Supplementary Online Content

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This supplementary material has been provided by the authors to give readers additional information about their work.

eTable 1. Healthy Eating Index-2010 scoring criteria standards

Healthy Eating Index-2010 components	Score[a]	Standard for Maximum Score	Standard for Minimum Score
	0-100	Sum of all components	
Adequacy components:[b]			
Total Fruit[c]	0-5	≥ 0.8 cup equivalent/1000 kcal	No fruit
Whole Fruit[d]	0-5	≥ 0.4 cup equivalent/1000 kcal	No whole fruit
Total Vegetables[e]	0-5	≥ 1.1 cup equivalents/1000 kcal	No vegetables
Greens and Beans[f]	0-5	≥ 0.2 cup equivalent/1000 kcal	No dark-green vegetables, beans, or peas
Whole Grains	0-10	≥ 1.5 ounce equivalents/1000 kcal	No whole grains
Dairy[g]	0-10	≥ 1.3 cup equivalents/1000 kcal	No dairy
Total Protein Food[h]	0-5	≥ 2.5 ounce equivalents/1000 kcal	No protein foods
Seafood/Plant Proteins[h,i]	0-5	≥ 0.8 ounce equivalent/1000 kcal	No seafood or plant proteins
Fatty Acids[j]	0-10	(PUFAs+MUFAs)/SFAs ≥ 2.5	(PUFAs + MUFAs)/SFAs ≤ 1.2
Moderation components:[k]			
Sodium	0-10	≤ 1.1 grams/1000 kcal	≥ 2.0 grams/1000 kcal
Refined Grains	0-10	≤ 1.8 ounce equivalents/1000 kcal	≥ 4.3 ounce equivalents/1000 kcal
SOFAAS[l]	0-20	≤ 19% of energy	≥ 50% of energy

[a] Intakes between the minimum and maximum standards are scored proportionately.

[b] Nine of the components are adequacy components which reflect adequacy of nutrient intake. Greater intake leads to a higher score.

[c] Includes 100% fruit juice

[d] Includes all forms except juice.

[e] Includes legumes (beans and peas) not counted as Total Protein Foods.

[f] Greens and Beans is a subcomponent of Total Vegetables and refers to dark green vegetables and beans and peas.

[g] Includes all milk products, such as fluid milk, yogurt, and cheese, and fortified soy beverages

[h] Beans and peas are included here (and not with vegetables) when the Total Protein Foods standard is otherwise not met.

[i] Includes seafood, nuts, seeds, soy products (other than beverages) as well as beans and peas counted as Total Protein Foods.

[j] Ratio of poly- and monounsaturated fatty acids (PUFAs and MUFAs) to saturated fatty acids (SFAs).

[k] Three of the components are moderation components which reflect moderation of nutrient intake. Less intake represents a higher score.

[l] Calories from solid fats, alcohol, and added sugars (SOFAAS); threshold for counting alcohol is >13 grams/1000 kcal.

Source: National Cancer Institute, Division of Cancer Control and Genomics. Developing the Healthy Eating Index (HEI), HEI-2010 Components and Scoring Standards. US Department of Health and Human Services, National Institutes of Health, Epidemiology and Genomics Research Program. https://epi.grants.cancer.gov/hei/developing.html#2010c. Updated March 13, 2020. Accessed April 7, 2020.

eTable 2. Sample characteristics stratified by pre- and post-HHFKA[a] policy implementation.

	Pre-HHFKA policy		Post-HHFKA policy	
	NSLP[b] participants	**NSLP non-participants**	**NSLP participants**	**NSLP non-participants**
Demographic Variables	n=1222	n=1952	n=1250	n=1965
Age Category (No, %)[c]				
5-8 years old	415 (30.7)	449 (21.6)	357 (26.0)	461 (22.6)
9-13 years old	446 (33.1)	656 (30.8)	475 (36.4)	622 (30.9)
14-18 years old	361 (36.2)	847 (47.6)	418 (37.5)	882 (46.5)
Sex (No, %)				
Male	662 (54.4)	958 (46.1)	678 (55.3)	946 (48.8)
Female	560 (45.6)	994 (53.9)	572 (44.7)	1,019 (51.2)
Race/Ethnicity[d] (No, %)				
Non-Hispanic white	332 (52.1)	674 (64.0)	307 (46.0)	567 (55.5)
Non-Hispanic black	322 (18.0)	446 (12.5)	330 (15.7)	472 (14.0)
Mexican American	367 (16.5)	462 (11.3)	314 (19.7)	388 (13.0)
Other non-Hispanic	62 (5.9)	112 (5.4)	156 (10.2)	311 (9.8)
Other Hispanic	139 (7.6)	258 (6.8)	143 (8.4)	227 (7.6)
Income Poverty Level (No, %)				
≤130% of federal poverty line	577 (38.7)	813 (28.6)	634 (42.4)	786 (27.1)
>130 to ≤ 185% of federal poverty line	167 (12.3)	259 (10.9)	198 (16.3)	263 (10.2)
>185% of federal poverty line	478 (48.9)	880 (60.5)	418 (41.3)	916 (62.7)
School Grade Level (No, %)				
Elementary (K-5th grade)	806 (59.3)	994 (45.5)	755 (55.1)	955 (47.2)
Middle (6-8th grade)	233 (21.8)	479 (26.2)	302 (27.4)	485 (23.9)
High (9th-12th grade)	183 (18.9)	479 (28.3)	193 (17.5)	525 (28.9)
Time Period of Dietary Recall (No, %)				
November-April	712 (50.6)	840 (32.0)	704 (51.6)	843 (38.2)
May-October	510 (49.4)	1,112 (68.0)	546 (48.4)	1,122 (61.8)
Age, years (Mean, 95% CI)[c]	11.1 (10.7, 11.4)	12.0 (11.8, 12.3)	11.3 (11.0, 11.6)	12.0 (11.7, 12.3)
Body Mass Index, kg/m^2 (Mean, 95% CI)	20.9 (20.3, 21.5)	21.1 (20.7, 21.4)	21.2 (20.7, 21.7)	21.1 (20.7, 21.9)
HEI-2010 Lunch score (Mean, 95% CI)	42.7 (41.4, 44.0)	37.0 (35.6, 38.3)	42.7 (54.1, 56.4)	37.0 (38.4, 42.1)
HEI-2010 Total Day score (Mean, 95% CI)	46.8 (45.9, 47.7)	45.8 (44.9, 46.6)	46.8 (50.6, 52.8)	45.8 (47.3, 49.8)

[a] HHFKA: Healthy, Hunger-Free Kids Act of 2010. Pre-HHFKA policy time period contains data from 2007-2010. Post-HHFKA policy time period contains data from 2013-2016.
[b] NSLP: National School Lunch Program
[c] Proportions are calculated based on the survey weighted sample; Means and confidence intervals are estimated accounting for the complex sampling design and using Taylor series linearized standard errors.
[d] Race and ethnicity are self-reported by the child or proxy based on fixed categories provided by the National Center for Health Statistics.

eTable 3. Unadjusted mean HEI−2010[a] lunch and total day scores pre− and post−HHFKA[b] policy among NSLP[c] participants and non-participants based on income level.

	Low Income[d]				Low-Middle Income[d]				Middle-High Income[d]			
	Pre-HHFKA policy Mean (95% CI)[e]		Post-HHKFA policy Mean (95% CI)		Pre-HHFKA policy Mean (95% CI)		Post-HHFKA policy Mean (95% CI)		Pre-HHFKA policy Mean (95% CI)		Post-HHFKA policy Mean (95% CI)	
Dietary Quality Measure	NSLP participant	NSLP non-participant	NSLP participant	NSLP non-participant	NSLP participant	NSLP non-participant	NSLP participant	NSLP non-participant	NSLP participant	NSLP non-participant	NSLP participant	NSLP non-participant
HEI-2010 Lunch score	43.1 (41.2, 45.0)	34.7 (32.5, 36.8)	54.8 (53.2, 56.4)	33.7 (31.7, 35.7)	41.6 (38.2, 45.0)	33.3 (28.3, 38.3)	55.2 (51.8, 58.6)	35.9 (32.8, 39.1)	42.7 (40.6, 44.7)	38.7 (37.2, 40.3)	55.7 (53.5, 57.9)	43.8 (41.8, 45.7)
HEI-2010 Total Day score	47.3 (45.4, 49.2)	44.4 (43.0, 45.8)	51.5 (49.9, 53.2)	45.6 (44.0, 47.3)	46.5 (44.5, 48.4)	44.5 (41.5, 47.5)	51.7 (49.0, 54.4)	46.0 (43.9, 48.1)	46.5 (45.4, 47.7)	46.7 (45.7, 47.7)	52.0 (50.0, 53.9)	50.2 (48.5, 51.9)

[a] HEI-2010: HEI-2010: Healthy Eating Index 2010: The primary outcome measure was dietary quality of intake for lunch (all foods consumed between 10:00-14:00) and a secondary outcome measure was dietary quality of intake for total day (all foods consumed during a 24-hour period) using the Healthy Eating Index-2010 which is the sum of twelve component scores that align with key food groups and nutrients. The twelve components include total fruit, whole fruit, total vegetables, greens and beans, whole grains, dairy, total protein foods, seafood and plant proteins, fatty acids, refined grains, sodium, and energy from solid fats, alcohol, and added sugars. The total score ranges from 0 to 100 (each of the twelve component scores has a range of 0-5, 0-10, or 0-20 and these are summed together). Scoring standards are set based on a density approach so that component scores are based on per 1,000 calories or as a percentage of calories in order to measure dietary quality of children who have varying energy requirements. A score of 100 represents complete adherence to the 2010 Dietary Guidelines for Americans and a score of 0 represents no adherence to the 2010 Dietary Guidelines for Americans. Nine of the HEI component scores reflect adequacy of nutrient intake including consumption of total vegetables (and dark green and orange vegetables and legumes), total fruit (and whole fruit), whole grains, dairy, total protein foods (and seafood and plant proteins), and fatty acids. Three of the HEI component scores reflect moderation of intake including refined grains, sodium, and energy from solid fats, alcohol, and added sugars (SOFAAS). A HEI score of 40 (out of 100) can be interpreted as a diet adhering to 40% of the recommendations from the Dietary Guidelines. A minimum clinically important difference has not been established.

[b] HHFKA: Healthy, Hunger-Free Kids Act of 2010. Pre-HHFKA policy time period contains data from 2007-2010. Post-HHFKA policy time period contains data from 2013-2016.

[c] NSLP: National School Lunch Program

[d] Income was categorized by using criteria for free, reduced price and full price lunch (income to poverty ratio categories less than or equal to 130% of the federal poverty line as low income, greater than 130% to less than or equal to 185% of the federal poverty line as low-middle income, and greater than 185% of the federal poverty line as middle-high income).

[e] Confidence intervals are estimated accounting for survey sampling design from Taylor Series linearized standard errors.

eTable 4. Population Ratio Method[a] means for HEI-2010[b] total day component scores, stratified by time period and income level.

Dietary Quality Measure	Mean HEI-2010 Scores: Population Ratio Method						
	All school children	Low Income[c]		Low-Middle Income[c]		Middle-High Income[c]	
		Pre-HHFKA policy[d]	Post-HHFKA policy	Pre-HHFKA policy	Post-HHFKA policy	Pre-HHFKA policy	Post-HHFKA policy
	N=6389	N=1390	N=1420	N=426	N=461	N=1358	N=1334
HEI-2010 Total Day Score (0-100)	54.7	52.1	53.3	53.5	55.5	54.2	58.2
Total Fruit (0-5)	3.6	3.6	3.5	3.5	3.6	3.2	3.7
Whole Fruit (0-5)	4.4	4.1	4.1	4.5	4.3	4.4	5.0
Total Vegetables (0-5)	2.3	2.2	2.3	2.3	2.4	2.2	2.4
Greens and Beans (0-5)	1.2	1.2	1.2	1.2	1.2	1.1	1.5
Whole Grains (0-10)	2.8	1.8	2.2	2.2	3.2	3.3	4.0
Dairy (0-10)	8.6	8.9	8.5	8.8	8.6	8.3	8.4
Total Protein Food (0-5)	4.7	4.7	4.7	4.8	4.7	4.5	4.7
Seafood and Plant Proteins (0-5)	2.5	2.0	2.2	2.7	2.3	2.6	3.0
Fatty Acids (0-10)	3.2	3.1	3.5	3.3	3.2	3.1	3.0
Sodium (0-10)	4.2	4.3	4.6	4.2	4.1	3.8	4.0
Refined Grains (0-10)	4.4	4.4	4.6	4.4	4.0	4.5	4.7
SOFAAS (0-20)	12.8	11.6	12.0	11.7	13.9	13.2	13.9

[a] The population ratio method estimates usual intake for a group of people at the population level, not the individual level. Specifically, different than the simple HEI scoring algorithm method which provides a mean total score that is the mean of the total scores across individuals, the population ratio method sums the dietary constituents and energy for all individuals in a population to obtain estimates of the population's total intake, and then the ratios of each constituent to energy are computed and scored. Population Ratio Method derived from the National Cancer Institute: https://epi.grants.cancer.gov/hei/population-ratio-method.html.

[b] HEI-2010: Healthy Eating Index 2010: The primary outcome measure was dietary quality of intake for lunch (all foods consumed between 10:00-14:00) and a secondary outcome measure was dietary quality of intake for total day (all foods consumed during a 24-hour period) using the Healthy Eating Index-2010 which is the sum of twelve component scores that align with key food groups and nutrients. The twelve components include total fruit, whole fruit, total vegetables, greens and beans, whole grains, dairy, total protein foods, seafood and plant proteins, fatty acids, refined grains, sodium, and energy from solid fats, alcohol, and added sugars. The total score ranges from 0 to 100 (each of the twelve component scores has a range of 0-5, 0-10, or 0-20 and these are summed together). Scoring standards are set based on a density approach so that component scores are based on per 1,000 calories or as a percentage of calories in order to measure dietary quality of children who have varying energy requirements. A score of 100 represents complete adherence to the 2010 Dietary Guidelines for Americans and a score of 0 represents no adherence to the 2010 Dietary Guidelines for Americans. Nine of the HEI component scores reflect adequacy of nutrient intake including consumption of total vegetables (and dark green and orange vegetables and legumes), total fruit (and whole fruit), whole grains, dairy, total protein foods (and seafood and plant proteins), and fatty acids. Three of the HEI component scores reflect moderation of intake including refined grains, sodium, and energy from solid fats, alcohol, and added sugars (SOFAAS). A HEI score of 40 (out of 100) can be interpreted as a diet adhering to 40% of the recommendations from the Dietary Guidelines. A minimum clinically important difference has not been established.

[c] Income was categorized by using criteria for free, reduced price and full price lunch (income to poverty ratio categories less than or equal to 130% of the federal poverty line as low income, greater than 130% to less than or equal to 185% of the federal poverty line as low-middle income, and greater than 185% of the federal poverty line as middle-high income).

[d] HHFKA: Healthy, Hunger-Free Kids Act of 2010. Pre-HHFKA policy time period contains data from 2007-2010. Post-HHFKA policy time period contains data from 2013-2016.

eTable 5. Sensitivity analyses for regression-based difference-in-differences estimates of mean HEI-2010[a] lunch and total day scores for NSLP[b] participants compared to non-participants from pre- to post-HHFKA[c] stratified by income level.

Diet Quality Measure	Low Income[d]	Low-Middle Income[d]	Middle-High Income[d]
	Difference-in-differences estimate (95% CI)[e]	Difference-in-differences estimate (95% CI)	Difference-in-differences estimate (95% CI)
HEI-2010: Lunch score (primary model)[f]	12.6 (8.9, 16.3)	12.4 (4.9, 19.9)	8.1 (4.2, 12.0)
HEI-2010: Lunch score (model with no summer months)[g]	13.6 (6.4, 20.7)	12.8 (2.2, 23.4)	7.5 (0.3, 14.8)
HEI-2010: Lunch score (model not controlling for Body Mass Index)[h]	12.6 (8.9, 16.3)	12.5 (4.9, 20.0)	8.2 (4.3, 12.1)
HEI-2010: Lunch score (model controlling for physical activity)[i]	12.8 (9.1, 16.5)	12.0 (4.5, 19.5)	8.0 (4.1, 12.0)
HEI-2010: Lunch score (model controlling for day of week of dietary recall)[j]	12.6 (8.9, 16.3)	12.4 (4.9, 19.9)	8.1 (4.2, 12.1)
Multiple Imputation (model accounting for missing dietary recall and participant status)[k]	7.4 (4.1, 10.7)	10.0 (3.8, 16.2)	6.8 (3.6, 9.9)

[a] HEI-2010: Healthy Eating Index 2010: The primary outcome measure was dietary quality of intake for lunch (all foods consumed between 10:00-14:00) and a secondary outcome measure was dietary quality of intake for total day (all foods consumed during a 24-hour period) using the Healthy Eating Index-2010 which is the sum of twelve component scores that align with key food groups and nutrients. The twelve components include total fruit, whole fruit, total vegetables, greens and beans, whole grains, dairy, total protein foods, seafood and plant proteins, fatty acids, refined grains, sodium, and energy from solid fats, alcohol, and added sugars. The total score ranges from 0 to 100 (each of the twelve component scores has a range of 0-5, 0-10, or 0-20 and these are summed together). Scoring standards are set based on a density approach so that component scores are based on per 1,000 calories or as a percentage of calories in order to measure dietary quality of children who have varying energy requirements. A score of 100 represents complete adherence to the 2010 Dietary Guidelines for Americans and a score of 0 represents no adherence to the 2010 Dietary Guidelines for Americans. Nine of the HEI component scores reflect adequacy of nutrient intake including consumption of total vegetables (and dark green and orange vegetables and legumes), total fruit (and whole fruit), whole grains, dairy, total protein foods (and seafood and plant proteins), and fatty acids. Three of the HEI component scores reflect moderation of intake including refined grains, sodium, and energy from solid fats, alcohol, and added sugars (SOFAAS). A HEI score of 40 (out of 100) can be interpreted as a diet adhering to 40% of the recommendations from the Dietary Guidelines. A minimum clinically important difference has not been established.

[b] NSLP: National School Lunch Program

[c] HHFKA: Healthy, Hunger-Free Kids Act of 2010. Pre-HHFKA policy time period contains data from 2007-2010. Post-HHFKA policy time period contains data from 2013-2016.

[d] Income was categorized by using criteria for free, reduced price and full price lunch (income to poverty ratio categories less than or equal to 130% of the federal poverty line as low income, greater than 130% to less than or equal to 185% of the federal poverty line as low-middle income, and greater than 185% of the federal poverty line as middle-high income).

[e] Confidence intervals are estimated accounting for survey sampling design from Taylor Series linearized standard errors.

[f] Primary model includes regression-based difference-in-differences estimates adjusted for age, gender, race/ethnicity, school grade level, time period of dietary recall and Body Mass Index.

[g] Model with no summer months excludes all children in our sample who reported their dietary recall from May to October when school may not be in session due to the timing of summer break for school. This model included regression-based difference-in-differences estimates adjusted for age, gender, race/ethnicity, school grade level, and Body Mass Index.

[h] Model not controlling for Body Mass Index consists of regression-based difference-in-differences estimates adjusted for age, gender, race/ethnicity, school grade level, and time period of dietary recall.

[I] Model controlling for physical activity consists of regression-based difference-in-differences estimates adjusted for age, gender, race/ethnicity, school grade level, Body Mass Index, time period of dietary recall, and physical activity status.

[j] Model controlling for day of week of dietary recall consists of regression-based difference-in-differences estimates adjusted for age, gender, race/ethnicity, school grade level, Body Mass Index, time period of dietary recall, and day of dietary recall.

[k] Model uses multiple imputation to impute HEI-2010 lunch scores (from a joint multivariate normal imputation model) and participation status (from a logit imputation model) for 1213 individuals who were missing the dietary recall but who otherwise met inclusion criteria and had information on the remaining covariates. The imputation model includes all of the variables in the primary model and 50 imputation data sets were created and combined using the multiple imputation package in Stata. N for model is 7602.

eTable 6. Generalized linear model with gamma distribution and log link difference-in-differences estimates of HEI-2010[a] component scores from pre- to post-HHFKA[b] for NSLP[c] participants compared to non-participants, stratified by income as sensitivity analysis.

Diet Quality Measure	Low Income[d]		Low-Middle Income[d]		Middle-High Income[d]	
	Generalized linear model difference-in-differences estimate[e] (95% CI)[f]	P-value	Generalized linear model difference-in-differences estimate (95% CI)	P-value	Generalized linear model difference-in-differences estimate (95% CI)	P-value
HEI-2010 Lunch score						
Total Fruit (0-5)	0.5 (0.2, 0.8)	0.01	0.6 (0.0, 1.2)	0.04	0.1 (-0.2, 0.4)	0.53
Whole Fruit (0-5)	0.5 (0.1, 0.9)	0.01	0.6 (-0.2, 1.4)	0.15	0.1 (-0.2, 0.5)	0.52
Total Vegetables (0-5)	0.2 (-0.1, 0.6)	0.17	-0.0 (-0.5, 0.5)	0.95	0.0 (-0.2, 0.3)	0.82
Greens and Beans (0-5)	0.2 (-0.7, 1.1)	0.64	6.3 (2.4,10.2)	0.00	1.4 (0.1, 2.6)	0.03
Whole Grains (0-10)	2.1 (1.6, 2.7)	0.00	3.5 (2.5, 4.4)	0.00	1.9 (1.4, 2.4)	0.00
Dairy (0-10)	0.1 (-0.0, 0.3)	0.09	-0.2 (-0.5, 0.1)	0.18	-0.0 (-0.2, 0.1)	0.63
Total Protein Food (0-5)	0.2 (0.1, 0.4)	0.01	0.1 (-0.4, 0.5)	0.73	-0.1 (-0.2, 0.1)	0.29
Seafood and Plant Proteins (0-5)	1.3 (0.8, 1.8)	0.00	2.8 (1.7, 3.9)	0.00	0.5 (-0.1, 1.1)	0.09
Fatty Acids (0-10)	0.2 (-0.0, 0.5)	0.05	0.0 (-0.4, 0.4)	0.81	0.1 (-0.1, 0.4)	0.25
Sodium (0-10)	0.1 (-0.2, 0.3)	0.67	0.5 (0.1, 1.0)	0.01	0.2 (-0.0, 0.4)	0.10
Refined Grains (0-10)	0.3 (0.1, 0.5)	0.00	0.4 (-0.0, 0.9)	0.05	0.3 (0.1, 0.4)	0.01
SOFAAS (0-20)	0.2 (0.1, 0.4)	0.01	0.0 (-0.3, 0.3)	0.93	0.1 (-0.0, 0.2)	0.09
HEI-2010 Total Day score						
Total Fruit (0-5)	0.2 (-0.0, 0.4)	0.08	0.2 (-0.2, 0.6)	0.38	-0.1 (-0.3, 0.1)	0.53
Whole Fruit (0-5)	0.2 (-0.0, 0.5)	0.05	0.1 (-0.5, 0.7)	0.83	-0.0 (-0.3, 0.2)	0.70
Total Vegetables (0-5)	-0.0 (-0.2, 0.1)	0.63	0.0 (-0.2, 0.3)	0.84	0.1 (-0.1, 0.2)	0.44
Greens and Beans (0-5)	0.3 (-0.3, 0.8)	0.32	0.6 (-0.6, 1.9)	0.32	-0.3 (-0.8, 0.2)	0.26
Whole Grains (0-10)	0.8 (0.6, 1.1)	0.00	0.5 (0.0, 1.1)	0.04	0.6 (0.3, 0.8)	0.00
Dairy (0-10)	0.0 (-0.1, 0.1)	0.68	0.1 (-0.1, 0.3)	0.53	0.1 (-0.0, 0.1)	0.28
Total Protein Food (0-5)	-0.0 (-0.1, 0.1)	0.50	-0.1 (-0.3, 0.2)	0.67	-0.0 (-0.1, 0.1)	0.87
Seafood and Plant Proteins (0-5)	0.3 (-0.1, 0.6)	0.13	0.5 (-0.2, 1.2)	0.16	-0.1 (-0.4, 0.2)	0.72
Fatty Acids (0-10)	-0.0 (-0.3, 0.2)	0.80	-0.0 (-0.4, 0.3)	0.88	0.0 (-0.2, 0.2)	0.81
Sodium (0-10)	0.0 (-0.1, 0.2)	0.69	0.1 (-0.2, 0.5)	0.46	-0.1 (-0.3, 0.1)	0.44
Refined Grains (0-10)	-0.0 (-0.2, 0.2)	0.85	-0.0 (-0.3, 0.3)	0.97	-0.0 (-0.2, 0.1)	0.59
SOFAAS (0-20)	0.0 (-0.1, 0.1)	0.73	0.0 (-0.2, 0.3)	0.67	0.1 (-0.0, 0.2)	0.20

[a] HEI-2010: Healthy Eating Index 2010: The primary outcome measure was dietary quality of intake for lunch (all foods consumed between 10:00-14:00) and a secondary outcome measure was dietary quality of intake for total day (all foods consumed during a 24-hour period) using the Healthy Eating Index-2010 which is the sum of twelve component scores that align with key food groups and nutrients. The twelve components include total fruit, whole fruit, total vegetables, greens and beans, whole grains, dairy, total protein foods, seafood and plant proteins, fatty acids, refined grains, sodium, and energy from solid fats, alcohol, and added sugars. The total score ranges from 0 to 100 (each of the twelve component scores has a range of 0-5, 0-10, or 0-20 and these are summed together). Scoring standards are set based on a density approach so that component scores are based on per 1,000 calories or as a percentage of calories in order to measure dietary quality of children who have varying energy requirements. A score of 100 represents complete adherence to the 2010 Dietary Guidelines for Americans and a score of 0 represents no adherence to the 2010 Dietary Guidelines for Americans. Nine of the HEI component scores reflect adequacy of nutrient intake including consumption of total vegetables (and dark green and orange vegetables and legumes), total fruit (and whole fruit), whole grains, dairy, total protein foods (and seafood and plant proteins), and fatty acids. Three of the HEI component scores reflect moderation of intake including refined grains, sodium, and energy from solid fats, alcohol, and added sugars (SOFAAS). A HEI score of 40 (out of 100) can be interpreted as a diet adhering to 40% of the recommendations from the Dietary Guidelines. A minimum clinically important difference has not been established.

[b] HHFKA: Healthy, Hunger-Free Kids Act of 2010

[c] NSLP: National School Lunch Program

[d] Income was categorized by using criteria for free, reduced price and full price lunch (income to poverty ratio categories less than or equal to 130% of the federal poverty line as low income, greater than 130% to less than or equal to 185% of the federal poverty line as low-middle income, and greater than 185% of the federal poverty line as middle-high income).

[e] Generalized linear model with gamma distribution and log-link difference-in-differences estimates adjusted for age, gender, race/ethnicity, school grade level, time period of dietary recall and Body Mass Index.
[f] Confidence intervals are estimated accounting for survey sampling design from Taylor Series linearized standard errors.

eTable 7. Difference-in-differences estimates for mean HEI-2010[a] scores from years 2007-2008 to 2009-2010 before implementation of the HHFKA[b] for NSLP[c] participants compared to non-participants, stratified by income level.

Dietary Quality Measure	NSLP participants 2007-2008 Mean (95% CI)[e]	NSLP participants 2009-2010 Mean (95% CI)	NSLP participants Mean Difference[f] (95% CI)	NSLP non-participants 2007-2008 Mean (95% CI)	NSLP non-participants 2009-2010 Mean (95% CI)	NSLP non-participants Mean Difference (95% CI)	Difference-in-differences estimate[g] (95% CI)
Low Income[d]							
HEI-2010 Lunch score	43.1 (41.2, 45.0)	41.6 (38.6, 44.7)	-1.5 (-5.0, 2.0)	34.7 (31.0, 38.4)	35.6 (33.4, 37.9)	0.9 (-3.4, 5.3)	-2.4 (-7.8, 3.0)
HEI-2010 Total Day score	46.5 (44.3, 48.8)	47.1 (44.6, 49.6)	0.6 (-2.5, 3.7)	44.1 (42.0, 46.2)	45.2 (43.5, 47.0)	1.1 (-1.6, 3.9)	-0.6 (-4.4, 3.2)
Low-Middle Income[d]							
HEI-2010 Lunch score	41.0 (37.0,45.1)	39.5 (35.0, 44.0)	-1.5 (-7.3, 4.2)	31.1 (23.7, 38.4)	36.6 (33.3, 39.9)	5.5 (-1.5, 12.5)	-7.1 (-15.3, 1.2)
HEI-2010 Total Day score	45.3 (42.3, 48.3)	45.6 (42.1,49.1)	0.3 (-3.7, 4.3)	42.1 (39.9, 44.3)	47.6 (43.9, 51.2)	5.5 (1.5, 9.4)	-5.2 (-10.7, 0.3)
Middle-High Income[d]							
HEI-2010 Lunch score	42.5 (39.9, 45.1)	43.1 (39.3, 46.8)	0.6 (-3.7, 4.8)	37.3 (34.8, 39.8)	40.1 (38.1, 42.0)	2.8 (-0.3, 5.9)	-2.2 (-8.0, 3.6)
HEI-2010 Total Day score	46.4 (44.8, 48.0)	47.3 (45.9, 48.8)	0.9 (-1.0, 2.9)	45.9 (44.3, 47.4)	47.3 (45.9, 48.6)	1.4 (-0.7, 3.5)	-0.5 (-3.2, 2.3)

[a] HEI-2010: Healthy Eating Index 2010: The primary outcome measure was dietary quality of intake for lunch (all foods consumed between 10:00-14:00) and a secondary outcome measure was dietary quality of intake for total day (all foods consumed during a 24-hour period) using the Healthy Eating Index-2010 which is the sum of twelve component scores that align with key food groups and nutrients. The twelve components include total fruit, whole fruit, total vegetables, greens and beans, whole grains, dairy, total protein foods, seafood and plant proteins, fatty acids, refined grains, sodium, and energy from solid fats, alcohol, and added sugars. The total score ranges from 0 to 100 (each of the twelve component scores has a range of 0-5, 0-10, or 0-20 and these are summed together). Scoring standards are set based on a density approach so that component scores are based on per 1,000 calories or as a percentage of calories in order to measure dietary quality of children who have varying energy requirements. A score of 100 represents complete adherence to the 2010 Dietary Guidelines for Americans and a score of 0 represents no adherence to the 2010 Dietary Guidelines for Americans. Nine of the HEI component scores reflect adequacy of nutrient intake including consumption of total vegetables (and dark green and orange vegetables and legumes), total fruit (and whole fruit), whole grains, dairy, total protein foods (and seafood and plant proteins), and fatty acids. Three of the HEI component scores reflect moderation of intake including refined grains, sodium, and energy from solid fats, alcohol, and added sugars (SOFAAS). A HEI score of 40 (out of 100) can be interpreted as a diet adhering to 40% of the recommendations from the Dietary Guidelines. A minimum clinically important difference has not been established.

[b] HHFKA: Healthy, Hunger-Free Kids Act of 2010

[c] NSLP: National School Lunch Program

[d] Income was categorized by using criteria for free, reduced price and full price lunch (income to poverty ratio categories less than or equal to 130% of the federal poverty line as low income, greater than 130% to less than or equal to 185% of the federal poverty line as low-middle income, and greater than 185% of the federal poverty line as middle-high income).
[e] Confidence intervals are estimated accounting for survey sampling design from Taylor Series linearized standard errors.
[f] Mean Difference calculation is the mean 2009-2010 HEI-2010 score minus the mean 2007-2008 HEI-2010 score.
[g] Regression-based difference-in-differences estimates adjusted for age, gender, race/ethnicity, school grade level, time period of dietary recall and Body Mass Index.

eTable 8. Differences-in-differences estimates of HEI-2010[a] scores from pre- to post-HHFKA[b] for NSLP[c] participants compared to non-participants, stratified by income level.

Diet Quality Measure	Low Income[d]		Low-Middle Income[d]		Middle-High Income[d]	
	Difference-in-differences estimate[e] (95% CI)[f]	P-value	Difference-in-differences estimate (95% CI)	P-value	Difference-in-differences estimate (95% CI)	P-value
HEI-2010 Lunch score (0-100)	12.6 (8.9, 16.3)	0.00	12.4 (4.9, 19.9)	0.00	8.1 (4.2, 12.0)	0.00
Total Fruit (0-5)	0.7 (0.2, 1.1)	0.00	0.8 (0.1, 1.5)	0.03	0.2 (-0.3, 0.7)	0.50
Whole Fruit (0-5)	0.6 (0.2, 1.0)	0.01	0.8 (0.1, 1.5)	0.02	0.3 (-0.2, 0.8)	0.27
Total Vegetables (0-5)	0.4 (-0.2, 1.1)	0.15	0.2 (-0.5, 0.9)	0.62	0.1 (-0.3, 0.5)	0.58
Greens and Beans (0-5)	0.2 (0.0, 0.5)	0.03	0.6 (0.3, 0.9)	0.00	0.4 (0.1, 0.7)	0.01
Whole Grains (0-10)	3.5 (2.8, 4.1)	0.00	4.1 (2.8, 5.3)	0.00	3.1 (2.0, 4.1)	0.00
Dairy (0-10)	0.2 (-0.4, 0.9)	0.49	-1.1 (-2.4, 0.2)	0.10	-0.2 (-1.0, 0.7)	0.71
Total Protein Food (0-5)	0.7 (0.3, 1.1)	0.00	0.3 (-0.8, 1.3)	0.61	-0.2 (-0.7, 0.3)	0.36
Seafood and Plant Proteins (0-5)	0.8 (0.5, 1.1)	0.00	1.4 (0.8, 2.0)	0.00	0.2 (-0.3, 0.7)	0.34
Fatty Acids (0-10)	0.6 (-0.3, 1.5)	0.17	0.2 (-1.2, 1.7)	0.75	0.4 (-0.6, 1.5)	0.39
Sodium (0-10)	0.2 (-0.8, 1.3)	0.65	2.0 (0.6, 3.3)	0.01	0.7 (-0.2, 1.5)	0.11
Refined Grains (0-10)	1.4 (0.6, 2.3)	0.00	2.2 (0.3, 4.1)	0.03	1.4 (0.5, 2.3)	0.00
SOFAAS (0-20)	3.3 (1.5, 5.0)	0.00	1.0 (-2.1, 4.1)	0.51	1.7 (0.2, 3.1)	0.03
HEI-2010 Total Day score (0-100)	3.4 (0.5, 6.3)	0.02	4.7 (0.8, 8.7)	0.02	1.9 (-0.8, 4.5)	0.16
Total Fruit (0-5)	0.4 (-0.1, 0.9)	0.11	0.3 (-0.4, 1.1)	0.37	-0.2 (-0.7, 0.2)	0.33
Whole Fruit (0-5)	0.5 (0.0, 0.9)	0.05	0.2 (-0.5, 1.0)	0.56	-0.2 (-0.7, 0.2)	0.35
Total Vegetables (0-5)	-0.1 (-0.4, 0.3)	0.73	0.0 (-0.5, 0.6)	0.86	0.1 (-0.2, 0.5)	0.40
Greens and Beans (0-5)	0.2 (-0.0, 0.5)	0.09	0.3 (-0.5, 1.0)	0.45	-0.1 (-0.5, 0.2)	0.40
Whole Grains (0-10)	1.9 (1.3, 2.4)	0.00	1.4 (0.3, 2.5)	0.02	1.5 (0.8, 2.1)	0.00
Dairy (0-10)	0.0 (-0.5, 0.6)	0.88	0.4 (-0.9, 1.7)	0.54	0.4 (-0.2, 1.1)	0.22
Total Protein Food (0-5)	-0.1 (-0.4, 0.2)	0.57	-0.1 (-1.0, 0.7)	0.77	0.0 (-0.4, 0.3)	0.85
Seafood and Plant Proteins (0-5)	0.3 (-0.1, 0.6)	0.16	0.6 (-0.1, 1.4)	0.11	-0.1 (-0.6, 0.3)	0.57
Fatty Acids (0-10)	-0.2 (-0.9, 0.6)	0.65	0.1 (-1.2, 1.5)	0.87	0.0 (-0.7, 0.7)	0.94
Sodium (0-10)	0.1 (-0.6, 0.8)	0.75	0.5 (-1.1, 2.0)	0.54	-0.3 (-1.2, 0.6)	0.50
Refined Grains (0-10)	-0.1 (-1.0, 0.8)	0.82	0.2 (-1.2, 1.7)	0.77	-0.2 (-0.8, 0.5)	0.58
SOFAAS (0-20)	0.4 (-0.8, 1.6)	0.50	0.8 (-1.6, 3.1)	0.52	1.0 (-0.5, 2.5)	0.18

[a] HEI-2010: Healthy Eating Index 2010: The primary outcome measure was dietary quality of intake for lunch (all foods consumed between 10:00-14:00) and a secondary outcome measure was dietary quality of intake for total day (all foods consumed during a 24-hour period) using the Healthy Eating Index-2010 which is the sum of twelve component scores that align with key food groups and nutrients. The twelve components include total fruit, whole fruit, total vegetables, greens and beans, whole grains, dairy, total protein foods, seafood and plant proteins, fatty acids, refined grains, sodium, and energy from solid fats, alcohol, and added sugars. The total score ranges from 0 to 100 (each of the twelve component scores has a range of 0-5, 0-10, or 0-20 and these are summed together). Scoring standards are set based on a density approach so that component scores are based on per 1,000 calories or as a percentage of calories in order to measure dietary quality of children who have varying

energy requirements. A score of 100 represents complete adherence to the 2010 Dietary Guidelines for Americans and a score of 0 represents no adherence to the 2010 Dietary Guidelines for Americans. Nine of the HEI component scores reflect adequacy of nutrient intake including consumption of total vegetables (and dark green and orange vegetables and legumes), total fruit (and whole fruit), whole grains, dairy, total protein foods (and seafood and plant proteins), and fatty acids. Three of the HEI component scores reflect moderation of intake including refined grains, sodium, and energy from solid fats, alcohol, and added sugars (SOFAAS). A HEI score of 40 (out of 100) can be interpreted as a diet adhering to 40% of the recommendations from the Dietary Guidelines. A minimum clinically important difference has not been established.

[b] HHFKA: Healthy, Hunger-Free Kids Act of 2010. Pre-HHFKA policy time period contains data from 2007-2010. Post-HHFKA policy time period contains data from 2013-2016.

[c] NSLP: National School Lunch Program

[d] Income was categorized by using criteria for free, reduced price and full price lunch (income to poverty ratio categories less than or equal to 130% of the federal poverty line as low income, greater than 130% to less than or equal to 185% of the federal poverty line as low-middle income, and greater than 185% of the federal poverty line as middle-high income).

[e] Regression-based difference-in-differences estimates adjusted for age, gender, race/ethnicity, school grade level, time period of dietary recall and Body Mass Index.

[f] Confidence intervals are estimated accounting for survey sampling design from Taylor Series linearized standard errors.

eTable 9. Post-Lunch Exploratory Analysis: differences-in-differences estimates for HEI-2010[a] post-lunch from pre- to post-HHFKA[b] for NSLP[c] participants compared to non-participants, stratified by income level.

	Low Income[d]						
	NSLP participants			NSLP non-participants			Difference-in-differences estimate (95% CI)[h]
Dietary Quality Measure	Pre-HHFKA policy Mean (95% CI)[f]	Post-HHFKA policy Mean (95% CI)	Mean Difference[g] (95% CI)	Pre-HHFKA policy Mean (95% CI)	Post-HHFKA policy Mean (95% CI)	Mean Difference (95% CI)	
HEI-2010 Post-Lunch score[e]	42.4 (40.6, 44.2)	41.0 (39.2, 42.8)	-1.4 (-3.8, 1.1)	41.8 (40.7, 42.9)	41.5 (40.1, 42.9)	-0.3 (-2.0, 1.4)	-1.1 (-3.7, 1.6)
	Low-Middle Income[d]						
	NSLP participants			NSLP non-participants			Difference-in-differences estimate (95% CI)
Dietary Quality Measure	Pre-HHFKA policy Mean (95% CI)	Post-HHFKA policy Mean (95% CI)	Mean Difference (95% CI)	Pre-HHFKA policy Mean (95% CI)	Post-HHFKA policy Mean (95% CI)	Mean Difference (95% CI)	
HEI-2010 Post-Lunch score	41.9 (38.9, 44.8)	39.7 (36.9, 42.6)	-2.1 (-5.8, 1.6)	41.4 (38.8, 44.1)	42.3 (39.8, 44.7)	0.8 (-2.9, 4.5)	-2.9 (-7.9, 2.1)
	Middle-High Income[d]						
	NSLP participants			NSLP non-participants			Difference-in-differences estimate (95% CI)
Dietary Quality Measure	Pre-HHFKA policy Mean (95% CI)	Post-HHFKA policy Mean (95% CI)	Mean Difference (95% CI)	Pre-HHFKA policy Mean (95% CI)	Post-HHFKA policy Mean (95% CI)	Mean Difference (95% CI)	
HEI-2010 Post-Lunch score	42.1 (41.1, 43.2)	41.3 (39.7, 42.9)	-0.8 (-2.7, 1.1)	43.1 (42.0, 44.2)	42.8 (41.6, 44.1)	-0.3 (-1.9, 1.3)	-0.5 (-2.9, 1.8)

[a] HEI-2010: Healthy Eating Index 2010: The primary outcome measure was dietary quality of intake for lunch (all foods consumed between 10:00-14:00) and a secondary outcome measure was dietary quality of intake for total day (all foods consumed during a 24-hour period) using the Healthy Eating Index-2010 which is the sum of twelve component scores that align with key food groups and nutrients. The twelve components include total fruit, whole fruit, total vegetables, greens and beans, whole grains, dairy, total protein foods, seafood and plant proteins, fatty acids, refined grains, sodium, and energy from solid fats, alcohol, and added sugars. The total score ranges from 0 to 100 (each of the twelve component scores has a range of 0-5, 0-10, or 0-20 and these are summed together). Scoring standards are set based on a density approach so that component scores are based on per 1,000 calories or as a percentage of calories in order to measure dietary quality of children who have varying energy requirements. A score of 100 represents complete adherence to the 2010 Dietary Guidelines for Americans and a score of 0 represents no adherence to the 2010 Dietary Guidelines for Americans. Nine of the HEI component scores reflect adequacy of nutrient intake including consumption of total vegetables (and dark green and orange vegetables and legumes), total fruit (and whole fruit), whole grains, dairy, total protein foods (and seafood and plant proteins), and fatty acids. Three of the HEI component scores reflect moderation of intake including refined grains, sodium, and energy from solid fats, alcohol, and added sugars (SOFAAS). A HEI score of 40 (out of 100) can be interpreted as a diet adhering to 40% of the recommendations from the Dietary Guidelines. A minimum clinically important difference has not been established.

[b] HHFKA: Healthy, Hunger-Free Kids Act of 2010. Pre-HHFKA policy time period contains data from 2007-2010. Post-HHFKA policy time period contains data from 2013-2016.

[c] NSLP: National School Lunch Program

[d] Income was categorized by using criteria for free, reduced price and full price lunch (income to poverty ratio categories less than or equal to 130% of the federal poverty line as low income, greater than 130% to less than or equal to 185% of the federal poverty line as low-middle income, and greater than 185% of the federal poverty line as middle-high income).

[e] Post-Lunch HEI-2010 score is defined as all food and beverage consumed after lunch, representing the dietary quality of child intake after 14:00.

[f] Confidence intervals are estimated accounting for survey sampling design from Taylor Series linearized standard errors.

[g] Mean Difference is calculated by post-HHFKA policy mean minus pre-HHFKA policy mean.

[h] Regression-based difference-in-differences estimates adjusted for age, gender, race/ethnicity, school grade level, time period of dietary recall and Body Mass Index.

eMethods

A. DESCRIPTION OF EXCLUSIONS AND MISSING DATA

10,746 children 5-18 years old

1376 did not have a valid dietary recall (1288 missing and 88 completed but deemed not valid by NHANES)
1066 have only weekend measured
613 not generally in school
314 not in a school that serves a lunch that costs the same price each day
443 with missing grade level or grade>12

6,934 children meeting inclusion criteria (in school and in grade K-12, attending school that serves a lunch that costs the same price each day, and at least one valid weekday dietary recall)

510 were missing information on family income
33 missing Body Mass Index
2 missing HEI-2010 total day score

6,389 have complete information on HEI-2010 score for lunch and total day and covariates

B. DETAILED DESCRIPTION OF STATISTICAL MODELS AND ROBUSTNESS CHECKS

We conducted linear regression models with Taylor series linearized standard errors of the general form:

$$Y_{it} = \beta_0 + \beta_1(\textit{NSLP participant})_i + \beta_2(\textit{time})_t + \beta_3(\textit{NSLP participantXtime})_{it} + \beta_4\boldsymbol{X}_{it} + \varepsilon_{it},$$

where, Y_{it} is the HEI-2010 lunch score *i* at time *t*. *NSLP Participant* is an indicator variable that takes the value of 1 for observations for NSLP participants and 0 for NSLP non-participants; this controls for baseline differences in HEI-2010 lunch scores between NSLP participants and non-participants. *Time* is an indicator variable that takes the value of 1 for mean HEI-2010 lunch scores measured in the post-HHFKA implementation time period and 0 for mean HEI-2010 lunch scores measured in the pre-HHFKA implementation time period; this controls for the time trend we could have expected to see had the HHFKA policy not been implemented. The coefficient for the interaction between *NSLP participant* and *time* (NSLP participantXtime), β_3, is the difference-in-differences estimator. It estimates the mean change in HEI-2010 lunch scores among NSLP participants in comparison with the mean change in HEI-2010 lunch scores among NSLP non-participants over the same period and is our estimate of the association of the HHFKA with dietary quality of NSLP participants at lunch. $\boldsymbol{X}$ is a vector of control variables, as listed in the methods section.

Robustness checks. We also conducted robustness checks, which included 1) assessing the parallel trends assumption of difference-in-differences by testing whether the pre-policy change over time (2007-2010) in HEI-2010 lunch score were the same for NSLP participants versus non-participants (eTable 7); 2) conducting generalized linear models with a gamma distribution and log link function (instead of ordinary least squares models) to estimate relative differences in HEI-2010 individual component scores by income category (eTable 6); 3) including two additional covariates: physical

activity status and day of week of dietary intake (eTable 5); 4) excluding Body Mass Index from the models (eTable 5); and 5) including only observations between November and April to exclude summer months (eTable 5). For comparison to other studies calculating population-level HEI-2010 scores from NHANES, we also computed HEI-2010 total day scores using the population ratio method (eTable 4).

eResults

DETAILED HEI-2010 COMPONENT SCORE RESULTS

The secondary analyses of HEI-2010 lunch component scores found that, among low income children, the difference-in-differences estimates show larger positive differences among NSLP participants compared with non-participants for total fruit [difference-in-differences: +0.7; 95% CI: +0.2 to +1.1], whole fruit [difference-in-differences: +0.6; 95% CI: +0.2 to +1.0], greens and beans [difference-in-differences: +0.2; 95% CI: +0.0 to +0.5], whole grains [difference-in-differences: +3.5; 95% CI: +2.8 to +4.1], total protein food [difference-in-differences: +0.7; 95% CI: +0.3 to 1.1], seafood and plant proteins [difference-in-differences: +0.8; 95% CI: +0.5 to +1.1], refined grains [difference-in-differences: +1.4; 95% CI: +0.6 to +2.3], and SOFAAS [difference-in-differences: +3.3; 95% CI: +1.5 to +5.0] (Figure 2 and eTable 8). For low-middle income children, the secondary analyses for HEI-2010 lunch component scores show significantly larger differences for NSLP participants compared to non-participants for total fruit [difference-in-differences: +0.8; 95% CI: +0.1 to +1.5], whole fruit [difference-in-differences: +0.8; 95% CI: +0.1 to +1.5], greens and beans [difference-in-differences: +0.6; 95% CI: +0.3 to +0.9], whole grains [difference-in-differences: +4.1; 95% CI: +2.8 to +5.3], seafood and plant proteins [difference-in-differences: +1.4; 95% CI: +0.8 to +2.0], sodium [difference-in-differences: +2.0; 95% CI: +0.6 to +3.3], and refined grains [differences-in-differences: +2.2; 95% CI: +0.3 to +4.1]. For the middle-high income category, the difference-in-differences estimates indicate significantly larger differences for NSLP participants for greens and beans [difference-in-differences: +0.4; 95% CI: +0.1 to +0.7], whole grains [difference-in-differences: +3.1; 95% CI: +2.0 to +4.1], refined grains (difference-in-differences: +1.4; 95% CI: +0.5 to +2.3], and SOFAAS [difference-in-differences: +1.7; 95% CI: +0.2 to +3.1]. eTable 6 displays sensitivity analyses for generalized linear models that estimate the distribution of individual HEI-2010 total day and lunch component scores.