviation. These estimates are calculated before and after IPW.

ASB = absolute value of SB; FNS = Food and Nutrition Service; FPL = Federal poverty level; IPW = inverse probability weighting; NSLP = National School Lunch Program; SB = standardized bias.

Table G.5. Comparisons of Student Characteristics for SBP Participants and Nonparticipants in the Dietary Intake Analysis, Before and After Inverse Probability Weighting

Variable	Contrast	Mean		Student's T-test		Standardized Bias	
		Participants	Nonparticipants	Difference	p-value	SB (percentage)	ASB Percentage Change
		(1)	(2)	(3)	(4)	(5)	(6)
FNS Region: Mid-Atlantic	Before IPW	0.08	0.11	-0.03	0.09	-8.7	
	After IPW	0.08	0.08	0.00	0.99	1.1	87.7
FNS Region: Southeast	Before IPW	0.23	0.20	0.03	0.13	7.5	
	After IPW	0.23	0.25	-0.02	0.98	-4.0	46.1
FNS Region: Midwest	Before IPW	0.13	0.18	-0.05	0.01	-14.0	
	After IPW	0.13	0.13	0.00	0.99	1.4	89.7
FNS Region: Southwest	Before IPW	0.19	0.16	0.04	0.06	9.3	
	After IPW	0.19	0.19	0.00	0.99	1.4	84.4
FNS Region: Mountain Plains	Before IPW	0.12	0.11	0.01	0.67	2.1	
	After IPW	0.12	0.11	0.01	0.99	2.5	-17.9
FNS Region: West	Before IPW	0.20	0.21	-0.01	0.57	-2.9	
	After IPW	0.20	0.20	-0.00	1.00	-0.7	74.4
Student Lives in Suburban Area	Before IPW	0.42	0.55	-0.13	0.00	-27.0	
	After IPW	0.42	0.41	0.01	0.99	1.6	94.2
Student Lives in Rural Area	Before IPW	0.29	0.24	0.06	0.01	13.1	
	After IPW	0.29	0.30	-0.01	1.00	-0.7	94.3
Gender: Female	Before IPW	0.43	0.50	-0.07	0.01	-14.1	
	After IPW	0.43	0.41	0.02	0.98	3.4	75.8
Race/Ethnicity: White, Non-Hispanic	Before IPW	0.32	0.48	-0.16	0.00	-32.3	
	After IPW	0.32	0.31	0.01	0.99	1.3	95.8
Race/Ethnicity: Black, Non-Hispanic	Before IPW	0.20	0.10	0.10	0.00	27.2	
	After IPW	0.20	0.21	-0.01	0.98	-3.6	86.8
Race/Ethnicity: Multiracial	Before IPW	0.07	0.09	-0.02	0.19	-6.9	
	After IPW	0.07	0.08	0.01	0.99	-1.3	81.7

Variable	Contrast	Mean		Student's T-test		Standardized Bias	
		Participants	Nonparticipants	Difference	p-value	SB (percentage)	ASB Percentage Change
		(1)	(2)	(3)	(4)	(5)	(6)
Race/Ethnicity: Unknown	Before IPW	0.07	0.09	-0.01	0.35	-4.9	
	After IPW	0.07	0.07	0.00	1.00	-0.1	98.5
Age: 7 Years	Before IPW	0.09	0.06	0.03	0.01	12.6	
	After IPW	0.09	0.10	-0.01	0.99	-2.2	82.7
Age: 8 Years	Before IPW	0.11	0.06	0.05	0.00	18.2	
	After IPW	0.11	0.10	0.01	0.99	1.5	91.6
Age: 9 Years	Before IPW	0.09	0.06	0.03	0.05	9.6	
	After IPW	0.09	0.08	0.01	0.99	1.3	86.9
Age: 10 Years	Before IPW	0.09	0.06	0.03	0.03	10.5	
	After IPW	0.09	0.08	0.01	0.99	1.3	87.2
Age: 11 Years	Before IPW	0.07	0.07	0.00	0.84	-1.0	
	After IPW	0.07	0.08	-0.01	0.98	-3.1	-198.1
Age: 12 Years	Before IPW	0.10	0.13	-0.03	0.08	-9.0	
	After IPW	0.10	0.10	0.00	1.00	-0.4	95.3
Age: 13 Years	Before IPW	0.08	0.11	-0.03	0.10	-8.6	
	After IPW	0.08	0.09	-0.01	1.00	-0.5	93.7
Age: 14 Years	Before IPW	0.08	0.10	-0.02	0.18	-7.0	
	After IPW	0.08	0.09	0.01	1.00	-0.5	93.0
Age: 15 Years	Before IPW	0.08	0.10	-0.01	0.35	-4.8	
	After IPW	0.08	0.08	0.00	0.99	0.9	80.7
Age: 16 Years	Before IPW	0.08	0.09	-0.01	0.56	-3.0	
	After IPW	0.08	0.07	0.01	0.99	2.3	22.6
Age: 17 Years	Before IPW	0.06	0.09	-0.02	0.08	-9.1	
	After IPW	0.06	0.06	0.00	1.00	-0.2	97.9
Age: 18 Years	Before IPW	0.03	0.04	-0.01	0.19	-6.9	
	After IPW	0.03	0.03	0.00	1.00	-0.7	90.3

Variable	Contrast	Mean		Student's T-test		Standardized Bias	
		Participants	Nonparticipants	Difference	p-value	SB (percentage)	ASB Percentage Change
		(1)	(2)	(3)	(4)	(5)	(6)
Family Income*(between 130 and 185 percent FPL)	Before IPW	0.14	0.08	0.06	0.00	18.1	
	After IPW	0.14	0.13	0.01	0.99	2.5	86.2
Family Income*(> 185 percent FPL)	Before IPW	0.30	0.59	-0.29	0.00	-61.8	
	After IPW	0.30	0.29	-0.01	0.99	1.4	97.8
Family Income (unknown)	Before IPW	0.02	0.02	0.00	0.96	0.3	
	After IPW	0.02	0.02	0.00	1.00	0.2	12.8
Primary Household Language Is Spanish	Before IPW	0.18	0.14	0.04	0.01	12.1	
	After IPW	0.18	0.18	0.00	1.00	0.1	99.5
Student Eats the Same Amount Compared With Students of the Same Age	Before IPW	0.48	0.54	-0.06	0.02	-11.7	
	After IPW	0.48	0.48	0.00	1.00	-0.1	99.1
Student Eats a Smaller Amount Compared With Students of the same Age	Before IPW	0.10	0.13	-0.03	0.05	-10.1	
	After IPW	0.10	0.10	0.00	0.99	-0.9	90.9
Student Is a Somewhat Picky Eater	Before IPW	0.40	0.40	0.00	0.97	0.2	
	After IPW	0.40	0.41	-0.01	0.99	-1.7	-682.2
Student Is Not a Picky Eater	Before IPW	0.32	0.30	0.02	0.49	3.5	
	After IPW	0.32	0.31	0.01	0.99	1.7	51.7
Student Did Not Eat Less in the Past 30 Days to Lose Weight	Before IPW	0.17	0.19	-0.02	0.34	-4.9	
	After IPW	0.17	0.17	0.00	0.99	-2.0	59.7
No Information on Student's Dieting Habits (excludes elementary grades)	Before IPW	0.45	0.32	0.13	0.00	27.3	
	After IPW	0.45	0.45	0.00	1.00	-0.3	99.0
Student's Height	Before IPW	139.19	147.20	-8.01	0.00	-19.7	
	After IPW	139.19	138.27	0.92	0.99	2.3	88.5
Student's Height Unknown	Before IPW	0.08	0.05	0.03	0.03	10.7	
	After IPW	0.08	0.08	0.00	0.99	-1.8	83.5
Student's Self-Reported Health Is Excellent	Before IPW	0.41	0.42	0.00	0.85	-1.0	
	After IPW	0.41	0.41	0.00	1.00	0.8	20.7

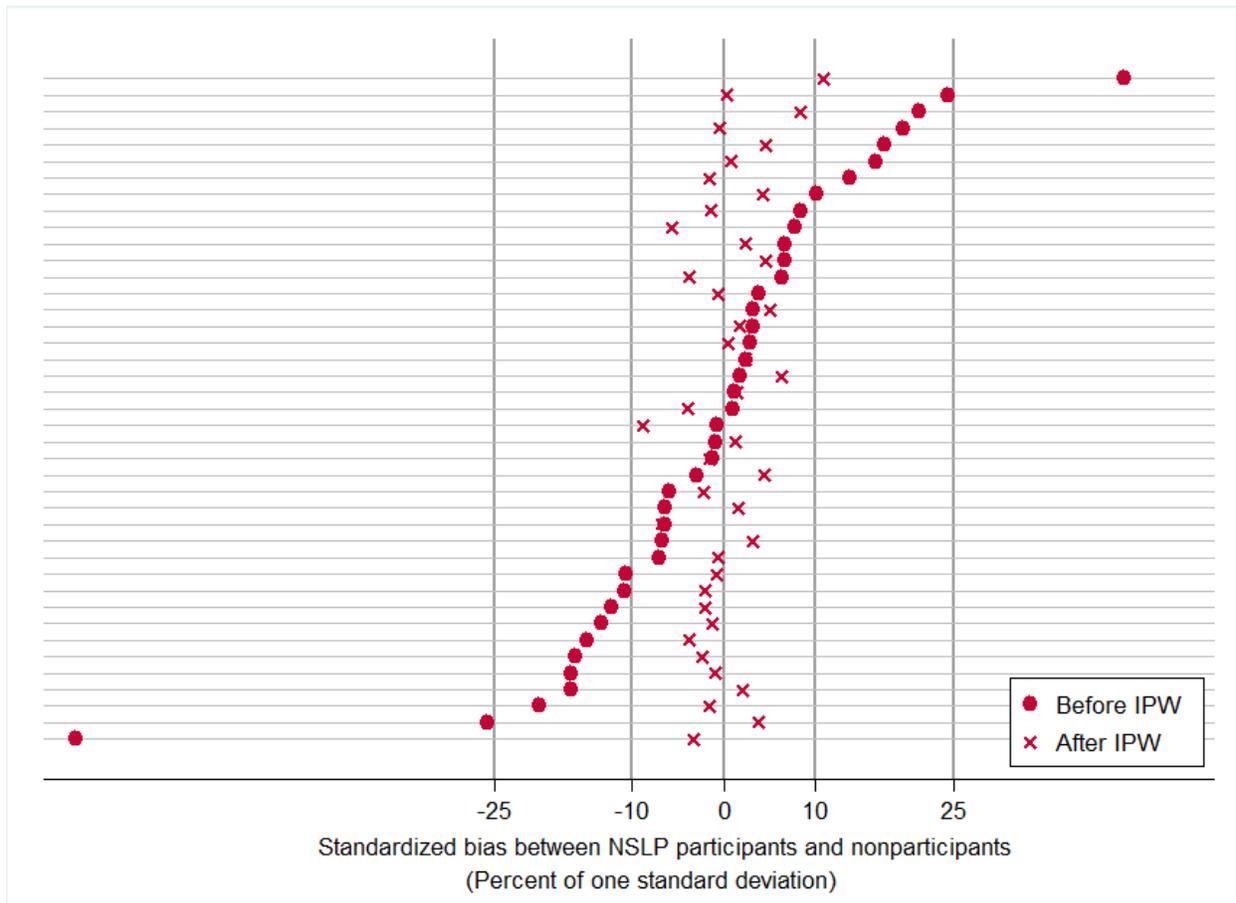
Variable	Contrast	Mean		Student's T-test		Standardized Bias	
		Participants	Nonparticipants	Difference	p-value	SB (percentage)	ASB Percentage Change
		(1)	(2)	(3)	(4)	(5)	(6)
Student's Self-Reported Health Is Very Good	Before IPW	0.27	0.28	0.00	0.89	-0.7	
	After IPW	0.27	0.28	-0.01	0.99	-2.7	-287.4
Student's Self-Reported Health Is Good	Before IPW	0.14	0.12	0.01	0.42	4.0	
	After IPW	0.14	0.13	0.01	0.99	1.5	62.1
Student's Health Not Reported	Before IPW	0.13	0.15	-0.02	0.31	-5.2	
	After IPW	0.13	0.13	0.00	0.99	1.4	73.6
	After IPW	0.13	0.13	0.00	0.99	1.4	73.6

Source: School Nutrition and Meal Cost Study, Child/Youth Interview, school year 2014–2015.

Notes: This table examines the improvement in balance between the SBP participants and nonparticipants achieved through IPW on individual characteristics included as predictors in the propensity score model. The means (or proportions) for each variable are presented for the two groups. In addition, the difference in the means (or proportions) is calculated as the standardized bias, which is the difference in terms of the percentage of one standard deviation of the covariate for the participant group. The proportions for categorical variable means do not total to 1 due to rounding and because base categories are not included. P-values in column (4) are from student's t-tests (chi-squared tests are unavailable with weighted samples). Standardized biases are presented as the percentage of one standard deviation. These estimates are calculated before and after IPW.

ASB = absolute value of SB; FNS = Food and Nutrition Service; FPL = Federal poverty level; IPW = inverse probability weighting; SB = standardized bias; SBP = School Breakfast Program.

Figure G.1. Standardized Biases for Student Characteristics between NSLP Participants and Nonparticipants, Before and After IPW

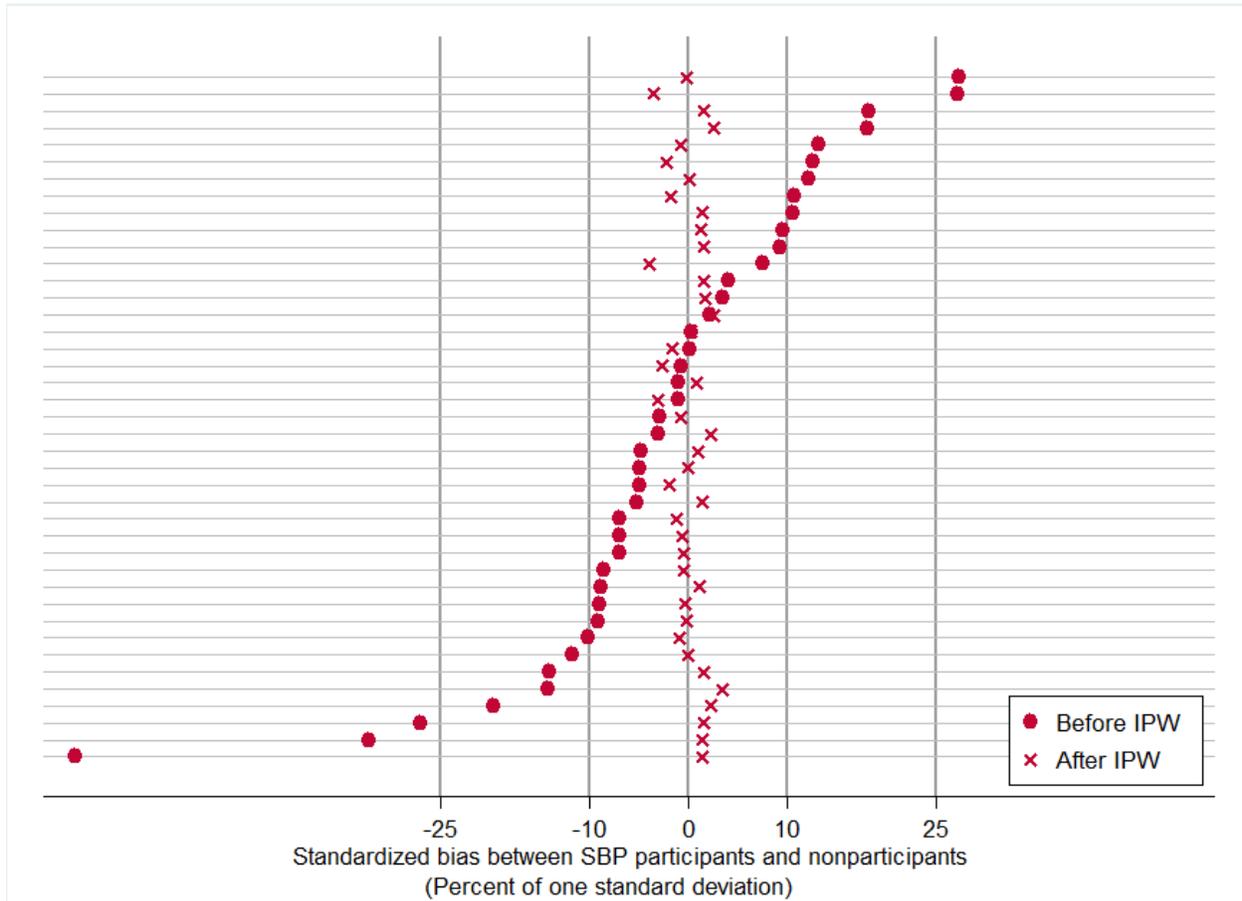


Source: School Nutrition and Meal Cost Study, Child/Youth Interview, school year 2014–2015.

Notes: This figure presents the improvement in balance between NSLP participant and nonparticipant comparison groups achieved through IPW on individual characteristics included as predictors in the propensity score model. Each row displays the differences between the two groups along an individual characteristic, in percentage points of one standard deviation, before IPW (dot) and after IPW (“x”). Table G.3 presents the estimates corresponding to these points.

IPW = inverse probability weighting; NSLP = National School Lunch Program.

Figure G.2. Standardized Biases for Student Characteristics between SBP Participants and Nonparticipants, Before and After IPW



Source: School Nutrition and Meal Cost Study, Child/Youth Interview, school year 2014–2015.

Notes: This figure presents the improvement in balance between SBP participant and nonparticipant comparison groups achieved through IPW on individual characteristics included as predictors in the propensity score model. Each row displays the differences between the two groups along an individual characteristic, in percentage points of one standard deviation, before IPW (dot) and after IPW (“x”). Table G.3 presents the estimates corresponding to these points.

IPW = inverse probability weighting; SBP = School Breakfast Program.

APPENDIX H

CHAPTER 7 SUPPLEMENTAL TABLES

Detailed usual intake tables for dark green vegetables, starchy vegetables, and legumes are not included in this appendix. Usual intake distributions for these vegetable subgroups could not be reliably estimated because so few students consumed these foods.

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Table H.1. Food Grouping System

Major Food Group	Minor Food Group	Examples
Milk	Whole, unflavored	Whole milk with no added flavoring
	Whole, flavored	Whole chocolate milk
	2%, unflavored	2% milk with no added flavoring
	2%, flavored	2% chocolate milk
	Low-fat (1%), unflavored	Low-fat milk with no added flavoring
	Low-fat (1%), flavored	Low-fat chocolate or strawberry milk
	Fat-free, unflavored	Fat-free milk with no added flavoring
	Fat-free, flavored	Fat-free chocolate or strawberry milk
	Other milk beverages	Soy milk, almond milk, fruit smoothies made with milk, hot chocolate made with milk, and milkshakes made with milk
Vegetables	Cooked, dark green	Broccoli, spinach, kale
	Cooked, beans and peas	Baked beans, refried beans, black beans, pinto/kidney beans, chickpeas, bean soups
	Cooked, other	String beans, summer squash, cabbage, asparagus, onions
	Cooked, red and orange	Carrots, sweet potato, tomato sauce (meatless)
	Cooked, starchy	French fries, tater tots, white potatoes, green peas, corn, plantains
	Cooked, mixtures	Mixed vegetables, peas and carrots
	Raw, dark green	Broccoli, spinach
	Raw, other	Cucumber, celery, side salads with iceberg lettuce
	Raw, red and orange	Carrots, tomatoes
Fruits	Canned, sweetened	Any canned fruit in light or heavy syrup or juice-packed, including fruit cocktail, peaches, pears, sweetened applesauce, mandarin oranges
	Canned, unsweetened	Any canned fruit water-packed or drained, including fruit cocktail, peaches, pears, unsweetened applesauce
	Dried	Any dried fruit, including raisins, cranberries, apples, apricots, mixtures
	Fresh	Any fresh fruit, including apples, oranges, grapes, strawberries, bananas
	Frozen	Any frozen fruit including blueberries, strawberries, fruit cocktail
	100% juice	Apple juice, orange juice, grape juice, cranberry juice, fruit juice blends
Combination Entrées	Breakfast burritos	Burrito with egg, cheese, and/or meat
	Breakfast sandwiches	Sandwich with egg and cheese or meat, sausage biscuit
	Cheeseburgers and similar beef/pork sandwiches	Cheeseburger
	Entrée salads	Chef's salad, cobb salad, grilled chicken salad, taco salad
	Hot dogs, corn dogs, and similar sausage sandwiches	Hot dog on bun, chicken hot dog on bun, corn dog, pancake-on-a-stick

Major Food Group	Minor Food Group	Examples
	Hamburger and similar beef/pork sandwiches	Hamburger, barbecue rib sandwich, sloppy joe
	Mexican-style entrees	Burrito, taco, nachos, quesadilla, enchilada
	Mixtures with grain, meat/meat alternate, and/or vegetables	Spaghetti with sauce; macaroni and cheese; lasagna, ravioli, and stuffed shells; chicken, beef, or pork with rice or noodles
	Other mixtures with meat/meat alternate and/or vegetables	Chili with meat and/or beans, baked potato with cheese and/or meat, stir fry with meat and vegetables
	Parfaits	Parfaits with yogurt, fruit, and granola
	Peanut butter sandwiches	Peanut butter sandwich, peanut butter and jelly sandwich, Uncrustables
	Pizza with meat	Sausage, pepperoni, chicken, and breakfast pizzas
	Pizza without meat	Cheese pizzas and vegetable pizzas
	Pizza pockets, pizza sticks, and calzones	Pizza pocket or turnover, calzone, pizza rolls, cheese breadsticks
	Prepackaged meals	Lunchables or similar boxed meals
	Sandwiches with breaded/fried meat, poultry, or fish	Chicken patty, breaded beef or pork patty, breaded fish patty sandwiches
	Sandwiches with mayonnaise-based poultry, tuna, or egg salad	Egg salad sandwiches, tuna salad sandwiches
	Sandwiches with cheese only	Grilled cheese, sandwich with cheese and vegetables
	Sandwiches with plain meat or poultry	Turkey, ham, bologna, grilled chicken, roast beef sandwiches
	Vegetarian sandwiches	Sandwich with vegetables
Grains/Breads	Biscuits and cornbread	Biscuits, cornbread, croissant
	Bread or bread alternate with added fat	Garlic bread
	Breads, rolls, bagels, and other plain breads	Bread, rolls, bagels, English muffins, tortillas, soft pretzels
	Cold cereal, sweetened ^a	Any type of sweetened cold cereal: Cinnamon Toast Crunch, Cocoa Puffs, Lucky Charms, Honey Nut Cheerios, Trix
	Cold cereal, unsweetened	Any type of unsweetened cold cereal: Cheerios, Frosted Mini-Wheats, Honey Bunches of Oats, Rice Krispies, Kix
	Corn/tortilla chips	Corn chips, tortilla chips, taco shells
	Crackers, croutons, pretzels	Animal crackers, graham crackers, saltines, cheese crackers, hard pretzels (plain)
	Granola and breakfast bars	Granola bars, Nutri-Grain Bars, Milk 'n Cereal bars, Clif Bars, PowerBars
	Hot cereal	Oatmeal, grits, cream of wheat
	Muffins and sweet/quick breads	Blueberry muffin, chocolate chip muffin, banana bread
	Other grains/breads	Egg rolls
	Pancakes, waffles, French toast	Pancakes, waffles, French toast, French toast sticks
	Pasta	Macaroni, spaghetti, noodles
	Pastries	Cinnamon rolls, doughnuts, toaster pastries, Danishes, coffee cake
	Rice	White, brown, or yellow rice, rice pilaf, Spanish rice

Major Food Group	Minor Food Group	Examples
Meats/Meat Alternates	Chicken and turkey, breaded or fried	Chicken nuggets, patties, tenders, fried chicken
	Chicken and turkey, plain	Grilled chicken, roasted chicken breast, roasted turkey
	Chicken and turkey, with sauce, gravy or mayonnaise	Barbecue chicken, chicken teriyaki
	Fish and shellfish, breaded or fried	Breaded fish patty or nuggets
	Fish and shellfish, plain	Baked or broiled tilapia or shrimp; plain tuna fish
	Meat, breaded or fried	Breaded/fried beef, pork chop, or ham
	Meat, plain	Ground beef or beef patty, ham, pork roast
	Meat with sauce, gravy or mayonnaise	Spaghetti sauce with meat, sausage gravy, steak teriyaki
	Other protein, cheese	Cheddar cheese, mozzarella cheese, American cheese, cheese sticks
	Other protein, eggs	Omelets with meat, cheese, and/or vegetables; hard-boiled, scrambled, or fried eggs
Other protein, meat substitutes	Vegetarian burger, protein powder	
Other protein, nuts, nut butters and seeds	Peanut butter, almond butter, peanuts, almonds, walnuts, sunflower seeds	
Sausage, frankfurters, cold cuts	Beef, pork, chicken or turkey sausage or hot dog; bacon; deli turkey, ham, beef, or bologna; pepperoni	
Yogurt	Flavored, fruited, or plain yogurt; fat-free, low-fat, and regular	
Desserts, Snacks, and Other Beverages	Beverages other than milk and 100% juice: Carbonated soda	Diet or regular soda, ginger ale, root beer
	Beverages other than milk and 100% juice: Juice drinks (not 100% juice)	Lemonade, fruit punch, Kool-Aid, Capri Sun
	Beverages other than milk and 100% juice: Nutritional Beverages	Boost, Ensure, Slim Fast, Carnation Instant Breakfast
	Beverages other than milk and 100% juice: Sports and energy drinks	Gatorade, Powerade, Monster Energy Drink, Rockstar Energy Drink
	Beverages other than milk and 100% juice: Tea and coffee	Coffee, espresso, cappuccino, cocoa made with water, tea
	Beverages other than milk and 100% juice: Water	Tap water, bottled plain water, carbonated unsweetened water
	Candy	Chocolate bars, licorice, gum, hard candy
	Dairy-based desserts	Ice cream; frozen yogurt; ice cream bars, sticks, or cones; pudding
	Desserts containing fruit or fruit juice	Gelatin with fruit
	Grain-based desserts	Brownies with or without icing; cake or cupcake with or without icing; chocolate chip cookie, oatmeal cookie, sugar cookie; apple crisp
	Other desserts	Gelatin without fruit, fruit leather, ice pops
	Snack chips and popcorn	Potato chips, Cheetos, Funyuns, Bugles, flavored popcorn, snack mixes

Major Food Group	Minor Food Group	Examples
Accompaniments	Condiments and toppings Salad dressing	Mayonnaise, mustard, catsup, gravy, jelly, margarine, butter, barbecue sauce, salsa, hot sauce, sour cream, syrup, cream Ranch, blue cheese, Italian

^aA cereal was classified as sweetened if it contained at least 21.3 grams of sucrose and other sugars per 100 grams of dry cereal—the current criterion for cereals allowed under the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC).

Table H.2. Foods Most Commonly Consumed at Lunch by NSLP Participants and Comparison Groups of Nonparticipants Defined by the Main Source of the Foods Consumed at Lunch

	Percentage of Students Consuming Food at Lunch			
	Participants	Nonparticipants		
		More Than Half of Lunch Foods Obtained from Home	More Than Half of Lunch Foods Obtained Outside of School	More Than Half of Lunch Foods Obtained at School
Milk	65.6	9.8	9.7 [^]	64.4
Fat-free	46.2	4.1	7.2 [^]	46.9
Flavored	39.5	<3	7.2 [^]	38.8
Unflavored	6.7	<3	<3	8.2 [^]
Low-fat	19.4	4.2	<3	16.5
Unflavored	18.1	<3	<3	16.4
Vegetables	42.8	16.3	23.2 [^]	35.4
Starchy vegetables	24.0	<3	17.4 [^]	17.4
French fries and similar potato products	10.1	<3	17.4 [^]	14.0
White potatoes	7.6	<3	<3	<3
Corn	5.7	<3	<3	<3
Red/orange vegetables	9.0	9.5	<3	10.0 [^]
Carrots	6.8	7.8	<3	5.1 [^]
Other vegetables	6.8	3.7 [^]	<3	4.1 [^]
Dark green vegetables	4.6	<3	4.3 [^]	11.2
Broccoli	3.4	<3	4.2 [^]	5.0 [^]
Kale	<3	<3	<3	5.8 [^]
Side salads	5.6	<3	<3	<3
Fruits and 100% Fruit Juices	57.7	48.4	8.7 [^]	52.7
Fresh fruit	36.1	36.0	7.4 [^]	32.1
Apples	16.7	12.6	<3	18.0
Oranges	9.9	5.7	<3	4.7 [^]
Grapes	3.6	9.3	<3	<3
Canned fruit	14.7	8.1	<3	8.6 [^]
Applesauce	5.2	5.0	<3	<3
Peaches	2.1	<3	<3	<3
100% juice	11.7	6.9	<3	18.2
Apple juice	6.3	3.9	<3	5.0 [^]
Orange juice	2.5	<3	<3	12.7

	Percentage of Students Consuming Food at Lunch			
	Participants	Nonparticipants		
		More Than Half of Lunch Foods Obtained from Home	More Than Half of Lunch Foods Obtained Outside of School	More Than Half of Lunch Foods Obtained at School
Combination Entrées	69.3	75.1	75.0 ^	57.4
Pizza	15.9	<3	6.9 ^	20.3
Pizza with meat	7.8	<3	5.8 ^	11.9
Pizza without meat	8.1	<3	<3	9.4 ^
Mixtures with grain, meat/ meat alternate, and/or vegetables ^a	10.3	4.1	12.8 ^	4.1 ^
Sandwiches with breaded meat, poultry, or fish	7.4	<3	12.1 ^	9.7 ^
Mexican-style entrées ^b	7.1	<3	17.3 ^	5.8 ^
Sandwiches with plain meat, poultry, or fish	7.2	33.2	18.5 ^	<3
Cheeseburgers, hamburgers, and similar beef/pork sandwiches	7.2	<3	5.4 ^	7.4 ^
Hot dogs and corn dogs	5.2	<3	<3	<3
Peanut butter sandwiches	4.1	21.6	<3	3.6 ^
Prepackaged meals ^c	<3	6.0	<3	<3
Grains/Breads	28.6	44.8	35.5	31.9
Breads, rolls, bagels, and other plain breads	9.7	8.9	4.0 ^	3.6 ^
Whole grain-rich breads, rolls, bagels, and other plain breads	7.3	<3	<3	<3
Not whole grain-rich breads, rolls, bagels, and other plain breads	2.4	7.9	4.0 ^	<3
Crackers, croutons, and pretzels	5.5	21.1	12.9 ^	4.3 ^
Corn/tortilla chips	4.4	7.2	4.2 ^	7.1 ^
Granola bars and breakfast bars	2.8	10.9	<3	4.7 ^
Sweet rolls, toaster pastries, donuts, fruit turnovers, Danishes	<3	3.4 ^	5.2 ^	<3
Rice	2.0	<3	6.1 ^	<3
Biscuits and cornbread	<3	<3	<3	6.2 ^
Egg rolls	<3	<3	6.0 ^	<3
Meats/Meat Alternates	28.1	28.0	18.1 ^	29.2
Chicken and turkey	17.9	3.6 ^	5.5 ^	24.1
Breaded/fried chicken nuggets, patties, and similar products	14.8	<3	5.5 ^	15.4
Plain (not breaded/fried) chicken and turkey	2.5	<3	<3	8.4 ^
Cheese	4.4	6.6	13.3 ^	<3
Nuts, nut butters, and seeds	<3	5.1	<3	<3
Yogurt	<3	9.9	<3	<3

	Percentage of Students Consuming Food at Lunch			
	Participants	Nonparticipants		
		More Than Half of Lunch Foods Obtained from Home	More Than Half of Lunch Foods Obtained Outside of School	More Than Half of Lunch Foods Obtained at School
Desserts, Snacks, and Other Beverages	48.2	86.4	84.1 ^a	43.0
Beverages other than milk and 100% juice	30.5	76.5	75.2 ^a	27.8
Water ^d	25.3	49.1	34.9	21.5
Carbonated soda	1.8	3.2 ^a	31.2	<3
Juice drinks (not 100% juice)	<3	23.1	12.2 ^a	3.0 ^a
Sports and energy drinks	<3	6.2	<3	<3
Tea and coffee	<3	<3	6.8 ^a	<3
Snack chips and popcorn	10.5	23.5	11.3 ^a	6.9 ^a
Candy	6.5	9.1	18.8 ^a	4.5 ^a
Cookies, cakes, and brownies	6.5	23.3	20.0 ^a	9.5 ^a
Dairy-based desserts ^e	3.4	6.7	<3	<3
Other desserts ^f	3.2	8.8	<3	<3
Number of Students	1,254	529	78	189

Source: School Nutrition and Meal Cost Study, 24-Hour Dietary Recalls: Day 1, school year 2014-2015. Tabulations are weighted to be representative of all students in public, non-charter schools offering the National School Lunch Program. Sample excludes students who did not consume a lunch.

Notes: The comparison group of matched nonparticipants was constructed using inverse probability weighting to control for differences between NSLP participants and nonparticipants in personal, family, and school characteristics. See Appendix G for more detail on the propensity score model and the covariates used.

Lunch intakes for both NSLP participants and the different subgroups of nonparticipants include all foods and beverages consumed at lunch. For NSLP participants, this may include, in addition to foods and beverages obtained as part of a reimbursable lunch, foods and beverages obtained from non-reimbursable sources at school, from home, and/or from other sources outside of school.

Subgroups of nonparticipants were defined based on the main source of their lunch foods, as reported in 24-hour dietary recalls. Nonparticipants who obtained more than half of their lunch foods at school may have consumed components of a reimbursable lunch and/or competitive foods.

Forty-seven nonparticipants did not obtain at least half of their lunch foods from one of the three defined sources (home, outside of school, or at school). This subgroup of nonparticipants is excluded from the tabulation because the sample size was too small to produce reliable estimates.

Table is limited to food groups consumed by at least 5 percent of participants or nonparticipants.

Differences between participants and the three subgroups of nonparticipants were not tested for statistical significance.

^aIncludes macaroni and cheese; spaghetti with sauce; lasagna, ravioli, and stuffed shells; and mixtures with poultry, beef, or pork with rice or noodles.

^bIncludes burritos, tacos, nachos, quesadillas, fajitas, and enchiladas.

^cIncludes Lunchables and similar boxed meals.

^dIncludes bottled and tap water.

^eIncludes pudding, ice cream, ice cream cones and bars, and frozen yogurt.

^fIncludes ice pops, snow cones, Jello, and fruit leather/snacks.

NSLP = National School Lunch Program

[^] 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.

Table H.3. Mean Amounts of USDA Food Pattern Food Groups Consumed over 24 Hours by NSLP Participants and Matched Comparison Group of Nonparticipants

	Elementary School Students		Middle School Students		High School Students		All Students	
	Participants	Nonparticipants	Participants	Nonparticipants	Participants	Nonparticipants	Participants	Nonparticipants
Vegetables (cups)	1.1	1.0	0.9	0.8	1.1	1.2	1.0	1.0
Dark green (cups)	0.1	0.1 ^	0.0	0.1 ^	0.0	0.1**	0.1	0.1*
Red and orange (cups)	0.3	0.3	0.2	0.3	0.3	0.3	0.3	0.3
Legumes (cups)	0.1	0.1 ^	0.1	0.1 ^	0.1	0.0	0.1	0.1
Starchy (cups)	0.4	0.3*	0.3	0.3	0.4	0.4	0.4	0.3
Other (cups)	0.3	0.2	0.2	0.2	0.3	0.3	0.3	0.3
Fruits (cups) ^a	1.5	1.3	1.4	1.3	1.3	1.3	1.4	1.3
Grains (oz)	7.1	7.3	6.8	6.9	8.0	7.3	7.3	7.4
Whole grains (oz)	1.6	1.2*	1.8	1.3	1.8	1.2**	1.7	1.2***
Dairy (cups)	2.5	2.0***	2.2	2.1	2.8	2.1**	2.5	2.1***
Protein Foods (oz)	4.1	4.3	4.5	4.2	5.7	5.7	4.5	4.7
Oils (tsp)	4.5	4.5	4.7	5.1	5.7	5.4	4.8	5.1
Empty Calories (kcal)	546	527	504	496	577	612	545	566
Calories from solid fats (kcal)	278	281	259	238	309	311	282	290
Calories from added sugars (kcal)	268	246	245	258	268	301	264	276
Number of Students	540	208	406	308	308	395	1,254	911

Source: School Nutrition and Meal Cost Study, 24-Hour Dietary Recalls: Day 1, school year 2014-2015. Tabulations are weighted to be representative of all students in public, non-charter schools offering the National School Lunch Program. Sample includes all students, including those who did not consume a lunch.

Notes: The comparison group of matched nonparticipants was constructed using inverse probability weighting to control for differences between NSLP participants and nonparticipants in personal, family, and school characteristics. See Appendix G for more detail on the propensity score model and the covariates used.

The USDA Food Pattern food groups are largely consistent with the meal components used in planning NSLP lunches, with two exceptions: (1) fluid milk is considered a separate meal component, and (2) other dairy foods such as yogurt and cheese are counted as meat alternates.

^aIntakes of fruit include both whole fruit (any fresh, canned, dried, or frozen fruit) and 100% fruit juice.

Difference between participants and the matched comparison group of nonparticipants is significantly different from zero at the *** 0.001 level, ** 0.01 level, or * 0.05 level.

cups = cup equivalents; oz = ounce equivalent; NSLP = National School Lunch Program; tsp = teaspoon.

^ 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.

Table H.4. Mean Proportion of 24-Hour Intakes of USDA Food Pattern Food Groups Contributed by Lunch: NSLP Participants and Matched Comparison Group of Nonparticipants

	Elementary School Students		Middle School Students		High School Students		All Students	
	Participants	Nonparticipants	Participants	Nonparticipants	Participants	Nonparticipants	Participants	Nonparticipants
Vegetables	32.2	14.0***	32.6	24.7*	35.2	33.1	33.0	23.7***
Dark green	7.9	4.7 ^	<3	4.6 ^	4.1 ^	6.2	5.8	5.1
Red and orange	32.8	13.2***	36.2	24.6*	30.9	24.6	33.0	21.5***
Legumes	5.6	<3	4.2 ^	3.0 ^	<3	5.1 ^	4.7	3.4
Starchy	21.2	5.2***^	22.5	17.8	26.2	26.3	22.7	14.8**
Other	20.1	15.0	17.7	11.0	16.4	23.2	18.8	16.4
Fruits ^a	37.0	47.8	36.9	31.5	32.1	27.1	35.8	39.0
Grains	30.0	32.4	34.5	35.8	33.5	40.1*	31.7	36.3*
Whole grains	50.2	28.6***	55.1	33.1***	53.6	29.5***	52.0	30.3***
Dairy	40.2	31.7*	39.3	25.5***	36.7	31.3	39.2	28.6***
Protein Foods	32.1	37.7	36.3	36.4	34.5	38.5	33.5	39.8*
Oils	32.4	36.7	39.6	43.6	38.6	41.6	35.3	40.0*
Empty Calories	21.6	28.2**	22.8	28.0	24.6	33.1***	22.5	29.9***
Calories from solid fats	19.6	23.7	22.5	25.6	22.9	32.0**	20.9	27.5**
Calories from added sugars	25.2	33.2**	25.4	30.7	28.7	31.9	26.1	31.9**
Number of Students	540	204	406	277	308	362	1,254	843

Source: School Nutrition and Meal Cost Study, 24-Hour Dietary Recalls: Day 1, school year 2014-2015. Tabulations are weighted to be representative of all students in public, non-charter schools offering the National School Lunch Program. Sample excludes students who did not consume a lunch.

Notes: The comparison group of matched nonparticipants was constructed using inverse probability weighting to control for differences between NSLP participants and nonparticipants in personal, family, and school characteristics. See Appendix G for more detail on the propensity score model and the covariates used.

Lunch intakes for both NSLP participants and the matched comparison group of nonparticipants include all foods and beverages consumed at lunch. For NSLP participants, this may include, in addition to foods and beverages obtained as part of a reimbursable lunch, foods and beverages obtained from non-reimbursable sources at school, from home, and/or from other sources outside of school.

The USDA Food Pattern food groups are largely consistent with the meal components used in planning NSLP lunches, with two exceptions: (1) fluid milk is considered a separate meal component, and (2) other dairy foods such as yogurt and cheese are counted as meat alternates.

^aIntakes of fruit include both whole fruit (any fresh, canned, dried, or frozen fruit) and 100% fruit juice.

Difference between participants and the matched comparison group of nonparticipants is significantly different from zero at the *** 0.001 level, ** 0.01 level, or * 0.05 level.

NSLP = National School Lunch Program.

^ 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.

Table H.5. Usual Daily Intakes of USDA Food Pattern Food Groups: Mean Proportion of Daily Recommended Amounts Consumed by NSLP Participants and Matched Comparison Group of Nonparticipants

	Elementary School Students		Middle School Students		High School Students		All Students	
	Participants	Nonparticipants	Participants	Nonparticipants	Participants	Nonparticipants	Participants	Nonparticipants
Vegetables ^a	41.6	40.7	35.0	34.6	35.5	35.4	39.2	38.3
Red and orange	34.1	36.9	31.4	32.1	36.4	33.3	34.2	33.8
Other	44.3	41.5	40.0	34.2	39.5	46.4	42.6	40.1
Fruits ^b	97.5	89.6	68.0	63.9	62.7	65.6	83.7	78.3
Grains	117.9	123.7	114.2	116.5	99.7	89.6	112.9	116.7
Whole grains	53.5	39.4*	57.3	45.2*	43.2	29.3***	51.6	37.3***
Dairy	82.7	69.1**	74.3	71.3	91.2	69.1**	83.0	72.3**
Protein Foods	79.4	82.0	81.4	76.3	82.6	85.9	78.7	82.7
Oils	92.7	92.5	76.9	85.4	79.0	76.9	85.0	90.1
Empty Calories	334.0	328.0	191.0	193.7	176.2	182.8	269.8	269.3
Number of Students	540	208	406	308	308	395	1,254	911

Source: School Nutrition and Meal Cost Study, 24-Hour Dietary Recalls: Day 1 and Day 2, school year 2014-2015. Tabulations are weighted to be representative of all students in public, non-charter schools offering the National School Lunch Program. Sample includes all students, including those who did not consume a lunch.

Notes: The comparison group of matched nonparticipants was constructed using inverse probability weighting to control for differences between NSLP participants and nonparticipants in personal, family, and school characteristics. See Appendix G for more detail on the propensity score model and the covariates used.

Usual nutrient intakes were estimated using the NCI method (Tooze et al 2010; Freedman et al. 2010).

USDA Food Pattern recommendations assign individuals to a calorie level based on their gender, age, and activity level (USDA, CNPP 2011). The Food Patterns for 1,800, 2,000, and 2,400 calories were used as reference standards for assessing usual food group intakes of elementary, middle, and high school students, respectively (IOM 2010). The USDA Food Patterns provide weekly recommendations for vegetable subgroups. For this analysis, weekly recommendations were divided by 7 (days per week) to reflect daily recommendations.

The USDA Food Pattern food groups are largely consistent with the meal components used in planning NSLP lunches, with two exceptions: (1) fluid milk is considered a separate meal component, and (2) other dairy foods such as yogurt and cheese are counted as meat alternates.

Actual sample sizes for some food groups and subgroups of students differ from the reported total sample sizes because outliers had to be omitted, on a food group by student subgroup basis, in order to estimate usual intake distributions.

^aUsual intake distributions of dark green vegetables, starchy vegetables, and legumes could not be reliably estimated because so few students consumed these foods. Dark green vegetables, starchy vegetables, and legumes are included in the (total) vegetables group. All legumes were counted as vegetables in this analysis.

^bIntakes of fruit include both whole fruit (any fresh, canned, dried, or frozen fruit) and 100% fruit juice.

Difference between participants and the matched comparison group of nonparticipants is significantly different from zero at the *** 0.001 level, ** 0.01 level, or * 0.05 level.

NCI = National Cancer Institute; NSLP = National School Lunch Program.

Table H.6. Usual Daily Intakes of Vegetables: NSLP Participants and Matched Comparison Group of Nonparticipants

	Vegetables Intakes (cups)										Recommended Daily Amount of Vegetables (cups), by Calorie Level ^a			
	N	Mean	SE	Percentiles							1,800	2,000	2,400	
				5	10	25	50	75	90	95				
By Age/Gender Groups														
6 to 8 Years ^b														
NSLP participants	259	1.0	0.05	0.5 ^	0.6	0.7	1.0	1.2	1.5	1.7 ^	-	-	-	-
NSLP nonparticipants	100	1.1	0.08	0.5 ^	0.6 ^	0.8	1.0	1.3	1.6 ^	1.8 ^	-	-	-	-
9 to 13 Years														
NSLP participants	594	1.0	0.06	0.5	0.6	0.7	0.9	1.2	1.5	1.7	-	-	-	-
NSLP nonparticipants	345	1.0	0.08	0.4 ^	0.4	0.6	0.9	1.2	1.6	1.9 ^	-	-	-	-
9 to 13 Years, Male														
NSLP participants	336	1.0	0.07	0.5 ^	0.5	0.7	0.9	1.2	1.5	1.7 ^	-	-	-	-
NSLP nonparticipants	158	1.0	0.13	0.3 ^	0.4 ^	0.6	0.9	1.4	1.8 ^	2.1 ^	-	-	-	-
9 to 13 Years, Female														
NSLP participants	258	1.0	0.08	0.4 ^	0.5	0.7	0.9	1.2	1.5	1.7 ^	-	-	-	-
NSLP nonparticipants	187	0.9	0.07	0.5 ^	0.6 ^	0.7	0.9	1.1	1.4 ^	1.5 ^	-	-	-	-
14 to 18 Years ^c														
NSLP participants	401	1.1	0.08	0.4	0.5	0.7	1.0	1.4	1.8	2.1	-	-	-	-
NSLP nonparticipants	465	1.0	0.05	0.5	0.6	0.7	1.0	1.3	1.5	1.7	-	-	-	-
14 to 18 Years, Male ^c														
NSLP participants	230	1.1	0.10	0.5 ^	0.6	0.8	1.0	1.4	1.7	2.0 ^	-	-	-	-
NSLP nonparticipants	228	1.0	0.06	0.5 ^	0.6	0.7	1.0	1.2	1.5	1.7 ^	-	-	-	-
14 to 18 Years, Female ^c														
NSLP participants	171	1.1	0.09	0.3 ^	0.4 ^	0.7	1.0	1.5	1.9 ^	2.3 ^	-	-	-	-
NSLP nonparticipants	237	1.0	0.07	0.2 ^	0.3	0.6	0.9	1.3	1.8	2.1 ^	-	-	-	-
All Students														
NSLP participants	1,254	1.0	0.05	0.5	0.6	0.7	1.0	1.3	1.5	1.7	-	-	-	-
NSLP nonparticipants	910	1.0	0.04	0.5	0.6	0.7	1.0	1.2	1.5	1.7	-	-	-	-
All Students, Male														
NSLP participants	694	1.0	0.06	0.5	0.6	0.8	1.0	1.3	1.5	1.7	-	-	-	-
NSLP nonparticipants	430	1.0	0.06	0.5	0.6	0.7	1.0	1.2	1.5	1.7	-	-	-	-
All Students, Female														
NSLP participants	560	1.0	0.06	0.4	0.5	0.7	0.9	1.2	1.6	1.8	-	-	-	-
NSLP nonparticipants	480	1.0	0.04	0.4	0.5	0.7	0.9	1.2	1.5	1.7	-	-	-	-

	Vegetables Intakes (cups)										Recommended Daily Amount of Vegetables (cups), by Calorie Level ^a			
	N	Mean	SE	Percentiles							1,800	2,000	2,400	
				5	10	25	50	75	90	95				
By School Type and Gender														
Elementary School Students												2.5	–	–
NSLP participants	540	1.0	0.06	0.5	0.6	0.8	1.0	1.3	1.6	1.8		2.5	–	–
NSLP nonparticipants	208	1.0	0.06	0.6 ^	0.6	0.8	1.0	1.2	1.5	1.6 ^		2.5	–	–
Elementary School Students, Male												2.5	–	–
NSLP participants	282	1.1	0.09	0.5 ^	0.6	0.8	1.0	1.3	1.6	1.7 ^		2.5	–	–
NSLP nonparticipants	94	1.0	0.13	0.4 ^	0.5 ^	0.7	0.9	1.3	1.6 ^	1.8 ^		2.5	–	–
Elementary School Students, Female												2.5	–	–
NSLP participants	258	1.0	0.08	0.5 ^	0.6	0.8	1.0	1.2	1.5	1.7 ^		2.5	–	–
NSLP nonparticipants	114	1.0	0.07	0.6 ^	0.6 ^	0.8	1.0	1.2	1.4 ^	1.6 ^		2.5	–	–
Middle School Students												–	2.5	–
NSLP participants	406	0.9	0.05	0.3	0.4	0.6	0.8	1.1	1.4	1.7		–	2.5	–
NSLP nonparticipants	308	0.9	0.06	0.2 ^	0.3	0.5	0.8	1.1	1.5	1.8 ^		–	2.5	–
Middle School Students, Male												–	2.5	–
NSLP participants	239	0.9	0.07	0.3 ^	0.4	0.6	0.9	1.2	1.5	1.8 ^		–	2.5	–
NSLP nonparticipants	144	0.9	0.09	0.3 ^	0.4 ^	0.6	0.8	1.1	1.5 ^	1.8 ^		–	2.5	–
Middle School Students, Female												–	2.5	–
NSLP participants	167	0.8	0.06	0.3 ^	0.4 ^	0.5	0.8	1.0	1.4 ^	1.6 ^		–	2.5	–
NSLP nonparticipants	164	0.8	0.08	0.1 ^	0.2 ^	0.4	0.7	1.1	1.6 ^	2.0 ^		–	2.5	–
High School Students												–	–	3.0
NSLP participants	308	1.1	0.07	0.4 ^	0.5	0.7	1.0	1.4	1.8	2.0 ^		–	–	3.0
NSLP nonparticipants	394	1.0	0.06	0.6 ^	0.6	0.8	1.0	1.2	1.5	1.6 ^		–	–	3.0
High School Students, Male												–	–	3.0
NSLP participants	173	1.1	0.11	0.4 ^	0.5 ^	0.7	1.0	1.3	1.8 ^	2.0 ^		–	–	3.0
NSLP nonparticipants	192	1.1	0.08	0.6 ^	0.6 ^	0.8	1.0	1.3	1.5 ^	1.7 ^		–	–	3.0
High School Students, Female												–	–	3.0
NSLP participants	135	1.1	0.08	0.3 ^	0.4 ^	0.7	1.0	1.4	1.8 ^	2.1 ^		–	–	3.0
NSLP nonparticipants	202	1.0	0.07	0.3 ^	0.4	0.6	0.9	1.3	1.8	2.1 ^		–	–	3.0

Source: School Nutrition and Meal Cost Study, 24-Hour Dietary Recalls: Day 1 and Day 2, school year 2014-2015. Tabulations are weighted to be representative of all students in public, non-charter schools offering the National School Lunch Program. Sample includes all students, including those who did not consume a lunch.

Notes: The comparison group of matched nonparticipants was constructed using inverse probability weighting to control for differences between NSLP participants and nonparticipants in personal, family, and school characteristics. See Appendix G for more detail on the propensity score model and the covariates used.

Usual food group intakes were estimated using the NCI method (Tooze et al 2010; Freedman et al. 2010).

Sample sizes for some subgroups of students may differ from the total sample size for the group because outliers had to be omitted (either for a subgroup or for the total group) in order to estimate usual intake distributions for specific food groups.

^aUSDA Food Pattern recommendations assign individuals to a calorie level based on their gender, age, and activity level (USDA, CNPP 2011). The Food Patterns for 1,800, 2,000, and 2,400 calories were used as reference standards for assessing usual food group intakes of elementary, middle, and high school students, respectively (IOM 2010).

^bThe DRI age group is 4 to 8 years; however, the dietary recall sample does not include 4- and 5-year-olds. This age group is not broken out by gender because of small sample sizes.

^cIncludes 13 students (9 males and 4 females) that were 19 years old.

cups = cup equivalents; DRI = Dietary Reference Intake; N = number (sample size); NCI = National Cancer Institute; NSLP = National School Lunch Program; SE = standard error.

– Not applicable. The analysis did not define reference values for usual daily intakes of USDA Food Pattern food groups for subgroups of students defined by age and gender. Rather, the analysis used a single USDA Food Pattern to define reference values for each school type (described above).

[^] 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.

Table H.7. Usual Daily Intakes of Red and Orange Vegetables: NSLP Participants and Matched Comparison Group of Nonparticipants

	Red and Orange Vegetables Intakes (cups)										Recommended Daily Amount of Red and Orange Vegetables (cups), by Calorie Level ^{a,b}			
	N	Mean	SE	Percentiles										
				5	10	25	50	75	90	95	1,800	2,000	2,400	
By Age/Gender Groups														
6 to 8 Years ^c														
NSLP participants	259	0.3	0.02	0.1 ^	0.1	0.2	0.3	0.4	0.5	0.5 ^				
NSLP nonparticipants	100	0.3	0.04	0.1 ^	0.1 ^	0.2	0.3	0.4	0.5 ^	0.6 ^				
9 to 13 Years														
NSLP participants	594	0.3	0.02	0.1	0.1	0.2	0.2	0.3	0.4	0.5				
NSLP nonparticipants	345	0.3	0.04	0.1 ^	0.1	0.2	0.3	0.4	0.6	0.7 ^				
9 to 13 Years, Male														
NSLP participants	336	0.2	0.02	0.1 ^	0.1	0.1	0.2	0.3	0.4	0.5 ^				
NSLP nonparticipants	158	0.3	0.04	0.1 ^	0.1 ^	0.2	0.3	0.4	0.6 ^	0.7 ^				
9 to 13 Years, Female														
NSLP participants	258	0.2	0.02	0.1 ^	0.1	0.2	0.2	0.3	0.4	0.4 ^				
NSLP nonparticipants	187	0.3	0.05	0.1 ^	0.1 ^	0.2	0.3	0.4	0.5 ^	0.6 ^				
14 to 18 Years ^d														
NSLP participants	401	0.3	0.02	0.1	0.1	0.2	0.3	0.4	0.5	0.6				
NSLP nonparticipants	466	0.3	0.02	0.1	0.1	0.1	0.2	0.4	0.5	0.6				
14 to 18 Years, Male ^d														
NSLP participants	230	0.3	0.02	0.0 ^	0.1	0.2	0.3	0.4	0.6	0.7 ^				
NSLP nonparticipants	229	0.3	0.03	0.1 ^	0.1	0.2	0.3	0.4	0.5	0.7 ^				
14 to 18 Years, Female ^d														
NSLP participants	171	0.3	0.03	0.1 ^	0.2 ^	0.2	0.3	0.3	0.4 ^	0.5 ^				
NSLP nonparticipants	237	0.2	0.03	0.0 ^	0.1	0.1	0.2	0.3	0.5	0.6 ^				
All Students														
NSLP participants	1,254	0.3	0.01	0.1	0.1	0.2	0.3	0.3	0.5	0.5				
NSLP nonparticipants	898	0.3	0.02	0.1	0.1	0.2	0.3	0.4	0.5	0.5				
All Students, Male														
NSLP participants	694	0.3	0.01	0.1	0.1	0.2	0.3	0.4	0.5	0.6				
NSLP nonparticipants	431	0.3	0.02	0.1	0.1	0.2	0.3	0.4	0.6	0.7				
All Students, Female														
NSLP participants	560	0.3	0.02	0.1	0.1	0.2	0.2	0.3	0.4	0.5				
NSLP nonparticipants	474	0.3	0.02	0.1	0.1	0.2	0.3	0.3	0.4	0.5				

	Red and Orange Vegetables Intakes (cups)										Recommended Daily Amount of Red and Orange Vegetables (cups), by Calorie Level ^{a,b}			
	N	Mean	SE	Percentiles							1,800	2,000	2,400	
				5	10	25	50	75	90	95				
By School Type and Gender														
Elementary School Students												0.79	–	–
NSLP participants	540	0.3	0.02	0.1	0.1	0.2	0.3	0.3	0.4	0.5		0.79	–	–
NSLP nonparticipants	207	0.3	0.04	0.1 ^	0.1	0.2	0.3	0.4	0.4	0.5 ^		0.79	–	–
Elementary School Students, Male												0.79	–	–
NSLP participants	282	0.3	0.02	0.1 ^	0.1	0.2	0.3	0.4	0.5	0.6 ^		0.79	–	–
NSLP nonparticipants	94	0.3	0.05	0.0 ^	0.1 ^	0.2	0.3	0.4	0.6 ^	0.6 ^		0.79	–	–
Elementary School Students, Female												0.79	–	–
NSLP participants	258	0.3	0.02	0.1 ^	0.1	0.2	0.2	0.3	0.4	0.4 ^		0.79	–	–
NSLP nonparticipants	114	0.3	0.04	0.1 ^	0.1 ^	0.2	0.3	0.4	0.4 ^	0.5 ^		0.79	–	–
Middle School Students												–	0.79	–
NSLP participants	406	0.2	0.02	0.1	0.1	0.1	0.2	0.3	0.4	0.5		–	0.79	–
NSLP nonparticipants	308	0.3	0.02	0.1 ^	0.1	0.2	0.2	0.3	0.4	0.4 ^		–	0.79	–
Middle School Students, Male												–	0.79	–
NSLP participants	239	0.3	0.02	0.1 ^	0.1	0.1	0.2	0.3	0.5	0.7 ^		–	0.79	–
NSLP nonparticipants	144	0.3	0.03	0.1 ^	0.1 ^	0.2	0.2	0.3	0.5 ^	0.6 ^		–	0.79	–
Middle School Students, Female												–	0.79	–
NSLP participants	167	0.2	0.02	0.1 ^	0.1 ^	0.2	0.2	0.3	0.3 ^	0.4 ^		–	0.79	–
NSLP nonparticipants	161	0.2	0.03	0.1 ^	0.1 ^	0.2	0.2	0.3	0.4 ^	0.4 ^		–	0.79	–
High School Students												–	–	0.86
NSLP participants	308	0.3	0.02	0.0 ^	0.1	0.2	0.3	0.4	0.5	0.6 ^		–	–	0.86
NSLP nonparticipants	395	0.3	0.03	0.1 ^	0.1	0.2	0.3	0.4	0.5	0.6 ^		–	–	0.86
High School Students, Male												–	–	0.86
NSLP participants	173	0.3	0.03	0.0 ^	0.0 ^	0.2	0.3	0.4	0.6 ^	0.7 ^		–	–	0.86
NSLP nonparticipants	193	0.3	0.05	0.1 ^	0.1 ^	0.2	0.3	0.4	0.6 ^	0.7 ^		–	–	0.86
High School Students, Female												–	–	0.86
NSLP participants	135	0.3	0.04	0.2 ^	0.2 ^	0.2	0.3	0.4	0.4 ^	0.5 ^		–	–	0.86
NSLP nonparticipants	202	0.2	0.03	0.1 ^	0.1	0.1	0.2	0.3	0.4	0.5 ^		–	–	0.86

Source: School Nutrition and Meal Cost Study, 24-Hour Dietary Recalls: Day 1 and Day 2, school year 2014-2015. Tabulations are weighted to be representative of all students in public, non-charter schools offering the National School Lunch Program. Sample includes all students, including those who did not consume a lunch.

Notes: The comparison group of matched nonparticipants was constructed using inverse probability weighting to control for differences between NSLP participants and nonparticipants in personal, family, and school characteristics. See Appendix G for more detail on the propensity score model and the covariates used.

Usual food group intakes were estimated using the NCI method (Tooze et al 2010; Freedman et al. 2010).

Sample sizes for some subgroups of students may differ from the total sample size for the group because outliers had to be omitted (either for a subgroup or for the total group) in order to estimate usual intake distributions for specific food groups.

^aUSDA Food Pattern recommendations assign individuals to a calorie level based on their gender, age, and activity level (USDA, CNPP 2011). The Food Patterns for 1,800, 2,000, and 2,400 calories were used as reference standards for assessing usual food group intakes of elementary, middle, and high school students, respectively (IOM 2010).

^bThe USDA Food Patterns provide weekly recommendations for vegetable subgroups. For this analysis, weekly recommendations were divided by 7 (days per week) to reflect daily recommendations.

^cThe DRI age group is 4 to 8 years; however, the dietary recall sample does not include 4- and 5-year-olds. This age group is not broken out by gender because of small sample sizes.

^dIncludes 13 students (9 males and 4 females) that were 19 years old.

cups = cup equivalents; DRI = Dietary Reference Intake; N = number (sample size); NCI = National Cancer Institute; NSLP = National School Lunch Program; SE = standard error.

– Not applicable. The analysis did not define reference values for usual daily intakes of USDA Food Pattern food groups for subgroups of students defined by age and gender. Rather, the analysis used a single USDA Food Pattern to define reference values for each school type (described above).

[^] 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.

Table H.8. Usual Daily Intakes of Other Vegetables: NSLP Participants and Matched Comparison Group of Nonparticipants

	Other Vegetables Intakes (cups)										Recommended Daily Amount of Other Vegetables (cups), by Calorie Level ^{a,b}			
	N	Mean	SE	Percentiles							1,800	2,000	2,400	
				5	10	25	50	75	90	95				
By Age/Gender Groups														
6 to 8 Years ^c														
NSLP participants	259	0.2	0.02	0.1 ^	0.1	0.1	0.2	0.3	0.4	0.5 ^	–	–	–	–
NSLP nonparticipants	100	0.2	0.05	0.1 ^	0.1 ^	0.1	0.2	0.3	0.4 ^	0.5 ^	–	–	–	–
9 to 13 Years														
NSLP participants	594	0.2	0.02	0.1	0.1	0.1	0.2	0.3	0.4	0.5	–	–	–	–
NSLP nonparticipants	345	0.2	0.04	0.0 ^	0.0	0.1	0.2	0.3	0.5	0.6 ^	–	–	–	–
9 to 13 Years, Male														
NSLP participants	336	0.3	0.02	0.1 ^	0.1	0.1	0.2	0.3	0.5	0.6 ^	–	–	–	–
NSLP nonparticipants	158	0.3	0.05	0.0 ^	0.0 ^	0.1	0.2	0.4	0.6 ^	0.7 ^	–	–	–	–
9 to 13 Years, Female														
NSLP participants	258	0.2	0.03	0.1 ^	0.1	0.1	0.2	0.3	0.4	0.5 ^	–	–	–	–
NSLP nonparticipants	187	0.2	0.05	0.0 ^	0.0 ^	0.1	0.1	0.2	0.4 ^	0.6 ^	–	–	–	–
14 to 18 Years ^d														
NSLP participants	401	0.3	0.03	0.0	0.1	0.1	0.3	0.4	0.6	0.7	–	–	–	–
NSLP nonparticipants	466	0.3	0.03	0.0	0.1	0.1	0.3	0.4	0.6	0.7	–	–	–	–
14 to 18 Years, Male ^d														
NSLP participants	230	0.3	0.04	0.1 ^	0.1	0.1	0.2	0.4	0.5	0.6 ^	–	–	–	–
NSLP nonparticipants	229	0.3	0.04	0.0 ^	0.1	0.1	0.2	0.4	0.6	0.7 ^	–	–	–	–
14 to 18 Years, Female ^d														
NSLP participants	171	0.3	0.04	0.0 ^	0.1 ^	0.1	0.3	0.4	0.7 ^	0.8 ^	–	–	–	–
NSLP nonparticipants	237	0.3	0.04	0.1 ^	0.1	0.2	0.3	0.4	0.5	0.6 ^	–	–	–	–
All Students														
NSLP participants	1,254	0.3	0.02	0.1	0.1	0.1	0.2	0.3	0.5	0.6	–	–	–	–
NSLP nonparticipants	911	0.2	0.02	0.0	0.0	0.1	0.2	0.3	0.5	0.6	–	–	–	–
All Students, Male														
NSLP participants	694	0.3	0.02	0.1	0.1	0.1	0.2	0.3	0.5	0.6	–	–	–	–
NSLP nonparticipants	431	0.3	0.03	0.0	0.0	0.1	0.2	0.4	0.5	0.7	–	–	–	–
All Students, Female														
NSLP participants	560	0.3	0.03	0.0	0.1	0.1	0.2	0.3	0.5	0.7	–	–	–	–
NSLP nonparticipants	480	0.2	0.03	0.0	0.1	0.1	0.2	0.3	0.4	0.5	–	–	–	–

	Other Vegetables Intakes (cups)										Recommended Daily Amount of Other Vegetables (cups), by Calorie Level ^{a,b}			
	N	Mean	SE	Percentiles							1,800	2,000	2,400	
				5	10	25	50	75	90	95				
By School Type and Gender														
Elementary School Students												0.57	–	–
NSLP participants	540	0.3	0.02	0.1	0.1	0.1	0.2	0.3	0.4	0.5		0.57	–	–
NSLP nonparticipants	208	0.2	0.04	0.0 ^	0.0	0.1	0.2	0.3	0.5	0.7 ^		0.57	–	–
Elementary School Students, Male												0.57	–	–
NSLP participants	282	0.3	0.03	0.1 ^	0.1	0.1	0.2	0.3	0.5	0.6 ^		0.57	–	–
NSLP nonparticipants	94	0.2	0.04	0.0 ^	0.0 ^	0.1	0.1	0.3	0.6 ^	0.8 ^		0.57	–	–
Elementary School Students, Female												0.57	–	–
NSLP participants	258	0.3	0.04	0.0 ^	0.1	0.1	0.2	0.3	0.5	0.7 ^		0.57	–	–
NSLP nonparticipants	114	0.2	0.05	0.0 ^	0.0 ^	0.1	0.2	0.3	0.5 ^	0.6 ^		0.57	–	–
Middle School Students												–	0.57	–
NSLP participants	406	0.2	0.03	0.1	0.1	0.1	0.2	0.3	0.4	0.5		–	0.57	–
NSLP nonparticipants	308	0.2	0.03	0.0 ^	0.0	0.1	0.2	0.3	0.4	0.5 ^		–	0.57	–
Middle School Students, Male												–	0.57	–
NSLP participants	239	0.3	0.05	0.1 ^	0.1	0.1	0.2	0.3	0.5	0.6 ^		–	0.57	–
NSLP nonparticipants	144	0.2	0.05	0.0 ^	0.0 ^	0.1	0.2	0.3	0.5 ^	0.6 ^		–	0.57	–
Middle School Students, Female												–	0.57	–
NSLP participants	167	0.2	0.03	0.0 ^	0.0 ^	0.1	0.2	0.3	0.4 ^	0.6 ^		–	0.57	–
NSLP nonparticipants	164	0.2	0.02	0.0 ^	0.0 ^	0.1	0.1	0.2	0.3 ^	0.4 ^		–	0.57	–
High School Students												–	–	0.71
NSLP participants	308	0.3	0.03	0.0 ^	0.0	0.1	0.2	0.4	0.6	0.7 ^		–	–	0.71
NSLP nonparticipants	395	0.3	0.03	0.0 ^	0.1	0.1	0.3	0.4	0.6	0.8 ^		–	–	0.71
High School Students, Male												–	–	0.71
NSLP participants	173	0.3	0.04	0.1 ^	0.1 ^	0.1	0.2	0.3	0.5 ^	0.6 ^		–	–	0.71
NSLP nonparticipants	193	0.3	0.05	0.0 ^	0.1 ^	0.1	0.3	0.5	0.7 ^	0.8 ^		–	–	0.71
High School Students, Female												–	–	0.71
NSLP participants	135	0.3	0.04	0.0 ^	0.0 ^	0.1	0.2	0.4	0.6 ^	0.8 ^		–	–	0.71
NSLP nonparticipants	202	0.3	0.05	0.0 ^	0.1	0.2	0.3	0.4	0.6	0.7 ^		–	–	0.71

Source: School Nutrition and Meal Cost Study, 24-Hour Dietary Recalls: Day 1 and Day 2, school year 2014-2015. Tabulations are weighted to be representative of all students in public, non-charter schools offering the National School Lunch Program. Sample includes all students, including those who did not consume a lunch.

Notes: The comparison group of matched nonparticipants was constructed using inverse probability weighting to control for differences between NSLP participants and nonparticipants in personal, family, and school characteristics. See Appendix G for more detail on the propensity score model and the covariates used.

Usual food group intakes were estimated using the NCI method (Tooze et al 2010; Freedman et al. 2010).

Sample sizes for some subgroups of students may differ from the total sample size for the group because outliers had to be omitted (either for a subgroup or for the total group) in order to estimate usual intake distributions for specific food groups.

^aUSDA Food Pattern recommendations assign individuals to a calorie level based on their gender, age, and activity level (USDA, CNPP 2011). The Food Patterns for 1,800, 2,000, and 2,400 calories were used as reference standards for assessing usual food group intakes of elementary, middle, and high school students, respectively (IOM 2010).

^bThe USDA Food Patterns provide weekly recommendations for vegetable subgroups. For this analysis, weekly recommendations were divided by 7 (days per week) to reflect daily recommendations.

^cThe DRI age group is 4 to 8 years; however, the dietary recall sample does not include 4- and 5-year-olds. This age group is not broken out by gender because of small sample sizes.

^dIncludes 13 students (9 males and 4 females) that were 19 years old.

cups = cup equivalents; DRI = Dietary Reference Intake; N = number (sample size); NCI = National Cancer Institute; NSLP = National School Lunch Program; SE = standard error.

– Not applicable. The analysis did not define reference values for usual daily intakes of USDA Food Pattern food groups for subgroups of students defined by age and gender. Rather, the analysis used a single USDA Food Pattern to define reference values for each school type (described above).

^ 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.

Table H.9. Usual Daily Intakes of Fruit: NSLP Participants and Matched Comparison Group of Nonparticipants

	Fruit Intakes (cups)										Recommended Daily Amount of Fruit (cups), by Calorie Level ^a			
	N	Mean	SE	Percentiles							1,800	2,000	2,400	
				5	10	25	50	75	90	95				
By Age/Gender Groups														
6 to 8 Years ^b												-	-	-
NSLP participants	259	1.5	0.10	0.7 ^	0.8	1.1	1.4	1.9	2.3	2.6 ^		-	-	-
NSLP nonparticipants	100	1.4	0.14	0.5 ^	0.6 ^	0.9	1.3	1.8	2.4 ^	2.8 ^		-	-	-
9 to 13 Years												-	-	-
NSLP participants	594	1.4	0.07	0.5	0.6	0.9	1.3	1.8	2.3	2.7		-	-	-
NSLP nonparticipants	345	1.4	0.12	0.4 ^	0.5	0.8	1.2	1.8	2.4	2.9 ^		-	-	-
9 to 13 Years, Male												-	-	-
NSLP participants	336	1.4	0.09	0.7 ^	0.8	1.0	1.4	1.7	2.2	2.4 ^		-	-	-
NSLP nonparticipants	158	1.5	0.17	0.6 ^	0.8 ^	1.1	1.5	1.9	2.4 ^	2.8 ^		-	-	-
9 to 13 Years, Female												-	-	-
NSLP participants	258	1.3	0.13	0.4 ^	0.5	0.8	1.2	1.7	2.3	2.8 ^		-	-	-
NSLP nonparticipants	187	1.2	0.15	0.0 ^	0.1 ^	0.4	0.9	1.6	2.6 ^	3.3 ^		-	-	-
14 to 18 Years ^c												-	-	-
NSLP participants	401	1.3	0.09	0.3	0.4	0.7	1.1	1.7	2.3	2.8		-	-	-
NSLP nonparticipants	466	1.3	0.12	0.4	0.5	0.7	1.1	1.7	2.2	2.7		-	-	-
14 to 18 Years, Male ^c												-	-	-
NSLP participants	230	1.4	0.13	0.2 ^	0.4	0.7	1.2	1.9	2.7	3.3 ^		-	-	-
NSLP nonparticipants	229	1.5	0.20	0.2 ^	0.4	0.8	1.4	2.1	2.8	3.3 ^		-	-	-
14 to 18 Years, Female ^c												-	-	-
NSLP participants	171	1.1	0.12	0.2 ^	0.4 ^	0.7	1.1	1.5	1.9 ^	2.2 ^		-	-	-
NSLP nonparticipants	237	0.9	0.12	0.4 ^	0.4	0.6	0.9	1.2	1.5	1.8 ^		-	-	-
All Students												-	-	-
NSLP participants	1,254	1.4	0.05	0.5	0.6	0.9	1.3	1.8	2.3	2.7		-	-	-
NSLP nonparticipants	911	1.3	0.07	0.4	0.5	0.8	1.2	1.7	2.3	2.7		-	-	-
All Students, Male												-	-	-
NSLP participants	694	1.4	0.05	0.4	0.6	0.9	1.3	1.9	2.5	2.9		-	-	-
NSLP nonparticipants	431	1.5	0.11	0.6	0.7	1.0	1.4	1.9	2.4	2.7		-	-	-
All Students, Female												-	-	-
NSLP participants	560	1.3	0.08	0.5	0.6	0.9	1.2	1.7	2.2	2.5		-	-	-
NSLP nonparticipants	480	1.2	0.10	0.3	0.4	0.7	1.0	1.6	2.1	2.5		-	-	-

	Fruit Intakes (cups)										Recommended Daily Amount of Fruit (cups), by Calorie Level ^a			
	N	Mean	SE	Percentiles							1,800	2,000	2,400	
				5	10	25	50	75	90	95				
By School Type and Gender														
Elementary School Students												1.5	–	–
NSLP participants	540	1.5	0.08	0.6	0.7	1.0	1.4	1.8	2.4	2.7		1.5	–	–
NSLP nonparticipants	208	1.3	0.12	0.4 ^	0.6	0.8	1.2	1.7	2.3	2.6 ^		1.5	–	–
Elementary School Students, Male												1.5	–	–
NSLP participants	282	1.4	0.09	0.5 ^	0.6	0.9	1.3	1.8	2.4	2.8 ^		1.5	–	–
NSLP nonparticipants	94	1.3	0.22	0.3 ^	0.4 ^	0.7	1.1	1.8	2.4 ^	2.9 ^		1.5	–	–
Elementary School Students, Female												1.5	–	–
NSLP participants	258	1.5	0.10	0.6 ^	0.7	1.0	1.4	1.9	2.3	2.7 ^		1.5	–	–
NSLP nonparticipants	114	1.4	0.14	0.5 ^	0.7 ^	0.9	1.3	1.7	2.3 ^	2.6 ^		1.5	–	–
Middle School Students												–	2.0	–
NSLP participants	406	1.4	0.06	0.5	0.6	0.9	1.3	1.7	2.2	2.6		–	2.0	–
NSLP nonparticipants	308	1.3	0.13	0.3 ^	0.4	0.8	1.2	1.7	2.2	2.6 ^		–	2.0	–
Middle School Students, Male												–	2.0	–
NSLP participants	239	1.6	0.10	0.5 ^	0.6	1.0	1.5	2.0	2.6	3.1 ^		–	2.0	–
NSLP nonparticipants	144	1.5	0.17	0.5 ^	0.7 ^	1.0	1.4	1.8	2.3 ^	2.7 ^		–	2.0	–
Middle School Students, Female												–	2.0	–
NSLP participants	167	1.1	0.08	0.2 ^	0.4 ^	0.6	1.0	1.5	2.1 ^	2.6 ^		–	2.0	–
NSLP nonparticipants	164	1.1	0.15	0.0 ^	0.1 ^	0.3	0.7	1.4	2.5 ^	3.5 ^		–	2.0	–
High School Students												–	–	2.0
NSLP participants	308	1.3	0.10	0.3 ^	0.4	0.7	1.1	1.7	2.4	2.8 ^		–	–	2.0
NSLP nonparticipants	395	1.3	0.13	0.4 ^	0.6	0.9	1.2	1.7	2.1	2.4 ^		–	–	2.0
High School Students, Male												–	–	2.0
NSLP participants	173	1.4	0.15	0.2 ^	0.3 ^	0.6	1.1	1.9	2.8 ^	3.5 ^		–	–	2.0
NSLP nonparticipants	193	1.4	0.18	0.1 ^	0.3 ^	0.8	1.4	1.9	2.5 ^	2.9 ^		–	–	2.0
High School Students, Female												–	–	2.0
NSLP participants	135	1.1	0.14	0.1 ^	0.3 ^	0.7	1.0	1.4	1.8 ^	2.1 ^		–	–	2.0
NSLP nonparticipants	202	1.1	0.13	0.2 ^	0.3	0.6	1.0	1.5	2.0	2.4 ^		–	–	2.0

Source: School Nutrition and Meal Cost Study, 24-Hour Dietary Recalls: Day 1 and Day 2, school year 2014-2015. Tabulations are weighted to be representative of all students in public, non-charter schools offering the National School Lunch Program. Sample includes all students, including those who did not consume a lunch.

Notes: The comparison group of matched nonparticipants was constructed using inverse probability weighting to control for differences between NSLP participants and nonparticipants in personal, family, and school characteristics. See Appendix G for more detail on the propensity score model and the covariates used.

Usual food group intakes were estimated using the NCI method (Tooze et al 2010; Freedman et al. 2010).

Usual fruit intakes include both whole fruit (any fresh, canned, dried, or frozen fruit) and 100% fruit juice.

Sample sizes for some subgroups of students may differ from the total sample size for the group because outliers had to be omitted (either for a subgroup or for the total group) in order to estimate usual intake distributions for specific food groups.

^aUSDA Food Pattern recommendations assign individuals to a calorie level based on their gender, age, and activity level (USDA, CNPP 2011). The Food Patterns for 1,800, 2,000, and 2,400 calories were used as reference standards for assessing usual food group intakes of elementary, middle, and high school students, respectively (IOM 2010).

^bThe DRI age group is 4 to 8 years; however, the dietary recall sample does not include 4- and 5-year-olds. This age group is not broken out by gender because of small sample sizes.

^cIncludes 13 students (9 males and 4 females) that were 19 years old.

cups = cup equivalents; DRI = Dietary Reference Intake; N = number (sample size); NCI = National Cancer Institute; NSLP = National School Lunch Program; SE = standard error.

– Not applicable. The analysis did not define reference values for usual daily intakes of USDA Food Pattern food groups for subgroups of students defined by age and gender. Rather, the analysis used a single USDA Food Pattern to define reference values for each school type (described above).

[^] 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.

Table H.10. Usual Daily Intakes of Grains: NSLP Participants and Matched Comparison Group of Nonparticipants

	Grains Intakes (oz)										Recommended Daily Amount of Grains (oz), by Calorie Level ^a			
	N	Mean	SE	Percentiles						1,800	2,000	2,400		
				5	10	25	50	75	90				95	
By Age/Gender Groups														
6 to 8 Years ^b												-	-	-
NSLP participants	259	7.2	0.23	4.7 ^	5.2	6.0	7.0	8.1	9.2	10.0 ^		-	-	-
NSLP nonparticipants	100	7.1	0.39	3.2 ^	3.8 ^	5.1	6.8	8.7	10.7 ^	12.0 ^		-	-	-
9 to 13 Years												-	-	-
NSLP participants	594	7.1	0.19	4.7	5.1	5.9	7.0	8.1	9.2	9.9		-	-	-
NSLP nonparticipants	345	8.1	0.39	3.5 ^	4.2	5.7	7.6	10.0	12.5	14.1 ^		-	-	-
9 to 13 Years, Male												-	-	-
NSLP participants	336	7.5	0.20	5.0 ^	5.4	6.3	7.4	8.6	9.9	10.7 ^		-	-	-
NSLP nonparticipants	158	8.2	0.48	4.4 ^	5.0 ^	6.2	7.9	9.7	11.7 ^	13.0 ^		-	-	-
9 to 13 Years, Female												-	-	-
NSLP participants	258	6.6	0.28	4.4 ^	4.8	5.5	6.5	7.5	8.5	9.1 ^		-	-	-
NSLP nonparticipants	187	8.1	0.92	2.9 ^	3.7 ^	5.3	7.5	10.2	13.1 ^	15.1 ^		-	-	-
14 to 18 Years ^c												-	-	-
NSLP participants	401	7.7	0.34	3.6	4.3	5.6	7.4	9.4	11.6	13.0		-	-	-
NSLP nonparticipants	466	7.2	0.37	2.7	3.4	4.8	6.7	9.0	11.5	13.2		-	-	-
14 to 18 Years, Male ^c												-	-	-
NSLP participants	230	8.8	0.48	4.6 ^	5.3	6.6	8.3	10.4	12.8	14.4 ^		-	-	-
NSLP nonparticipants	229	8.2	0.52	3.7 ^	4.5	6.0	7.9	10.1	12.3	13.7 ^		-	-	-
14 to 18 Years, Female ^c												-	-	-
NSLP participants	171	6.4	0.33	2.9 ^	3.6 ^	4.7	6.2	7.9	9.5 ^	10.6 ^		-	-	-
NSLP nonparticipants	237	5.9	0.43	2.1 ^	2.7	3.8	5.4	7.4	9.6	11.3 ^		-	-	-
All Students												-	-	-
NSLP participants	1,254	7.2	0.15	4.8	5.2	6.1	7.1	8.3	9.4	10.2		-	-	-
NSLP nonparticipants	911	7.5	0.21	3.4	4.1	5.4	7.2	9.2	11.4	12.8		-	-	-
All Students, Male												-	-	-
NSLP participants	694	7.8	0.20	5.0	5.5	6.5	7.6	8.9	10.3	11.1		-	-	-
NSLP nonparticipants	431	7.8	0.33	4.3	4.9	6.1	7.6	9.3	11.0	12.2		-	-	-
All Students, Female												-	-	-
NSLP participants	560	6.6	0.18	4.4	4.8	5.6	6.5	7.6	8.6	9.3		-	-	-
NSLP nonparticipants	480	7.2	0.44	2.7	3.4	4.8	6.7	9.0	11.5	13.1		-	-	-

	Grains Intakes (oz)										Recommended Daily Amount of Grains (oz), by Calorie Level ^a			
	N	Mean	SE	Percentiles							1,800	2,000	2,400	
				5	10	25	50	75	90	95				
By School Type and Gender														
Elementary School Students												6.0	–	–
NSLP participants	540	7.1	0.18	4.7	5.2	6.0	7.0	8.1	9.2	9.9		6.0	–	–
NSLP nonparticipants	208	7.4	0.59	3.0 ^	3.8	5.2	7.0	9.3	11.6	13.2 ^		6.0	–	–
Elementary School Students, Male												6.0	–	–
NSLP participants	282	7.5	0.20	5.0 ^	5.5	6.3	7.4	8.6	9.8	10.6 ^		6.0	–	–
NSLP nonparticipants	94	7.0	0.48	4.2 ^	4.7 ^	5.6	6.7	8.2	9.7 ^	10.8 ^		6.0	–	–
Elementary School Students, Female												6.0	–	–
NSLP participants	258	6.7	0.28	4.5 ^	4.9	5.6	6.6	7.6	8.6	9.2 ^		6.0	–	–
NSLP nonparticipants	114	7.9	0.89	2.6 ^	3.5 ^	5.1	7.3	10.0	12.9 ^	14.9 ^		6.0	–	–
Middle School Students												–	6.0	–
NSLP participants	406	6.9	0.22	4.6	5.0	5.8	6.8	7.8	8.9	9.6		–	6.0	–
NSLP nonparticipants	308	7.0	0.28	3.8 ^	4.4	5.5	6.8	8.3	9.8	10.7 ^		–	6.0	–
Middle School Students, Male												–	6.0	–
NSLP participants	239	7.4	0.33	4.4 ^	4.9	5.9	7.2	8.7	10.2	11.4 ^		–	6.0	–
NSLP nonparticipants	144	7.5	0.42	3.8 ^	4.5 ^	5.7	7.3	9.0	10.8 ^	12.1 ^		–	6.0	–
Middle School Students, Female												–	6.0	–
NSLP participants	167	6.3	0.20	4.3 ^	4.6 ^	5.3	6.2	7.2	8.1 ^	8.7 ^		–	6.0	–
NSLP nonparticipants	164	6.6	0.26	2.3 ^	3.0 ^	4.3	6.2	8.4	10.8 ^	12.3 ^		–	6.0	–
High School Students												–	–	8.0
NSLP participants	308	8.0	0.38	3.6 ^	4.4	5.8	7.6	9.8	12.0	13.6 ^		–	–	8.0
NSLP nonparticipants	395	7.2	0.46	2.8 ^	3.5	4.8	6.7	9.0	11.5	13.1 ^		–	–	8.0
High School Students, Male												–	–	8.0
NSLP participants	173	9.0	0.48	4.7 ^	5.4 ^	6.7	8.5	10.7	13.2 ^	15.1 ^		–	–	8.0
NSLP nonparticipants	193	8.2	0.63	3.5 ^	4.3 ^	5.8	7.7	10.2	12.6 ^	14.4 ^		–	–	8.0
High School Students, Female												–	–	8.0
NSLP participants	135	6.8	0.41	2.9 ^	3.6 ^	4.8	6.5	8.4	10.3 ^	11.6 ^		–	–	8.0
NSLP nonparticipants	202	6.1	0.43	2.4 ^	3.0	4.1	5.7	7.6	9.7	11.1 ^		–	–	8.0

Source: School Nutrition and Meal Cost Study, 24-Hour Dietary Recalls: Day 1 and Day 2, school year 2014-2015. Tabulations are weighted to be representative of all students in public, non-charter schools offering the National School Lunch Program. Sample includes all students, including those who did not consume a lunch.

Notes: The comparison group of matched nonparticipants was constructed using inverse probability weighting to control for differences between NSLP participants and nonparticipants in personal, family, and school characteristics. See Appendix G for more detail on the propensity score model and the covariates used.

Usual food group intakes were estimated using the NCI method (Tooze et al 2010; Freedman et al. 2010).

Sample sizes for some subgroups of students may differ from the total sample size for the group because outliers had to be omitted (either for a subgroup or for the total group) in order to estimate usual intake distributions for specific food groups.

^aUSDA Food Pattern recommendations assign individuals to a calorie level based on their gender, age, and activity level (USDA, CNPP 2011). The Food Patterns for 1,800, 2,000, and 2,400 calories were used as reference standards for assessing usual food group intakes of elementary, middle, and high school students, respectively (IOM 2010).

^bThe DRI age group is 4 to 8 years; however, the dietary recall sample does not include 4- and 5-year-olds. This age group is not broken out by gender because of small sample sizes.

^cIncludes 13 students (9 males and 4 females) that were 19 years old.

DRI = Dietary Reference Intake; N = number (sample size); NCI = National Cancer Institute; NSLP = National School Lunch Program; oz = ounce equivalents; SE = standard error.

– Not applicable. The analysis did not define reference values for usual daily intakes of USDA Food Pattern food groups for subgroups of students defined by age and gender. Rather, the analysis used a single USDA Food Pattern to define reference values for each school type (described above).

[^] 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.

Table H.11. Usual Daily Intakes of Whole Grains: NSLP Participants and Matched Comparison Group of Nonparticipants

	Whole Grain Intakes (oz)										Recommended Daily Amount of Whole Grains (oz), by Calorie Level ^a			
	N	Mean	SE	Percentiles							1,800	2,000	2,400	
				5	10	25	50	75	90	95				
By Age/Gender Groups														
6 to 8 Years ^b												–	–	–
NSLP participants	258	1.6	0.11	1.0 ^	1.1	1.4	1.6	1.9	2.1	2.3 ^		–	–	–
NSLP nonparticipants	100	NR	NR	NR	NR	NR	NR	NR	NR	NR		–	–	–
9 to 13 Years												–	–	–
NSLP participants	584	1.7	0.09	0.9	1.1	1.4	1.7	1.9	2.2	2.4		–	–	–
NSLP nonparticipants	345	1.2	0.10	0.2 ^	0.4	0.8	1.2	1.6	2.0	2.2 ^		–	–	–
9 to 13 Years, Male												–	–	–
NSLP participants	327	1.8	0.11	1.1 ^	1.3	1.5	1.8	2.1	2.3	2.5 ^		–	–	–
NSLP nonparticipants	158	1.4	0.14	0.8 ^	0.9 ^	1.1	1.4	1.7	2.1 ^	2.3 ^		–	–	–
9 to 13 Years, Female												–	–	–
NSLP participants	257	1.5	0.10	0.9 ^	1.0	1.3	1.5	1.8	2.0	2.2 ^		–	–	–
NSLP nonparticipants	187	1.0	0.18	0.4 ^	0.5 ^	0.6	0.9	1.2	1.5 ^	1.8 ^		–	–	–
14 to 18 Years ^c												–	–	–
NSLP participants	391	1.6	0.07	0.8 ^	1.0	1.3	1.6	1.9	2.2	2.4 ^		–	–	–
NSLP nonparticipants	466	1.3	0.14	0.1	0.2	0.5	0.9	1.7	2.7	3.5		–	–	–
14 to 18 Years, Male ^c												–	–	–
NSLP participants	221	1.7	0.08	0.9 ^	1.2	1.4	1.8	2.1	2.3	2.5 ^		–	–	–
NSLP nonparticipants	229	1.5	0.16	0.1 ^	0.2	0.6	1.2	2.1	3.1	3.8 ^		–	–	–
14 to 18 Years, Female ^c												–	–	–
NSLP participants	170	1.5	0.10	0.8 ^	0.9 ^	1.2	1.5	1.8	2.0 ^	2.2 ^		–	–	–
NSLP nonparticipants	237	1.0	0.18	0.1 ^	0.2	0.4	0.7	1.2	2.1	2.8 ^		–	–	–
All Students												–	–	–
NSLP participants	1,233	1.6	0.06	0.9	1.1	1.4	1.6	1.9	2.2	2.4		–	–	–
NSLP nonparticipants	911	1.2	0.07	0.4	0.5	0.7	1.1	1.6	2.1	2.4		–	–	–
All Students, Male												–	–	–
NSLP participants	676	1.8	0.07	1.1	1.2	1.5	1.8	2.1	2.3	2.5		–	–	–
NSLP nonparticipants	431	1.3	0.09	0.4	0.5	0.8	1.2	1.7	2.3	2.7		–	–	–
All Students, Female												–	–	–
NSLP participants	557	1.5	0.08	0.8	1.0	1.2	1.5	1.8	2.0	2.2		–	–	–
NSLP nonparticipants	480	1.1	0.11	0.4	0.5	0.7	1.0	1.3	1.7	2.0		–	–	–

	Whole Grain Intakes (oz)										Recommended Daily Amount of Whole Grains (oz), by Calorie Level ^a			
	N	Mean	SE	Percentiles						1,800	2,000	2,400		
				5	10	25	50	75	90				95	
By School Type and Gender														
Elementary School Students												3.0	–	–
NSLP participants	536	1.6	0.09	0.9	1.1	1.3	1.6	1.9	2.2	2.3		3.0	–	–
NSLP nonparticipants	208	1.2	0.16	0.3 ^	0.4	0.7	1.1	1.5	2.1	2.5 ^		3.0	–	–
Elementary School Students, Male												3.0	–	–
NSLP participants	279	1.7	0.10	1.0 ^	1.2	1.5	1.7	2.0	2.3	2.5 ^		3.0	–	–
NSLP nonparticipants	94	1.0	0.14	0.2 ^	0.3 ^	0.5	0.9	1.4	1.9 ^	2.3 ^		3.0	–	–
Elementary School Students, Female												3.0	–	–
NSLP participants	257	1.5	0.09	0.8 ^	1.0	1.2	1.5	1.7	2.0	2.2 ^		3.0	–	–
NSLP nonparticipants	114	1.3	0.25	0.5 ^	0.6 ^	0.9	1.2	1.6	2.0 ^	2.3 ^		3.0	–	–
Middle School Students												–	3.0	–
NSLP participants	398	1.7	0.09	1.0 ^	1.2	1.4	1.7	2.0	2.3	2.5 ^		–	3.0	–
NSLP nonparticipants	308	1.4	0.12	0.4 ^	0.5	0.8	1.2	1.7	2.4	3.0 ^		–	3.0	–
Middle School Students, Male												–	3.0	–
NSLP participants	232	1.9	0.10	1.1 ^	1.3	1.6	1.8	2.1	2.4	2.6 ^		–	3.0	–
NSLP nonparticipants	144	1.7	0.20	0.4 ^	0.6 ^	0.9	1.4	2.1	3.1 ^	4.0 ^		–	3.0	–
Middle School Students, Female												–	3.0	–
NSLP participants	166	1.6	0.10	0.9 ^	1.1 ^	1.3	1.6	1.9	2.1 ^	2.3 ^		–	3.0	–
NSLP nonparticipants	164	0.9	0.09	0.4 ^	0.4 ^	0.6	0.9	1.1	1.4 ^	1.7 ^		–	3.0	–
High School Students												–	–	4.0
NSLP participants	299	1.7	0.07	0.9 ^	1.1	1.4	1.7	2.0	2.3	2.4 ^		–	–	4.0
NSLP nonparticipants	395	1.2	0.14	0.1 ^	0.2	0.4	0.9	1.6	2.6	3.3 ^		–	–	4.0
High School Students, Male												–	–	4.0
NSLP participants	173	2.0	0.20	1.0 ^	1.1 ^	1.4	1.9	2.5	3.1 ^	3.6 ^		–	–	4.0
NSLP nonparticipants	193	1.3	0.19	0.1 ^	0.1 ^	0.5	1.1	1.9	2.7 ^	3.3 ^		–	–	4.0
High School Students, Female												–	–	4.0
NSLP participants	134	1.5	0.09	0.8 ^	1.0 ^	1.3	1.5	1.8	2.1 ^	2.2 ^		–	–	4.0
NSLP nonparticipants	202	1.1	0.16	0.1 ^	0.2	0.4	0.7	1.3	2.3	3.1 ^		–	–	4.0

Source: School Nutrition and Meal Cost Study, 24-Hour Dietary Recalls: Day 1 and Day 2, school year 2014-2015. Tabulations are weighted to be representative of all students in public, non-charter schools offering the National School Lunch Program. Sample includes all students, including those who did not consume a lunch.

Notes: The comparison group of matched nonparticipants was constructed using inverse probability weighting to control for differences between NSLP participants and nonparticipants in personal, family, and school characteristics. See Appendix G for more detail on the propensity score model and the covariates used.

Usual food group intakes were estimated using the NCI method (Tooze et al 2010; Freedman et al. 2010).

Sample sizes for some subgroups of students may differ from the total sample size for the group because outliers had to be omitted (either for a subgroup or for the total group) in order to estimate usual intake distributions for specific food groups.

^aUSDA Food Pattern recommendations assign individuals to a calorie level based on their gender, age, and activity level (USDA, CNPP 2011). The Food Patterns for 1,800, 2,000, and 2,400 calories were used as reference standards for assessing usual food group intakes of elementary, middle, and high school students, respectively (IOM 2010).

^bThe DRI age group is 4 to 8 years; however, the dietary recall sample does not include 4- and 5-year-olds. This age group is not broken out by gender because of small sample sizes.

^cIncludes 13 students (9 males and 4 females) that were 19 years old.

DRI = Dietary Reference Intake; N = number (sample size); NCI = National Cancer Institute; NR = Not reported because usual intake distribution could not be reliably estimated; NSLP = National School Lunch Program; oz = ounce equivalent; SE = standard error.

– Not applicable. The analysis did not define reference values for usual daily intakes of USDA Food Pattern food groups for subgroups of students defined by age and gender. Rather, the analysis used a single USDA Food Pattern to define reference values for each school type (described above).

[^] 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.

Table H.12. Usual Daily Intakes of Dairy: NSLP Participants and Matched Comparison Group of Nonparticipants

	Dairy Intakes (cups)										Recommended Daily Amount of Dairy (cups), by Calorie Level ^a			
	N	Mean	SE	Percentiles							1,800	2,000	2,400	
				5	10	25	50	75	90	95				
By Age/Gender Groups														
6 to 8 Years ^b														
NSLP participants	259	2.6	0.07	1.8 ^	2.0	2.3	2.6	2.9	3.3	3.5 ^	-	-	-	-
NSLP nonparticipants	100	2.3	0.15	1.5 ^	1.6 ^	1.9	2.2	2.6	3.0 ^	3.2 ^	-	-	-	-
9 to 13 Years														
NSLP participants	594	2.4	0.10	1.1	1.3	1.7	2.3	2.9	3.6	4.0	-	-	-	-
NSLP nonparticipants	345	2.1	0.14	0.9 ^	1.1	1.5	2.0	2.7	3.3	3.7 ^	-	-	-	-
9 to 13 Years, Male														
NSLP participants	336	2.5	0.10	1.2 ^	1.5	1.9	2.4	3.0	3.6	4.0 ^	-	-	-	-
NSLP nonparticipants	158	2.3	0.13	1.2 ^	1.4 ^	1.8	2.3	2.8	3.3 ^	3.7 ^	-	-	-	-
9 to 13 Years, Female														
NSLP participants	258	2.2	0.16	0.8 ^	1.0	1.5	2.1	2.8	3.6	4.1 ^	-	-	-	-
NSLP nonparticipants	187	2.0	0.22	0.7 ^	0.9 ^	1.3	1.8	2.5	3.2 ^	3.8 ^	-	-	-	-
14 to 18 Years ^c														
NSLP participants	401	2.6	0.15	0.8	1.1	1.6	2.4	3.3	4.4	5.1	-	-	-	-
NSLP nonparticipants	466	2.1	0.17	0.4	0.6	1.0	1.8	2.9	4.2	5.1	-	-	-	-
14 to 18 Years, Male ^c														
NSLP participants	230	3.2	0.24	1.1 ^	1.4	2.1	3.0	4.1	5.3	6.1 ^	-	-	-	-
NSLP nonparticipants	229	2.6	0.30	0.3 ^	0.5	1.1	2.1	3.6	5.4	6.7 ^	-	-	-	-
14 to 18 Years, Female ^c														
NSLP participants	171	1.8	0.11	0.9 ^	1.0 ^	1.3	1.7	2.1	2.6 ^	2.8 ^	-	-	-	-
NSLP nonparticipants	237	1.5	0.15	0.5 ^	0.7	1.0	1.4	1.9	2.5	3.0 ^	-	-	-	-
All Students														
NSLP participants	1,254	2.5	0.07	1.1	1.3	1.8	2.4	3.1	3.8	4.2	-	-	-	-
NSLP nonparticipants	911	2.2	0.07	0.8	1.0	1.4	2.0	2.8	3.6	4.1	-	-	-	-
All Students, Male														
NSLP participants	694	2.8	0.09	1.3	1.5	2.0	2.7	3.4	4.1	4.6	-	-	-	-
NSLP nonparticipants	431	2.4	0.12	0.9	1.1	1.6	2.3	3.1	3.9	4.5	-	-	-	-
All Students, Female														
NSLP participants	560	2.2	0.08	0.9	1.1	1.5	2.1	2.7	3.3	3.7	-	-	-	-
NSLP nonparticipants	480	1.9	0.13	0.7	0.9	1.3	1.8	2.4	3.1	3.5	-	-	-	-

	Dairy Intakes (cups)										Recommended Daily Amount of Dairy (cups), by Calorie Level ^a			
	N	Mean	SE	Percentiles							1,800	2,000	2,400	
				5	10	25	50	75	90	95				
By School Type and Gender														
Elementary School Students												3.0	–	–
NSLP participants	540	2.5	0.07	1.4	1.6	2.0	2.4	2.9	3.4	3.7		3.0	–	–
NSLP nonparticipants	208	2.1	0.14	0.9 ^	1.1	1.5	2.0	2.6	3.1	3.5 ^		3.0	–	–
Elementary School Students, Male												3.0	–	–
NSLP participants	282	2.6	0.07	1.6 ^	1.8	2.1	2.6	3.0	3.4	3.7 ^		3.0	–	–
NSLP nonparticipants	94	2.2	0.19	1.0 ^	1.2 ^	1.6	2.1	2.7	3.3 ^	3.8 ^		3.0	–	–
Elementary School Students, Female												3.0	–	–
NSLP participants	258	2.3	0.14	1.1 ^	1.3	1.7	2.3	2.9	3.5	3.9 ^		3.0	–	–
NSLP nonparticipants	114	2.0	0.18	0.9 ^	1.1 ^	1.5	1.9	2.5	3.0 ^	3.4 ^		3.0	–	–
Middle School Students												–	3.0	–
NSLP participants	406	2.2	0.08	0.9	1.1	1.5	2.1	2.8	3.5	4.0		–	3.0	–
NSLP nonparticipants	308	2.1	0.12	0.8 ^	1.0	1.4	2.0	2.7	3.5	4.0 ^		–	3.0	–
Middle School Students, Male												–	3.0	–
NSLP participants	239	2.5	0.13	1.1 ^	1.3	1.8	2.4	3.1	3.8	4.2 ^		–	3.0	–
NSLP nonparticipants	144	2.5	0.20	0.9 ^	1.2 ^	1.7	2.3	3.1	4.0 ^	4.5 ^		–	3.0	–
Middle School Students, Female												–	3.0	–
NSLP participants	167	1.9	0.15	0.7 ^	0.9 ^	1.3	1.8	2.4	3.1 ^	3.5 ^		–	3.0	–
NSLP nonparticipants	164	1.7	0.14	0.9 ^	1.1 ^	1.3	1.7	2.1	2.5 ^	2.8 ^		–	3.0	–
High School Students												–	–	3.0
NSLP participants	308	2.7	0.19	0.9 ^	1.1	1.7	2.5	3.5	4.6	5.4 ^		–	–	3.0
NSLP nonparticipants	395	2.1	0.15	0.4 ^	0.6	1.0	1.8	2.8	4.0	4.9 ^		–	–	3.0
High School Students, Male												–	–	3.0
NSLP participants	173	3.4	0.26	1.2 ^	1.6 ^	2.2	3.2	4.3	5.7 ^	6.6 ^		–	–	3.0
NSLP nonparticipants	193	2.5	0.25	0.4 ^	0.6 ^	1.2	2.1	3.4	5.0 ^	6.2 ^		–	–	3.0
High School Students, Female												–	–	3.0
NSLP participants	135	1.9	0.11	1.0 ^	1.2 ^	1.5	1.8	2.3	2.7 ^	2.9 ^		–	–	3.0
NSLP nonparticipants	202	1.6	0.15	0.5 ^	0.7	1.0	1.4	2.0	2.7	3.2 ^		–	–	3.0

Source: School Nutrition and Meal Cost Study, 24-Hour Dietary Recalls: Day 1 and Day 2, school year 2014-2015. Tabulations are weighted to be representative of all students in public, non-charter schools offering the National School Lunch Program. Sample includes all students, including those who did not consume a lunch.

Notes: The comparison group of matched nonparticipants was constructed using inverse probability weighting to control for differences between NSLP participants and nonparticipants in personal, family, and school characteristics. See Appendix G for more detail on the propensity score model and the covariates used.

Usual food group intakes were estimated using the NCI method (Tooze et al 2010; Freedman et al. 2010).

The USDA Food Pattern food groups are largely consistent with the meal components used in planning NSLP lunches, with two exceptions: (1) fluid milk is considered a separate meal component, and (2) other dairy foods such as yogurt and cheese are counted as meat alternates.

Sample sizes for some subgroups of students may differ from the total sample size for the group because outliers had to be omitted (either for a subgroup or for the total group) in order to estimate usual intake distributions for specific food groups.

^aUSDA Food Pattern recommendations assign individuals to a calorie level based on their gender, age, and activity level (USDA, CNPP 2011). The Food Patterns for 1,800, 2,000, and 2,400 calories were used as reference standards for assessing usual food group intakes of elementary, middle, and high school students, respectively (IOM 2010).

^bThe DRI age group is 4 to 8 years; however, the dietary recall sample does not include 4- and 5-year-olds. This age group is not broken out by gender because of small sample sizes.

^cIncludes 13 students (9 males and 4 females) that were 19 years old.

cups = cup equivalents; DRI = Dietary Reference Intake; N = number (sample size); NCI = National Cancer Institute; NSLP = National School Lunch Program; SE = standard error.

– Not applicable. The analysis did not define reference values for usual daily intakes of USDA Food Pattern food groups for subgroups of students defined by age and gender. Rather, the analysis used a single USDA Food Pattern to define reference values for each school type (described above).

[^] 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.

Table H.13. Usual Daily Intakes of Protein Foods: NSLP Participants and Matched Comparison Group of Nonparticipants

	Protein Food Intakes (oz)										Recommended Daily Amount of Protein Foods (oz), by Calorie Level ^a			
	N	Mean	SE	Percentiles							1,800	2,000	2,400	
				5	10	25	50	75	90	95				
By Age/Gender Groups														
6 to 8 Years ^b												-	-	-
NSLP participants	259	3.7	0.20	1.6 ^	1.9	2.6	3.5	4.5	5.6	6.3 ^		-	-	-
NSLP nonparticipants	100	3.9	0.48	1.7 ^	2.0 ^	2.8	3.7	4.9	6.1 ^	6.8 ^		-	-	-
9 to 13 Years												-	-	-
NSLP participants	592	4.3	0.17	2.0	2.4	3.1	4.1	5.2	6.4	7.2		-	-	-
NSLP nonparticipants	345	4.2	0.32	1.8 ^	2.2	2.9	4.0	5.2	6.5	7.4 ^		-	-	-
9 to 13 Years, Male												-	-	-
NSLP participants	335	4.5	0.18	2.1 ^	2.5	3.3	4.3	5.5	6.7	7.5 ^		-	-	-
NSLP nonparticipants	158	4.0	0.36	1.8 ^	2.1 ^	2.9	3.9	5.0	6.2 ^	7.0 ^		-	-	-
9 to 13 Years, Female												-	-	-
NSLP participants	257	3.9	0.25	2.4 ^	2.7	3.2	3.8	4.5	5.1	5.6 ^		-	-	-
NSLP nonparticipants	187	4.5	0.55	1.9 ^	2.3 ^	3.1	4.2	5.5	6.9 ^	7.9 ^		-	-	-
14 to 18 Years ^c												-	-	-
NSLP participants	401	5.3	0.40	2.6	3.1	3.9	5.1	6.4	7.8	8.8		-	-	-
NSLP nonparticipants	466	5.5	0.27	2.2	2.7	3.8	5.2	6.9	8.7	9.9		-	-	-
14 to 18 Years, Male ^c												-	-	-
NSLP participants	230	6.1	0.64	3.0 ^	3.5	4.5	5.8	7.4	9.1	10.2 ^		-	-	-
NSLP nonparticipants	229	6.2	0.44	2.4 ^	3.0	4.2	5.8	7.8	9.8	11.2 ^		-	-	-
14 to 18 Years, Female ^c												-	-	-
NSLP participants	171	4.3	0.19	2.1 ^	2.5 ^	3.2	4.1	5.2	6.3 ^	6.9 ^		-	-	-
NSLP nonparticipants	237	4.6	0.35	2.4 ^	2.8	3.5	4.4	5.5	6.6	7.3 ^		-	-	-
All Students												-	-	-
NSLP participants	1,237	4.3	0.14	2.6	2.9	3.4	4.2	5.0	5.8	6.4		-	-	-
NSLP nonparticipants	911	4.6	0.21	2.0	2.4	3.2	4.4	5.7	7.0	7.9		-	-	-
All Students, Male												-	-	-
NSLP participants	681	4.6	0.15	2.8	3.1	3.7	4.5	5.3	6.2	6.7		-	-	-
NSLP nonparticipants	431	4.7	0.29	1.5	1.9	2.9	4.3	6.1	8.0	9.4		-	-	-
All Students, Female												-	-	-
NSLP participants	556	3.9	0.16	2.3	2.6	3.2	3.8	4.6	5.4	5.9		-	-	-
NSLP nonparticipants	480	4.4	0.28	2.5	2.8	3.5	4.3	5.2	6.2	6.7		-	-	-

	Protein Food Intakes (oz)										Recommended Daily Amount of Protein Foods (oz), by Calorie Level ^a			
	N	Mean	SE	Percentiles										
				5	10	25	50	75	90	95	1,800	2,000	2,400	
By School Type and Gender														
Elementary School Students												5.0	–	–
NSLP participants	534	4.0	0.17	2.4	2.7	3.2	3.9	4.7	5.5	6.0		5.0	–	–
NSLP nonparticipants	208	4.1	0.37	2.2 ^	2.6	3.2	4.0	4.9	5.8	6.4 ^		5.0	–	–
Elementary School Students, Male												5.0	–	–
NSLP participants	279	4.2	0.17	2.6 ^	2.8	3.4	4.1	4.9	5.6	6.2 ^		5.0	–	–
NSLP nonparticipants	94	3.8	0.56	0.7 ^	1.1 ^	1.9	3.2	5.1	7.2 ^	8.8 ^		5.0	–	–
Elementary School Students, Female												5.0	–	–
NSLP participants	255	3.8	0.21	2.3 ^	2.5	3.1	3.7	4.4	5.2	5.7 ^		5.0	–	–
NSLP nonparticipants	114	4.3	0.46	2.2 ^	2.6 ^	3.3	4.2	5.2	6.2 ^	6.8 ^		5.0	–	–
Middle School Students												–	5.5	–
NSLP participants	403	4.5	0.17	2.7	3.0	3.6	4.4	5.2	6.0	6.6		–	5.5	–
NSLP nonparticipants	308	4.2	0.32	2.1 ^	2.4	3.1	4.1	5.1	6.1	6.8 ^		–	5.5	–
Middle School Students, Male												–	5.5	–
NSLP participants	236	5.0	0.23	3.1 ^	3.5	4.1	4.9	5.8	6.6	7.2 ^		–	5.5	–
NSLP nonparticipants	144	4.6	0.50	1.6 ^	2.1 ^	3.0	4.3	5.8	7.6 ^	8.7 ^		–	5.5	–
Middle School Students, Female												–	5.5	–
NSLP participants	167	3.9	0.25	2.3 ^	2.6 ^	3.1	3.8	4.5	5.3 ^	5.8 ^		–	5.5	–
NSLP nonparticipants	164	3.7	0.39	1.3 ^	1.6 ^	2.4	3.5	4.8	6.2 ^	7.2 ^		–	5.5	–
High School Students												–	–	6.5
NSLP participants	308	5.4	0.48	2.4 ^	2.9	3.8	5.1	6.6	8.2	9.4 ^		–	–	6.5
NSLP nonparticipants	395	5.6	0.33	2.4 ^	2.9	3.9	5.3	6.9	8.6	9.8 ^		–	–	6.5
High School Students, Male												–	–	6.5
NSLP participants	173	6.3	0.79	3.0 ^	3.5 ^	4.5	5.9	7.6	9.6 ^	10.9 ^		–	–	6.5
NSLP nonparticipants	193	6.4	0.51	3.1 ^	3.6 ^	4.7	6.1	7.8	9.6 ^	10.9 ^		–	–	6.5
High School Students, Female												–	–	6.5
NSLP participants	135	4.3	0.21	1.9 ^	2.3 ^	3.1	4.1	5.3	6.5 ^	7.2 ^		–	–	6.5
NSLP nonparticipants	202	4.6	0.36	2.3 ^	2.7	3.5	4.4	5.6	6.8	7.6 ^		–	–	6.5

Source: School Nutrition and Meal Cost Study, 24-Hour Dietary Recalls: Day 1 and Day 2, school year 2014-2015. Tabulations are weighted to be representative of all students in public, non-charter schools offering the National School Lunch Program. Sample includes all students, including those who did not consume a lunch.

Notes: The comparison group of matched nonparticipants was constructed using inverse probability weighting to control for differences between NSLP participants and nonparticipants in personal, family, and school characteristics. See Appendix G for more detail on the propensity score model and the covariates used.

Usual food group intakes were estimated using the NCI method (Tooze et al 2010; Freedman et al. 2010).

Sample sizes for some subgroups of students may differ from the total sample size for the group because outliers had to be omitted (either for a subgroup or for the total group) in order to estimate usual intake distributions for specific food groups.

^aUSDA Food Pattern recommendations assign individuals to a calorie level based on their gender, age, and activity level (USDA, CNPP 2011). The Food Patterns for 1,800, 2,000, and 2,400 calories were used as reference standards for assessing usual food group intakes of elementary, middle, and high school students, respectively (IOM 2010).

^bThe DRI age group is 4 to 8 years; however, the dietary recall sample does not include 4- and 5-year-olds. This age group is not broken out by gender because of small sample sizes.

^cIncludes 13 students (9 males and 4 females) that were 19 years old.

DRI = Dietary Reference Intake; N = number (sample size); NCI = National Cancer Institute; NSLP = National School Lunch Program; oz = ounce equivalents; SE = standard error.

– Not applicable. The analysis did not define reference values for usual daily intakes of USDA Food Pattern food groups for subgroups of students defined by age and gender. Rather, the analysis used a single USDA Food Pattern to define reference values for each school type (described above).

^ 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.

Table H.14. Usual Daily Intakes of Oils: NSLP Participants and Matched Comparison Group of Nonparticipants

	Oils Intakes (tsp)										Recommended Daily Amount of Oils (tsp), by Calorie Level ^a			
	N	Mean	SE	Percentiles							1,800	2,000	2,400	
				5	10	25	50	75	90	95				
By Age/Gender Groups														
6 to 8 Years ^b												-	-	-
NSLP participants	258	4.5	0.22	2.6 ^	2.9	3.5	4.3	5.2	6.2	6.9 ^		-	-	-
NSLP nonparticipants	100	4.7	0.39	0.9 ^	1.4 ^	2.4	4.1	6.3	8.9 ^	10.5 ^		-	-	-
9 to 13 Years												-	-	-
NSLP participants	591	4.8	0.20	2.8	3.1	3.8	4.6	5.6	6.7	7.4		-	-	-
NSLP nonparticipants	345	5.1	0.43	1.9 ^	2.4	3.4	4.7	6.4	8.3	9.5 ^		-	-	-
9 to 13 Years, Male												-	-	-
NSLP participants	334	4.9	0.25	2.7 ^	3.1	3.8	4.7	5.8	6.9	7.7 ^		-	-	-
NSLP nonparticipants	158	5.4	0.35	2.4 ^	2.8 ^	3.8	5.1	6.6	8.3 ^	9.6 ^		-	-	-
9 to 13 Years, Female												-	-	-
NSLP participants	257	4.8	0.23	2.8 ^	3.1	3.8	4.7	5.6	6.7	7.3 ^		-	-	-
NSLP nonparticipants	187	5.2	0.76	1.2 ^	1.8 ^	2.9	4.6	6.8	9.3 ^	11.1 ^		-	-	-
14 to 18 Years ^c												-	-	-
NSLP participants	401	5.5	0.36	1.9	2.4	3.4	4.9	6.9	9.2	10.9		-	-	-
NSLP nonparticipants	466	5.5	0.28	2.6	3.1	4.0	5.3	6.8	8.4	9.5		-	-	-
14 to 18 Years, Male ^c												-	-	-
NSLP participants	230	6.1	0.57	2.0 ^	2.5	3.7	5.4	7.8	10.6	12.7 ^		-	-	-
NSLP nonparticipants	229	5.8	0.41	2.6 ^	3.1	4.1	5.4	7.1	9.0	10.2 ^		-	-	-
14 to 18 Years, Female ^c												-	-	-
NSLP participants	171	4.7	0.34	1.6 ^	2.0 ^	2.9	4.3	6.0	8.1 ^	9.5 ^		-	-	-
NSLP nonparticipants	237	5.2	0.38	2.8 ^	3.2	4.0	5.0	6.2	7.4	8.3 ^		-	-	-
All Students												-	-	-
NSLP participants	1,246	4.7	0.15	2.7	3.1	3.7	4.6	5.6	6.6	7.3		-	-	-
NSLP nonparticipants	911	5.1	0.23	1.8	2.2	3.3	4.7	6.6	8.6	10.0		-	-	-
All Students, Male												-	-	-
NSLP participants	689	4.9	0.21	2.7	3.0	3.8	4.7	5.8	6.9	7.7		-	-	-
NSLP nonparticipants	431	5.3	0.25	2.3	2.8	3.7	5.0	6.5	8.1	9.3		-	-	-
All Students, Female												-	-	-
NSLP participants	558	4.7	0.17	2.7	3.0	3.7	4.5	5.5	6.5	7.2		-	-	-
NSLP nonparticipants	480	5.0	0.39	1.4	1.9	3.0	4.5	6.5	8.7	10.1		-	-	-

	Oils Intakes (tsp)										Recommended Daily Amount of Oils (tsp), by Calorie Level ^a			
	N	Mean	SE	Percentiles							1,800	2,000	2,400	
				5	10	25	50	75	90	95				
By School Type and Gender														
Elementary School Students												5.0	–	–
NSLP participants	536	4.7	0.19	2.7	3.1	3.7	4.5	5.5	6.5	7.2		5.0	–	–
NSLP nonparticipants	208	4.6	0.48	0.9 ^	1.4	2.4	4.0	6.2	8.6	10.5 ^		5.0	–	–
Elementary School Students, Male												5.0	–	–
NSLP participants	280	4.7	0.23	2.6 ^	2.9	3.6	4.5	5.6	6.7	7.4 ^		5.0	–	–
NSLP nonparticipants	94	4.5	0.51	1.1 ^	1.5 ^	2.5	3.9	5.9	8.1 ^	9.8 ^		5.0	–	–
Elementary School Students, Female												5.0	–	–
NSLP participants	256	4.8	0.24	2.8 ^	3.1	3.8	4.6	5.6	6.6	7.3 ^		5.0	–	–
NSLP nonparticipants	114	4.9	0.69	1.0 ^	1.5 ^	2.6	4.2	6.4	9.1 ^	11.0 ^		5.0	–	–
Middle School Students												–	6.0	–
NSLP participants	405	4.6	0.25	2.6	3.0	3.6	4.4	5.4	6.4	7.1		–	6.0	–
NSLP nonparticipants	308	5.1	0.24	2.4 ^	2.9	3.8	4.9	6.2	7.6	8.5 ^		–	6.0	–
Middle School Students, Male												–	6.0	–
NSLP participants	238	4.9	0.36	2.7 ^	3.1	3.8	4.7	5.8	7.0	7.7 ^		–	6.0	–
NSLP nonparticipants	144	5.7	0.39	2.2 ^	2.7 ^	3.8	5.3	7.2	9.3 ^	10.7 ^		–	6.0	–
Middle School Students, Female												–	6.0	–
NSLP participants	167	4.2	0.26	2.4 ^	2.7 ^	3.3	4.1	5.0	5.9 ^	6.6 ^		–	6.0	–
NSLP nonparticipants	164	4.6	0.46	1.6 ^	2.0 ^	3.0	4.2	5.8	7.6 ^	9.0 ^		–	6.0	–
High School Students												–	–	7.0
NSLP participants	308	5.5	0.42	1.9 ^	2.4	3.4	4.9	7.0	9.5	11.4 ^		–	–	7.0
NSLP nonparticipants	395	5.4	0.31	2.5 ^	2.9	3.8	5.1	6.6	8.2	9.3 ^		–	–	7.0
High School Students, Male												–	–	7.0
NSLP participants	173	6.2	0.68	2.1 ^	2.7 ^	3.8	5.5	7.8	10.7 ^	13.0 ^		–	–	7.0
NSLP nonparticipants	193	5.7	0.44	2.4 ^	2.9 ^	3.9	5.3	7.1	9.1 ^	10.5 ^		–	–	7.0
High School Students, Female												–	–	7.0
NSLP participants	135	4.8	0.37	1.7 ^	2.1 ^	2.9	4.3	6.0	8.1 ^	9.6 ^		–	–	7.0
NSLP nonparticipants	202	4.9	0.44	1.2 ^	1.7	2.8	4.4	6.4	8.7	10.3 ^		–	–	7.0

Source: School Nutrition and Meal Cost Study, 24-Hour Dietary Recalls: Day 1 and Day 2, school year 2014-2015. Tabulations are weighted to be representative of all students in public, non-charter schools offering the National School Lunch Program. Sample includes all students, including those who did not consume a lunch.

Notes: The comparison group of matched nonparticipants was constructed using inverse probability weighting to control for differences between NSLP participants and nonparticipants in personal, family, and school characteristics. See Appendix G for more detail on the propensity score model and the covariates used.

Usual food group intakes were estimated using the NCI method (Tooze et al 2010; Freedman et al. 2010).

Sample sizes for some subgroups of students may differ from the total sample size for the group because outliers had to be omitted (either for a subgroup or for the total group) in order to estimate usual intake distributions for specific food groups.

^aUSDA Food Pattern recommendations assign individuals to a calorie level based on their gender, age, and activity level (USDA, CNPP 2011). The Food Patterns for 1,800, 2,000, and 2,400 calories were used as reference standards for assessing usual food group intakes of elementary, middle, and high school students, respectively (IOM 2010).

^bThe DRI age group is 4 to 8 years; however, the dietary recall sample does not include 4- and 5-year-olds. This age group is not broken out by gender because of small sample sizes.

^cIncludes 13 students (9 males and 4 females) that were 19 years old.

DRI = Dietary Reference Intake; N = number (sample size); NCI = National Cancer Institute; NSLP = National School Lunch Program; SE = standard error; tsp = teaspoon.

– Not applicable. The analysis did not define reference values for usual daily intakes of USDA Food Pattern food groups for subgroups of students defined by age and gender. Rather, the analysis used a single USDA Food Pattern to define reference values for each school type (described above).

^ 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.

Table H.15. Usual Daily Intakes of Empty Calories: NSLP Participants and Matched Comparison Group of Nonparticipants

	Empty Calories Intakes (kcal)										Recommended Daily Amount of Empty Calories (kcal), by Calorie Level ^a			
	N	Mean	SE	Percentiles						1,800	2,000	2,400		
				5	10	25	50	75	90				95	
By Age/Gender Groups														
6 to 8 Years ^b														
NSLP participants	259	525	17.9	275 ^	318	398	505	628	757	847 ^	—	—	—	
NSLP nonparticipants	100	495	41.6	230 ^	274 ^	355	468	606	753 ^	848 ^	—	—	—	
9 to 13 Years														
NSLP participants	594	540	25.4	284	327	409	519	647	783	873	—	—	—	
NSLP nonparticipants	345	577	44.4	198 ^	261	385	546	736	933	1,061 ^	—	—	—	
9 to 13 Years, Male														
NSLP participants	336	577	34.9	333 ^	375	455	560	679	801	885 ^	—	—	—	
NSLP nonparticipants	158	593	39.2	309 ^	360 ^	458	582	712	841 ^	924 ^	—	—	—	
9 to 13 Years, Female														
NSLP participants	258	497	25.0	217 ^	260	349	466	613	771	884 ^	—	—	—	
NSLP nonparticipants	187	566	83.4	139 ^	202 ^	333	518	746	990 ^	1,162 ^	—	—	—	
14 to 18 Years ^c														
NSLP participants	401	573	24.6	239	290	390	533	711	907	1,044	—	—	—	
NSLP nonparticipants	466	599	23.4	295	347	446	577	725	883	987	—	—	—	
14 to 18 Years, Male ^c														
NSLP participants	230	642	39.0	230 ^	292	419	593	814	1,056	1,222 ^	—	—	—	
NSLP nonparticipants	229	663	42.8	229 ^	301	438	623	846	1,080	1,236 ^	—	—	—	
14 to 18 Years, Female ^c														
NSLP participants	171	487	27.4	293 ^	328 ^	390	473	567	666 ^	732 ^	—	—	—	
NSLP nonparticipants	237	518	30.1	198 ^	249	347	483	649	832	951 ^	—	—	—	
All Students														
NSLP participants	1,254	540	15.2	283	326	409	519	647	783	874	—	—	—	
NSLP nonparticipants	911	566	23.2	225	278	387	535	710	895	1,018	—	—	—	
All Students, Male														
NSLP participants	694	574	19.5	291	339	431	551	691	840	936	—	—	—	
NSLP nonparticipants	431	600	26.3	247	306	422	576	748	924	1,045	—	—	—	
All Students, Female														
NSLP participants	560	502	18.3	274	312	386	483	595	714	796	—	—	—	
NSLP nonparticipants	480	529	40.8	202	250	353	496	663	853	974	—	—	—	

	Empty Calories Intakes (kcal)										Recommended Daily Amount of Empty Calories (kcal), by Calorie Level ^a			
	N	Mean	SE	Percentiles							1,800	2,000	2,400	
				5	10	25	50	75	90	95				
By School Type and Gender														
Elementary School Students												161	–	–
NSLP participants	540	538	21.0	320	359	432	524	629	734	803	161	–	–	–
NSLP nonparticipants	208	528	48.1	188 ^	242	348	495	671	854	984 ^	161	–	–	–
Elementary School Students, Male												161	–	–
NSLP participants	282	542	27.3	339 ^	377	448	533	627	721	779 ^	161	–	–	–
NSLP nonparticipants	94	543	50.7	237 ^	294 ^	390	517	671	825 ^	933 ^	161	–	–	–
Elementary School Students, Female												161	–	–
NSLP participants	258	532	22.0	280 ^	321	403	511	635	768	859 ^	161	–	–	–
NSLP nonparticipants	114	528	71.4	167 ^	223 ^	330	481	674	894 ^	1,043 ^	161	–	–	–
Middle School Students												–	258	–
NSLP participants	406	493	21.0	290	326	392	478	576	680	751	–	–	258	–
NSLP nonparticipants	308	500	25.8	219 ^	269	362	481	616	754	847 ^	–	–	258	–
Middle School Students, Male												–	258	–
NSLP participants	239	549	31.7	324 ^	363	437	532	641	755	836 ^	–	–	258	–
NSLP nonparticipants	144	534	35.7	244 ^	296 ^	395	515	652	795 ^	899 ^	–	–	258	–
Middle School Students, Female												–	258	–
NSLP participants	167	429	22.6	256 ^	289 ^	344	417	499	586 ^	642 ^	–	–	258	–
NSLP nonparticipants	164	460	27.6	208 ^	246 ^	326	433	562	708 ^	814 ^	–	–	258	–
High School Students												–	–	330
NSLP participants	308	581	30.5	245 ^	297	399	542	717	915	1,058 ^	–	–	–	330
NSLP nonparticipants	395	603	27.7	314 ^	365	458	583	724	871	967 ^	–	–	–	330
High School Students, Male												–	–	330
NSLP participants	173	659	43.8	249 ^	314 ^	438	614	829	1,066 ^	1,233 ^	–	–	–	330
NSLP nonparticipants	193	678	48.3	215 ^	288 ^	429	629	880	1,136 ^	1,320 ^	–	–	–	330
High School Students, Female												–	–	330
NSLP participants	135	488	28.5	306 ^	337 ^	395	473	565	660 ^	727 ^	–	–	–	330
NSLP nonparticipants	202	520	29.2	206 ^	259	356	488	647	824	941 ^	–	–	–	330

Source: School Nutrition and Meal Cost Study, 24-Hour Dietary Recalls: Day 1 and Day 2, school year 2014-2015. Tabulations are weighted to be representative of all students in public, non-charter schools offering the National School Lunch Program. Sample includes all students, including those who did not consume a lunch.

Notes: The comparison group of matched nonparticipants was constructed using inverse probability weighting to control for differences between NSLP participants and nonparticipants in personal, family, and school characteristics. See Appendix G for more detail on the propensity score model and the covariates used.

Usual food group intakes were estimated using the NCI method (Tooze et al 2010; Freedman et al. 2010).

Sample sizes for some subgroups of students may differ from the total sample size for the group because outliers had to be omitted (either for a subgroup or for the total group) in order to estimate usual intake distributions for specific food groups.

^aUSDA Food Pattern recommendations assign individuals to a calorie level based on their gender, age, and activity level (USDA, CNPP 2011). The Food Patterns for 1,800, 2,000, and 2,400 calories were used as reference standards for assessing usual food group intakes of elementary, middle, and high school students, respectively (IOM 2010).

^bThe DRI age group is 4 to 8 years; however, the dietary recall sample does not include 4- and 5-year-olds. This age group is not broken out by gender because of small sample sizes.

^cIncludes 13 students (9 males and 4 females) that were 19 years old.

DRI = Dietary Reference Intake; N = number (sample size); NCI = National Cancer Institute; NSLP = National School Lunch Program; SE = standard error.

– Not applicable. The analysis did not define reference values for usual daily intakes of USDA Food Pattern food groups for subgroups of students defined by age and gender. Rather, the analysis used a single USDA Food Pattern to define reference values for each school type (described above).

[^] 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.

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Table H.16. Mean Proportion of 24-Hour Intakes of USDA Food Pattern Food Groups Contributed by Lunch: NSLP Participants and Matched Comparison Group of Nonparticipants, by Household Poverty Level

	Students from Lower Income Households		Students from Higher Income Households		All Students	
	Participants	Nonparticipants	Participants	Nonparticipants	Participants	Nonparticipants
Vegetables	31.2	23.2 [*]	35.7	23.5 ^{***}	33.0	23.4 ^{***}
Dark green	7.6	7.1 [^]	3.2 [^]	3.3	5.9	5.1
Red and orange	31.9	23.1	34.6	19.4 ^{***}	33.0	21.2 ^{***}
Legumes	4.5	3.8 [^]	5.3	3.3 [^]	4.8	3.5
Starchy	20.1	14.1	27.2	15.7 ^{**}	22.9	15.0 ^{**}
Other	20.1	18.6	16.9	13.5	18.8	15.9
Fruits ^a	36.9	37.1	34.7	41.1	36.0	39.2
Grains	28.7	34.8 [*]	36.2	37.7	31.7	36.3 [*]
Whole grains	49.3	31.7 ^{**}	55.8	28.9 ^{***}	51.9	30.2 ^{***}
Dairy	39.7	32.0 [*]	38.3	25.2 ^{***}	39.1	28.5 ^{***}
Protein Foods	33.0	36.7	34.4	42.6 ^{**}	33.5	39.8 [*]
Oils	33.6	40.1	38.0	39.6	35.3	39.8
Empty Calories	21.5	28.9 ^{**}	24.1	30.6 ^{***}	22.5	29.8 ^{***}
Calories from solid fats	20.2	26.2	22.4	28.9 ^{**}	21.0	27.6 ^{**}
Calories from added sugars	24.3	31.9 [*]	28.5	31.9	25.9	31.9 ^{**}
Number of Students	757	210	475	614	1,232	824

Source: School Nutrition and Meal Cost Study, 24-Hour Dietary Recalls: Day 1, school year 2014-2015. Tabulations are weighted to be representative of all students in public, non-charter schools offering the National School Lunch Program. Sample excludes 42 students with missing data on household poverty level and students who did not consume a lunch.

Notes: The comparison group of matched nonparticipants was constructed using inverse probability weighting to control for differences between NSLP participants and nonparticipants in personal, family, and school characteristics. See Appendix G for more detail on the propensity score model and the covariates used.

Lower income households had incomes less than or equal to 185 percent of the Federal poverty level; higher income households had incomes greater than 185 percent of the Federal poverty level.

Lunch intakes for both NSLP participants and the matched comparison group of nonparticipants include all foods and beverages consumed at lunch. For NSLP participants, this may include, in addition to foods and beverages obtained as part of a reimbursable lunch, foods and beverages obtained from non-reimbursable sources at school, from home, and/or from other sources outside of school.

The USDA Food Pattern food groups are largely consistent with the meal components used in planning NSLP lunches, with two exceptions: (1) fluid milk is considered a separate meal component, and (2) other dairy foods such as yogurt and cheese are counted as meat alternates.

^aIntakes of fruit include both whole fruit (any fresh, canned, dried, or frozen fruit) and 100% fruit juice.

Difference between participants and the matched comparison group of nonparticipants is significantly different from zero at the *** 0.001 level, ** 0.01 level, or * 0.05 level.

NSLP = National School Lunch Program.

^ 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.

Table H.17. Usual Daily Intakes of USDA Food Pattern Food Groups: Mean Proportion of Daily Recommended Amounts Consumed by NSLP Participants and Matched Comparison Group of Nonparticipants, by Household Poverty Level

	Students from Lower Income Households		Students from Higher Income Households		All Students	
	Participants	Nonparticipants	Participants	Nonparticipants	Participants	Nonparticipants
Vegetables ^a	40.7	39.4	37.2	38.7	39.4	38.0
Red and orange	33.3	36.4	35.3	34.5	34.3	33.7
Other	46.8	35.7	36.4	42.5	43.0	39.2
Fruits ^b	90.4	67.5**	74.3	89.5**	84.3	78.5
Grains	115.2	110.9	110.9	123.4	113.1	117.1
Whole grains	51.9	35.1***	51.7	39.7**	51.8	37.3***
Dairy	81.9	70.8*	85.1	74.1	83.3	72.3**
Protein Foods	76.9	76.6	81.5	88.3	78.4	82.5
Oils	83.8	90.0	91.6	91.1	85.3	90.4
Empty Calories	276.1	262.2	262.6	281.2	271.1	271.2
Number of Students	757	247	475	644	1,232	891

Source: School Nutrition and Meal Cost Study, 24-Hour Dietary Recalls: Day 1 and Day 2, school year 2014-2015. Tabulations are weighted to be representative of all students in public, non-charter schools offering the National School Lunch Program. Sample excludes 42 students with missing data on household poverty level; all other students, including those who did not consume a lunch, are included in the analysis.

Notes: The comparison group of matched nonparticipants was constructed using inverse probability weighting to control for differences between NSLP participants and nonparticipants in personal, family, and school characteristics. See Appendix G for more detail on the propensity score model and the covariates used.

Lower income households had incomes less than or equal to 185 percent of the Federal poverty level; higher income households had incomes greater than 185 percent of the Federal poverty level.

Usual nutrient intakes were estimated using the NCI method (Tooze et al 2010; Freedman et al. 2010).

USDA Food Pattern recommendations assign individuals to a calorie level based on their gender, age, and activity level (USDA, CNPP 2011). The Food Patterns for 1,800, 2,000, and 2,400 calories were used as reference standards for assessing usual food group intakes of elementary, middle, and high school students, respectively (IOM 2010). The USDA Food Patterns provide weekly recommendations for vegetable subgroups. For this analysis, weekly recommendations were divided by 7 (days per week) to reflect daily recommendations.

The USDA Food Pattern food groups are largely consistent with the meal components used in planning NSLP lunches, with two exceptions: (1) fluid milk is considered a separate meal component, and (2) other dairy foods such as yogurt and cheese are counted as meat alternates.

Actual sample sizes for some food groups and subgroups of students differ from the reported total sample sizes because outliers had to be omitted, on a food group by student subgroup basis, in order to estimate usual intake distributions.

^aUsual intake distributions of dark green vegetables, starchy vegetables, and legumes could not be reliably estimated because so few students consumed these foods. Dark green vegetables, starchy vegetables, and legumes are included in the (total) vegetables group. All legumes were counted as vegetables in this analysis.

^bIntakes of fruit include both whole fruit (any fresh, canned, dried, or frozen fruit) and 100% fruit juice.

Difference between participants and the matched comparison group of nonparticipants is significantly different from zero at the *** 0.001 level, ** 0.01 level, or * 0.05 level.

NCI = National Cancer Institute; NSLP = National School Lunch Program.