Project Final Report

School Vending Menu Analysis
Methods, Assumptions, and Results

July 2016

Prepared By

Grace Chan, MS, MPH, DTR
Project Policy Analyst

Under the Direction of

Pat Crawford, DrPH, RD
Senior Director of Research

Nutrition Policy Institute

Table of Contents

Project Overview

The primary purpose of this report is to provide menu scores that can be used to differentiate the nutritional quality of menus from a variety of school food vendors. To accomplish this task, we conducted a menu analysis plan to score using a menu driven Healthy Eating Index (HEI) score for each vendor. This involved:

1) Researching studies that used HEI scoring for menu analysis in the literature,

2) Gathering nutrition information for each vendor, including those

   a. Collected in Dropbox

   b. Collected via the vendor or school's website

   c. Collected via contacting (phone/email) vendor or school representative

3) Creating criteria to assign USDA food codes to the vendors' food items for analysis,

   a. Summary of steps:

      i. Matched vendor foods to USDA foods using the What's in the Foods You Eat online search tool

         1. Matched by name

         2. Matched by calories, total fat, and saturated fat within 20% difference

            a. Entrees, meat/meat alternatives, and whole grain items were also matched by protein and fiber.

         3. A coding system was created to denote the quality of the match

      ii. Imported the data to SAS

         1. Cleaned and prepared the data

         2. Used USDA HEI SAS macros to determine HEI scores

4) Creating a supplemental scoring system to include additional food categories commonly found in school lunch menus. This method was reviewed by 5 nutrition experts.

5) Combining the HEI and supplement scores for the total scores.

The analyses for all meals offered by vendors are now complete and score have been compiled. We used a Delphi method with three nutrition experts who reviewed the assumptions made during the analysis.

Background and sample

This study will examine and evaluate the nutritional quality of school menus from a variety of vendors. A review of the literature on menu analysis has established HEI scoring as the state of the art method of analysis. However, studies differed in the way they generated ingredients, food groups, calories, and nutrients required to determine the HEI scores. Some studies used additional software like the Nutrition Data System for Research[1] or the Nutritionist Pro Diet Analysis Module[2]. Others utilized matching methods to assign food groups and nutrients to menu items using the USDA food databases.[3][4][5] Both matching methods assigned USDA food codes to the foods. For this analysis, an adaptation of the latter method was used using the USDA What's In the Foods You Eat Search Tool.

The What's In the Foods You Eat Search Tool has nutrient values for 13,000 foods commonly eaten in the United States. This search tool allows user to search nutrient profiles for foods using familiar portion sizes, which can be adjusted. These data are based on information collected from the National Health and Nutrition Examination Survey (NHANES) dietary intake data. The underlying food composition data are from the USDA National Nutrient Database for Standard Reference 26.[6]

Past studies have used the HEI scores to investigate dietary quality in settings such as fast food restaurants,[7][8] schools, [9] and food assistance programs. [10]. Information from a sample of 17 vendors was provided in a shared Dropbox. Sample menus and nutrient information from Dropbox for each vendor were used where available. For those without sample menus or nutrient information, vendors were contacted. See Table 1 for the description of the vendor menus obtained.

---

[1] Erinosho, T. O., Ball, S. C., Hanson, P. P., Vaughn, A. E., & Ward, D. S. (2013). Assessing foods offered to children at child-care centers using the Healthy Eating Index-2005. Journal of the Academy of Nutrition and Dietetics, 113(8), 1084-1089.

[2] Byker, C., & Smith, T. (2015). Food assistance programs for children afford mixed dietary quality based on HEI-2010. Nutrition Research, 35(1), 35-40.

[3] Sharma, S., Murphy, S. P., Wilkens, L. R., Au, D., Shen, L., & Kolonel, L. N. (2003). Extending a multiethnic food composition table to include standardized food group servings. Journal of Food Composition and Analysis, 16(4), 485-495.

[4] Kirkpatrick, S. I., Reedy, J., Kahle, L. L., Harris, J. L., Ohri-Vachaspati, P., & Krebs-Smith, S. M. (2014). Fast-food menu offerings vary in dietary quality, but are consistently poor. Public health nutrition, 17(04), 924-931.

[5] Reedy, J., Krebs-Smith, S. M., & Bosire, C. (2010). Evaluating the food environment: application of the Healthy Eating Index-2005. American journal of preventive medicine, 38(5), 465-471.

[6] What's In The Foods You Eat Search Tool, 2011-2012. (2015, July 29). Retrieved from http://www.ars.usda.gov/Services/docs.htm?docid=17032

[7] Reedy, J., Krebs-Smith, S. M., & Bosire, C. (2010).

[8] Kirkpatrick, S. I., Reedy, J., Kahle, L. L., Harris, J. L., Ohri-Vachaspati, P., & Krebs-Smith, S. M. (2014).

[9] Hanson, K. L., & Olson, C. M. (2013). School meals participation and weekday dietary quality were associated after controlling for weekend eating among US school children aged 6 to 17 years. The Journal of nutrition, 143(5), 714-721.

[10] Byker, C., & Smith, T. (2015).

Table 1. Description of Vendor Sample

Vendor	School	Grade	Menu Date	Incomplete Data
Ararmark	Burbank Unified Elementary	Elementary	Jun 2015	N/A
Bellflower	Bellflower Unified School District	Elementary	May 2014	No nutrition information
Choice Lunch	Cummins	Elementary	N/A Top 5 entrees used (2015)	N/A
Compass	Burlingame Elementary	Elementary	Jan 2015	N/A
CSU Chico	Four Winds Indian Education	K-8	April 2014	No nutrition information
Fieldbrook	Fieldbrook Elementary School	Elementary	June (2012?)	Out of business
Kid Chow	-	-	Oct 2013	Out of business
Neil Cummins/Good Earth	Neil Cummins School Elementary	Elementary	Aug - Nov 2012	No nutrition information
Preferred Choice	Camino Union School District	Elementary	May 2014	Fruit nutrition missing, nutrition given in calories and carbohydrates only
Preferred Meals	Springfield Elementary, IL	Elementary	Sep 2015	N/A
Rev Foods	-	-	N/A Given 5 meals	N/A
Royal Dining	LA Boys and Girls Club	Middle	Aug 2014	N/A
Santa Clarita	Santa Clarita Valley School	Elementary	Aug 2015	N/A (list of sides served during Aug obtained)
SFE	Taft City School District	Elementary	Nov 2011	No nutrition information
SNP	Renaissance Arts Academy	Middle	Sep 2014	No nutrition information
Sodexo	Hilmar USD	Elementary	Jan 2015	No saturated fats
Trinidad	Fieldbrook Elementary School	Elementary	Feb 2014	Nutrition information given by day, not by food item

HEI Method Overview

The Healthy Eating Index 2010 (HEI) was used to evaluate the quality of school vendor meals. The HEI-2010 is a measure of diet quality based on its compliance with the 2010 Dietary Guidelines. It is made up of 12 dietary components (see below). The total HEI-2010 score is the sum of the component scores and has a maximum of 100 points.[11]

The HEI has been primarily used to evaluate individual level diets in the past. However, in recent years, it has been applied to the community and macro-level food environments.[12] An HEI score for a menu represents the healthfulness of the food choices offered. It has been previously proposed that a score greater than 80 suggest a "good" diet and scores less than 51 indicate a "poor" diet.[13] Recent reports using NHANES 2011-2012 data found that the diet for children 2-17 years old in the United States is 55.07.[14]

HEI- 2010[1] component	Maximum	Standard for maximum score	Standard for minimum score of zero
▲ Adequacy *(higher score indicates higher consumption)*			
Total Fruit[2]	5	≥ 0.8 cup equiv. / 1,000 kcal[10]	No fruit
Whole Fruit[3]	5	≥ 0.4 cup equiv. / 1,000 kcal	No whole fruit
Total Vegetables[4]	5	≥ 1.1 cup equiv. / 1,000 kcal	No vegetables
Greens and Beans[4]	5	≥ 0.2 cup equiv. / 1,000 kcal	No dark-green vegetables, beans, or peas
Whole Grains	10	≥ 1.5 ounce equiv. / 1,000 kcal	No whole grains
Dairy[5]	10	≥ 1.3 cup equiv. / 1,000 kcal	No dairy
Total Protein Foods[6]	5	≥ 2.5 ounce equiv. / 1,000 kcal	No protein foods
Seafood and Plant Proteins[6,7]	5	≥ 0.8 ounce equiv. / 1,000 kcal	No seafood or plant proteins
Fatty Acids[8]	10	(PUFAs + MUFAs) / SFAs ≥ 2.5	(PUFAs + MUFAs) / SFAs ≤ 1.2
▼ Moderation *(higher score indicates lower consumption)*			
Refined Grains	10	≤ 1.8 ounce equiv. / 1,000 kcal	≥ 4.3 ounce equiv. / 1,000 kcal
Sodium	10	≤ 1.1 gram / 1,000 kcal	≥ 2.0 grams / 1,000 kcal
Empty Calories[9]	20	≤ 19% of energy	≥ 50% of energy

[1] Intakes between the minimum and maximum standards are scored proportionately.
[2] Includes 100% fruit juice.
[3] Includes all forms except juice.
[4] Includes any beans and peas not counted as Total Protein Foods.
[5] Includes all milk products, such as fluid milk, yogurt, and cheese, and fortified soy beverages.
[6] Beans and peas are included here (and not with vegetables) when the Total Protein Foods standard is otherwise not met.
[7] Includes seafood, nuts, seeds, soy products (other than beverages) as well as beans and peas counted as Total Protein Foods.
[8] Ratio of poly- and monounsaturated fatty acids (PUFAs and MUFAs) to saturated fatty acids (SFAs).
[9] Calories from solid fats, alcohol, and added sugars; threshold for counting alcohol is > 13 grams/1,000 kcal.
[10] Equiv. ▪ equivalent, kcal ▪ kilocalories.

---

[11] US Department of Agriculture, Center of Nutrition Policy and Promotion. Healthy Eating Index. Available from: http://www.cnpp.usda.gov/healthyeatingindex
[12] Reedy, J., Krebs-Smith, S. M., & Bosire, C. (2010).
[13] Basiotis, P. P., Carlson, A., Gerrior, S. A., Juan, W. Y., & Lino, M. (2002). The healthy eating index: 1999-2000. US Department of Agriculture, Center for Nutrition Policy and Promotion. CNPP-12, 3-5.
[14] US Department of Agriculture, Center of Nutrition Policy and Promotion.

Description of Steps to Implement HEI Scoring

Overview of Matching Process

The USDA What's In the Foods You Eat online search tool was utilized to assign USDA food codes to the items offered.[15] This method is able to break down food items into food group components to be used in HEI scoring. Individual food items from the menus were matched with the foods available in the USDA database. The matching criteria was adapted from the Cancer Research Center of Hawaii's food composition project of multiethnic foods. [16]

The following are the steps used to determine HEI-2010 component and total scores for each school vendor:

1. Each menu item offered in the first week (5 days) of the vendor's menu was weighted based on the proportion it made up in its category (i.e. entrée, side, beverage) and the number of times it was served that week. This weight was used to adjust the grams, calories, sodium, total, and saturated fat values of the food items, which were used for analysis.
   a. Example: If the three entrees were offered during the week, once per week, each entrée will get a "proportion" score of 1/3 and "times" value of 1. The weight was determined by multiplying "proportion" and "times." Therefore, each entrée would have a weight of 1/3.

2. For **menus with nutrition information**, items were matched to foods in the USDA database using the What's In The Foods You Eat online search tool (2011-2012).
   a. Initial matching was based on food name and description.
   b. A further check was done to see if any of the matched foods differed by more than 20% in calories. Foods that did not match to within 20% were looked at in more detail to determine if a better match could be found or if the amount needed to be adjusted.
   c. A similar check was done on fat content (total and saturated fat). Protein and fiber were also checked for protein and whole grain items.
   d. Although added sugar contributes to the HEI Empty Calories score, it could not be used for matching because it was often missing in the vendor nutrition information as well.
   e. Sodium content was matched when possible.
   f. Exception 1; due to limited nutrition information: Preferred Choice menu was matched by calories and carbohydrates.
   g. Exception 2; due to limited nutrition information: Sodexo menu was matched by calories and total fats (and fiber, protein, and sodium where applicable).

3. See Figure 1 and the following section for matching description.

---

[15] Byker, p.36
[16] Sharma, S., Murphy, S. P., Wilkens, L. R., Au, D., Shen, L., & Kolonel, L. N. (2003).

Figure 1. Matching Process
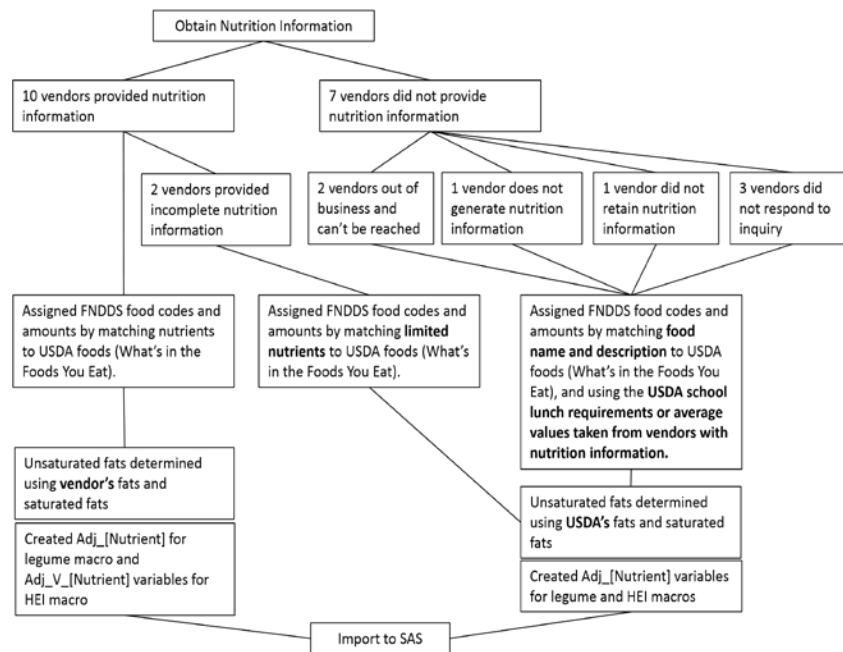
Detailed description of the matching process

Vendors with nutrition information

A. Detailed description of the matching process for vendor menus with nutrition information was as follows:

1. Foods were first matched by name in the USDA What's in the Foods You Eat online search tool (2011-2012)

2. Then matching was done by energy level. The amount entered into the search tool was based on energy as measured by calories and as provided by the vendors
    a. Go to the Search Tool
    b. Type in the name of the food item in the search bar
    c. Type in "1" for any unit, check the box for that measure, and click "View Nutrients"
    d. Calculate how many units are needed to match the calories given by the vendor
    e. If nutrients do not match,
        i. Try using two or more separate components of the food item to match with calories and fat (and sodium, if possible). See #5.
        ii. Try using a similar food item within the food group.

3. A further check on the matching was done by comparing fat content (and sodium, when possible). The criterion used is that there would be a difference of less than 20% between vendor and USDA nutrients.
    a. If more than 20% difference, amount was adjusted so that the food will be within
        i. 20% difference in energy
        ii. 20% difference in fat content (saturated and total fat)
        iii. (20% difference in sodium, if possible)
    b. We did not compare sugar (for Added Sugar) or MUFA/PUFA because not all vendors provided this information.
    c. For entrées, meat/meat alternative, and whole grain products, we tried to match protein and fiber content as closely as possible.

    *If vendors indicate 0 fat or 0 saturated fat, assume < .5 g per FDA labeling regulations.

4. A code system was created to denote the quality of the match, based on calories, sodium, and fat matching
    a. 1 = exact match (<1% difference) in calories, sodium, total, and saturated fat
    b. 2 = similar, with slight differences (within 20% difference) in calories, sodium, total, and sat fat
    c. 3 = A similar food item within food group was used or a composite of multiple items was used, and able to match with calories, sodium, total, and sat fat (within 20% difference)
    d. 4 = Unable to match sodium with 20% criteria, best match made by calories, total, and sat fat only
    e. 5 = Unable to match sodium, total, and sat fat with 20% criteria, best match made by food name and calories
    f. 6 = Nutrition information not available, matched to limited information given

5. For foods that do not match the USDA foods, a combination of similar foods, in the same food category, were used
    a. Example 1: Regular + low fat option
    b. Example 2: Look up recipe, break down food into food components, use combination of components

> Note: For our analysis, separate and optional condiments were not considered a biologically significant contributor of nutrients to the meal and were not included. However, condiments were included if they were incorporated in mixed meals and the nutrition information given was for the mixed meal, such as the teriyaki sauce in teriyaki chicken

B. After matching and assigning foods a USDA food code, each item's calorie, sodium, saturated, and total fats were adjusted based on the weight given for each food.
    1. Create new variables in Excel:
        a. For the legume macro, the following variables were created using USDA matched nutrients multiplied by the food item's weight. In the macro, protein from legumes was assigned to the meat or vegetable category.
            a. Adj_Calories
            b. Adj_Sodium
            c. Adj_UFA
            d. Adj_Fat
            e. Adj_SFA

    2. For the HEI macro, the following variables were created using the vendor's nutrient information (if available) multiplied by the food item's weight.
            i. Adj_V_Calories
            ii. Adj_V_Sodium
            iii. Adj_V_UFA
            iv. Adj_V_Fat
            v. Adj_V_SFA

> Note: A set of HEI scores for these vendors using Adj_[Nutrient] was also generated for comparison

    a. If vendor did not provide nutrition information, Adj_[Nutrient] were used for the HEI macro.
    b. nb. Unsaturated fats were determined by subtracting saturated fat from total fats.

Vendors without nutrition information

For menus without nutrition information (Bellflower, CSU Chico, Fieldbrook, KidChow, Good Earth, SFE, SNP), where values for nutrients and amounts were not provided, several methods were used as described below:

A. **Method 1: USDA defaults with 650 calories**

Modified matching process using *USDA database* and *USDA school lunch guidelines was as follows*:

Because these vendors did not provide nutrition information, we matched menu items with USDA foods based on the food name and descriptions. Since amounts were also not provided, we determined default amounts that vendors would have to follow to be compliant to the USDA school meal pattern requirements, which went into effect as of July 2012.

1. Amounts of the sides were determined by the USDA requirements for school lunches:

Category	USDA requirements	Amount used for analysis (daily)
Fruit	½ - 1 cup per day	Average of range – .75 cup
Vegetables	¾ - 1 cup per day	Average of range – .875 cup
Meat/Meat Alternate	(K-5) 8-10 oz. weekly	Average of range – 1.8 oz.
Grains	(K-5) 8-9 oz. weekly	Average of range – 1.7 oz.
Milk	1 cup per day	1 cup
Calories	(K-5) 550-650 calories per day	Maximum of range – 650 calories

2. Amounts for the entrees were determined by matching calories. The calories from entrees were determined by taking the average calories contributed by the sides – fruits, vegetables, other, and beverages – and subtracting them from the maximum allowed calories for K-5 lunch meals.

Examples
For Bellflower, CSU Chico, and SFE, the average for beverages was used. Entrée calories differed depending on what fruit, vegetable, and other sides were available that day.

For Fieldbrook, the average for the fruit options (apple, banana, and orange) and beverage options (1%, skim, and skim chocolate) were used. Entrée calories differed depending on what fruit and vegetable side were available that day.

For KidChow, students were allowed 3 sides from 4 categories. We assumed students would get one side of fruit, one side of vegetables, and one side of either dairy/chips/or desserts, along with their beverage of choice. The averages from these categories were used.

For Good Earth, students have the same daily side dish selections. The average of fruit options, salad/vegetable options, and average of beverages (unspecified milk) were used.

For SNP, average of fruit options (apple, banana, and orange) and beverages (non-fat and 1% milk) were used to determine total calories for entrée and vegetables (since separate vegetable sides were not specified in all meals).

B. Method 2: Vendor Averages with 650 calories.

Modified matching process using *average food calories* and *USDA guidelines was as follows*:

During our review with nutrition experts, it was suggested that we gather nutrient data using information from vendors who provided nutrition information. This method assumes that all school lunch vendors would offer items with similar nutrient values. We gathered calorie information on entrée and side items offered by vendors who provided nutrition information. Average calories of similar items offered by these vendors were determined and used for similar food items offered by vendors who did not provide nutrition information. Beverage options were assumed to be standard or close enough in nutrient values among the vendors.

Not all entrees offered by vendors without nutrition information were matched with the foods with average calorie values. For these items, we used Method 1, where vendors were assumed to be compliant with the USDA guidelines and offered 650 calories per meal.

1. Calories from entrée and side items were determined by using the information available from vendors who provided nutrient information. The procedure are as follows:

    a. List entrées and sides (chips and desserts) that were offered by vendors without nutrition information
    b. Determine the calories for similar foods from vendors that had nutrition information
    c. Calculate the average calories for each food item
    d. Match vendor food items by name and description using What's In The Foods You Eat Search Tool.
        i. Determine amounts based on the average calories from other vendors, where available.

        Note: the calories for the following foods were provided by information from one vendor only:

        i. Meatball Grinder
        ii. Potstickers
        iii. Chicken Burrito
        iv. Quesadilla
        v. Arroz con Pollo
        vi. Teriyaki chicken
        vii. Chicken Tikka
        viii. Fish Sticks
        ix. Veggie Sushi
        x. Homemade pizza pocket
        xi. Chicken salad sandwich
        xii. Grilled chicken sandwich
        xiii. CA roll
        xiv. Tamales
        xv. Cheese sandwich
        xvi. Sesame Noodle
        xvii. Yogurt Parfait
        xviii. Chocolate chip cookie
        xix. Pretzels
        xx. Fortune cookie
        xxi. Edamame

2. For foods without average calories (i.e. none of the vendors who provided nutrient information offered these foods), Method 1 was used.
    a. For fruit and vegetable sides without average nutrient values, USDA guideline amounts were used
    b. For entrees without average nutrient values - the calories from entrees were determined by taking the calories contributed by the sides – fruits, vegetables, other, and beverages – per meal and subtracting them from 650.

    Sources for food averages:

    - Aramark – Used all nutrition information available (foods offered all month, listed on their website)
    - Choice Lunch – Used all nutrition information available on website.
    - Compass – Used all nutrition information available (foods offered all month, pages provided by vendor)
    - Preferred Choice – Used all nutrition information available on nutrition fact sheet.
    - Preferred Meals
        o Nutrition information of combined foods "Chicken tenders and tomato parmesan sauce" which are not comparable to the other items that have their own nutrition information.
        o Used all nutrition information available (foods offered all month on their website).
    - RevFoods – Used all nutrition information available (8 meals, pages provided).
    - Royal Dining – Used all nutrition information available (5 meals, pages provided).
    - Santa Clarita – Used all nutrition information available from website.
    - Sodexo – Used all nutrition information available (foods offered all month, pages provided).

C. **Method 3: Vendor Averages with 644 calories**

Modified matching process using *default food calories* and *average total calories per meal*:

One nutrition expert expressed concern that using the USDA school meal pattern requirements to determine the maximum calories vendors offer would be a source of systematic bias. She suggested to use the average calories offered by the vendors who provided calorie information, because school lunch vendors are likely to offer the same about of nutrients. For each of these vendors, total calories per week (or for five lunch meals) were determined using adjusted calorie values. Then, the average calories for five meals was calculated. This was divided by five to get the average calories per meal.

Method 3 uses the food average values from Method 2. For entrees without average calorie values, we used the average calories per meal provided by vendors with nutrition information. Therefore vendors are assumed to offer 643.8 calories per meal.

1. Foods were first matched following Method 2.
2. For fruit and vegetable sides without average nutrient values, USDA guideline amounts were used
3. For entrees without average nutrient values - The calories from entrees were determined by taking the calories contributed by the sides – fruits, vegetables, other, and beverages – per meal and subtracting it from the average total calories per meal calculated from vendors with nutrition information (643.8 kcal)

Vendor	Total Calories for 5 meals
Aramark	2877.5
Blue Lake	2827.0
Choice Lunch	3716.7
Compass	3986.5
Preferred Choice	2636.3
Preferred Meals	2886.0
Rev Foods	2733.0
Royal Dining	3055.0
Santa Clarita	4421.8
Sodexo	3050.2
Average Calories for 5 meals	3219.0
Average Calories per meal	643.8

D. **Method 4: USDA defaults with 644 calories**

Modified matching process using *USDA database* and *average total calories per meal*:

This method is similar to Method 1 in that we matched menu items with USDA foods based on the food name and descriptions. To determine the amount of sides (fruits, vegetables, other, and beverages), the USDA required amounts were used. To determine the amount from entrees, we determined the calories from entrée by subtracting calories contributed by sides from the average total calories vendors with information provided per meal (643.8 kcal).

1. Amounts for sides were determined using the USDA school lunch guidelines.
2. Calories for entrees were determined using the average total calories per meal and subtracting the calories contributed by sides.
3. Entrée foods were matched by calories, name, and description using the What's in the Foods You Eat search tool.

E. After matching and assigning foods a USDA food code, each item's calorie, sodium, saturated, and total fats were adjusted based on the weight given for each food.
   1. Create new variables in Excel:
      a. For the legume macro, the following variables were created using USDA matched nutrients multiplied by the food item's weight. In the macro, protein from legumes was assigned to the meat or vegetable category.
         i. Adj_Calories
         ii. Adj_Sodium
         iii. Adj_UFA
         iv. Adj_Fat
         v. Adj_SFA
   2. These variables were used in the HEI macro.
   3. Unsaturated fats were determined by subtracting saturated fat from total fats.
      a. If vendor did not provide fat values, these values were taken from the matched USDA food item.

Analysis of nutrition information using SAS

After assigning food codes to each individual food item, the dataset was imported to SAS (version 9.4; SAS Institute, Inc., Cary, NC, USA) to undergo cleaning and matching with the FPED database to generate ingredients, food groups, and nutrients. Vendor food data was combined with the most recent USDA Food Pyramid Equivalents Database (FPED 2011-2012). HEI component and total scores were then estimated using published SAS code for the Community Food Environment.[17] See Figure 2 and the following box for more a detailed description of the process. Finally, t-tests were computed to assess whether mean HEI total scores differed between the vendors who provided nutrition information and those who did not, given the different matching methods.

Figure 2. SAS Process

---
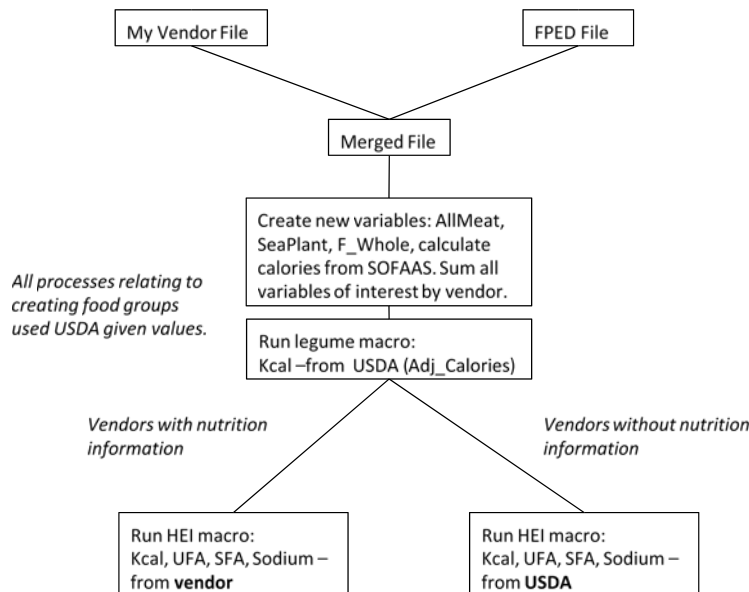
[17] US Department of Health & Human Services, National Institutes of Health, National Cancer Institute. HEI Tools for Researchers. Available from: http://epi.grants.cancer.gov/hei/tools.html; 2015

Detailed steps for analyzing data by SAS are as follows:

1. Combine vendors with nutrition information into one spreadsheet and vendors without nutrient information into another spreadsheet.
2. Import Excel data with vendor nutrition information to SAS.
3. Combine vendor file with the Food Patterns Equivalents Database.
    a. Sorted both files by food code, then merged
    b. Deleted all foods that were not on the vendor's menu
4. Label the variables
5. Check the merged dataset to make sure all vendor foods were matched to the FPED variables
6. Export merged dataset to check for duplicate Adj_[Nutrient] and/or Adj_V_[Nutrient] values due to food disaggregates
    a. Replace duplicate values with "."
    b. Save and import dataset to SAS
    c. Run automated deduplication code to double check duplicates
7. Create new variables for the HEI macro in the merged dataset
    a. AllMeat combines protein from meat, poultry, eggs, seafood, nuts, seeds, and soy
    b. SeaPlant combines protein from seafood, nuts, seeds, and soy
    c. F_Whole (whole fruit) is determined by subtracting Fruit juice from Total fruit
    d. Calculate intake of calories from SOFAAS
8. Sum variables of interest by vendor name.
9. Run the legume and HEI macros
    a. Legumes macro - Allocate legumes to plant protein or meat alternative, using values from the USDA matched foods.
    b. HEI macro - Calculate HEI score, using vendor given values if available. Otherwise, values from the USDA matched foods. (Note: Preferred Choice and Sodexo analyses used USDA values because of incomplete nutrition information from vendors).
10. Print and save results
    a. Export to Excel
11. Repeat for vendors without nutrient information spreadsheet, and for Preferred Choice and Sodexo, which had incomplete nutrition information.

Evolution in the Scoring of Menus

Part 1: Different methods were used in the default process

For this project, we needed to assign vendor foods to USDA food codes to produce the food groups required for HEI scoring. We initially thought we could do this by matching the foods by name and description. When this was not possible, we matched nutrients as closely as possible to the foods that had vendor nutrition information. Despite attempts to contact schools and vendors to obtain this information, almost half of the sample did not have nutrition information. Without either serving size or nutrient information, we assessed quantity in two different ways: by using the data from vendors who did provide nutrition information and by using the USDA School Meal Patterns Requirements.

Using the methods described in previous sections, we created 8 sets of HEI score:
1. Method 1: USDA defaults with 650 calories, where HEI scores for vendors with nutrition information was determined by using the vendor's values (Adj_V_[Nutrient])
2. Method 1a: USDA defaults with 650 calories, where HEI scores for vendors with nutrition information was determined by using the USDA matched values (Adj_[Nutrient])
3. Method 2: Vendor averages with 650 calories, using Adj_V_[Nutrient] for vendors with info
4. Method 2a: Vendor averages with 650 calories, using Adj_[Nutrient] for vendors with info
5. Method 3: Vendor averages with 644 calories, using Adj_V_[Nutrient] for vendors with info
6. Method 3a: Vendor averages with 644 calories, using Adj_[Nutrient] for vendors with info
7. Method 4: USDA defaults with 644 calories, using Adj_V_[Nutrient] for vendors with info
8. Method 4a: USDA defaults with 644 calories, using Adj_[Nutrient] for vendors with info

Part 2: School meal pattern requirements changed in 2012 thus impacting menu scores

In 2012, the USDA established new standards for the National School Lunch and Breakfast Programs to align them with the Dietary Guidelines for Americans. As of July 2012, schools were required to increase the availability of fruits, vegetables, whole grains, and fat-free and low-fat milk in school meals; reduce sodium, saturated fat, and trans fat in meals; and meet calorie requirements by grade levels. Sodium reduction was established with three benchmarks. At the time of this project, schools should be meeting Target 1 for sodium and the requirement that half of grains offered is whole-grain rich, both of which went into effect for school year 2014-2015. See Appendix for a comparison table of the previous requirements and the current requirements.

We created another 8 sets of HEI scores that assumes that vendors are compliant to the standards as they are required to be by law. The set of scores gives all vendors full points for the following categories: whole grains, total protein foods, refined grains, and sodium.

Note that two of the vendor menus were from years before schools were required to meet these regulations: 1) Fieldbrook – the menu did not specify the year, but from the dates, it may have been from June 2012; 2) SFE – the menu is from Nov 2011. These menus were treated the same as the other vendor menus.

Part 3: Use of supplemental scores to illuminate differences in menu quality

Recognizing the limitations of HEI scores when USDA meal pattern requirements attenuated the nutritional differences, a group of 5 nutrition experts created a supplemental scoring system to further distinguish healthy versus less healthy menu options. Using the Delphi method, additional food categories, their definitions, and associated points were determined. The list was finalized when all experts reached a consensus. The experts agreed on the seven categories found on the next page in Table 2. While USDA meal pattern requirements required us to default to required nutrients/foods when information was not provided, the supplemental scores provided two additional points for healthy options that exceeded USDA requirements and conversely, a reduction in two points for fast foods, certain processed foods and high sugar foods. Rationale for inclusion is found in Table 2. Supplemental scores were calculated for each vendor and subsequently were added to HEI scores to obtain total nutritional quality scores for each vendor.

Table 2. Description of supplemental scoring

Categories	Definition	Points
Salad bar	2 points are given for each day that vendors offer a salad bar. Salad bars have been shown to increase the frequency of fruit and vegetable consumption in children, which can decrease their intake of excess energy, cholesterol, saturated and total fats.[18]	+2
Processed meats	2 points are taken away for each day the vendor offers a food that includes meats with nitrates/nitrites, such as cured sandwich/lunch meats, bacon, salami, sausages, and ham. In a systematic review and meta-analysis of 20 studies, consumption of processed meats is found to be associated with higher incidence of coronary heart disease and diabetes mellitus.[19]	-2
Fast food	2 points are taken away for each day the vendor offers popular fast food items such as chicken nuggets, pizza or pizza pockets, burgers, fried chicken, nachos, hot dogs, and corn dogs. Fast food has been well established to have an adverse effect on dietary quality. Children who eat fast food consume more total energy, fat, carbohydrates, and added sugars. They also consume less fiber, and fewer fruits and non-starchy vegetables.[20]	-2
Fried potatoes	2 points are taken away for each day the vendor offers tater tots or French fries. Offering fried potato products in school meals more than once per week is associated with a significantly higher likelihood of obesity.[21]	-2
Chocolate milk	2 points are taken away for each day the vendor offers chocolate milk (sweetened milk). Although this topic of whether chocolate milk should be limited continues to be controversial, our nutrition experts agree that it contributes added sugars to a child's diet, which has been linked to higher risk of obesity and chronic diseases.[22] Pediatricians have also added that a child who drinks an 8 oz. carton of flavored milk at school will have consumed the recommended daily amount of added sugar in one sitting.[23]	-2
Sweets or desserts	2 points are taken away for each day the vendor offers additional sweets such as cookies or desserts. Offering dessert more than once per week is associated with a significantly higher likelihood of obesity.[24]	-2
Chips	2 points are taken away for each day the vendor offers additional salty snacks such as chips. Consumption of low nutrient dense snacks such as foods with added fats/oils, sugar, and salt have been associated with overweight status.[25]	-2

[18] Slusser, W. M., Cumberland, W. G., Browdy, B. L., Lange, L., & Neumann, C. (2007). A school salad bar increases frequency of fruit and vegetable consumption among children living in low-income households. Public health nutrition, 10(12), 1490-1496.

[19] Micha, R., Wallace, S. K., & Mozaffarian, D. (2010). Red and processed meat consumption and risk of incident coronary heart disease, stroke, and diabetes mellitus a systematic review and meta-analysis. Circulation, 121(21), 2271-2283.

[20] Bowman, S. A., Gortmaker, S. L., Ebbeling, C. B., Pereira, M. A., & Ludwig, D. S. (2004). Effects of fast-food consumption on energy intake and diet quality among children in a national household survey. Pediatrics, 113(1), 112-118.

[21] Fox, M. K., Dodd, A. H., Wilson, A., & Gleason, P. M. (2009). Association between school food environment and practices and body mass index of US public school children. Journal of the American Dietetic Association, 109(2), S108-S117.

[22] Ludwig, D. S., Peterson, K. E., & Gortmaker, S. L. (2001). Relation between consumption of sugar-sweetened drinks and childhood obesity: a prospective, observational analysis. The Lancet, 357(9255), 505-508.

[23] Dooley, D., Patel, A., & Schmidt, L. A. (2015). Chocolate Milk in Schools. Pediatrics, 136(6), e1680-e1680.

[24] Fox, M. K., Dodd, A. H., Wilson, A., & Gleason, P. M. (2009).

[25] Nicklas, T. A., Yang, S. J., Baranowski, T., Zakeri, I., & Berenson, G. (2003). Eating patterns and obesity in children: The Bogalusa Heart Study. American journal of preventive medicine, 25(1), 9-16.

Final Scoring

The final scores for each vendor were determined by adding the vendor's supplemental score to each set of vendor HEI scores described earlier.

Description of resolutions for problems associated with nutrition information by category

The following are notes on the problems encountered in contacting the vendors, making assumptions for menus that were missing food descriptions and nutrition information, and other overall discrepancies found during this analysis. For a more detailed description of the assumptions made throughout the matching process, please see Assumptions by Vendors.doc in Dropbox.

A. Vendors with limited information

Vendor	Resolution
Choice Lunch	Choice Lunch had many entrees to choose from. I analysed the 5 most popular entrees selected by students, given by vendor representative.
Compass	The nutrition information provided in Dropbox does not indicate if fruits were served to the students. However, the menu on the school website for January 2016 includes fruit as a side option. I contacted Erika Reavis from Burlingame School Districts. She does not have any records on the foods offered back in January 2015. So, I used the current fruit offerings as a proxy, with the exception of "fresh whole fruit" and "assorted chilled fruit" which were not specific enough to be matched.
Preferred Choice	Nutrition information was not available for fruit. I matched fruits to USDA database by name. Quantities are given on the menu as ½ cup fruit with each meal. Salad bar nutrition information was not given, so I used the USDA side salad. Nutrition information for entrees and beverages are given in calories and grams of carbohydrates only. I matched the foods based on these values. (Calories and carbohydrates matched within 20% difference.)
Santa Clarita	Information on the sides offered was not in the August 2015 menu. I called the SC nutrition department and got the fruits/veg offered from 8/12/15 – 8/18/15. Students are allowed to take as many fruits/veg as they want.
Sodexo	Nutrition information does not include saturated fats. The saturated and unsaturated fats used for HEI scoring were derived from the USDA database. Unsaturated fats were determined by subtracting USDA saturated fat from USDA total fat of each food item.
Trinidad/Blue Lake Rancheria	I called Fieldbrook, and was directed to Blue Lake Rancheria. Gina replied with nutrition information from Feb 2014 and 2016. I used Feb 2014. The nutrition information from Blue Lake Rancheria gives daily amounts of Calories, sodium, fats, etc. It does not break down nutrient information for individual food items. I had to figured out amounts for each item by first entering: 1) Milk (1 cup) 2) Fruit (1 small or ½ cup canned) 3) Vegetables (.875 cup) 4) Sides (i.e. Sun chips – 1 serving) 5) Entrée amounts were determined by using the remaining nutrient levels (i.e. Entrée calories = Daily calories – milk calories – fruit and vegetable calories – sides calories) Matched at the highest quantity that is within 20% difference in remaining calories, sodium, and fats. Gina: All breads, chips, pasta, etc. are whole wheat or whole grain items. Meats are two ounces and lean. Fruits are generally one serving fresh and ½ cup canned or frozen.

B. Vendors with missing nutrition information

Vendor	Resolution
Fieldbrook (Out of business)	The menu did not have detailed descriptions of the food items. For sides: • Unspecified "fruit" – used the average of three most common fruits (apple, orange, banana) • Unclear what "fruit snack" is – considered as a "fruit" • Unclear what "veggie trim" is – considered as a salad • Unspecified milk – used USDA allowed types of milk (1% or nonfat unflavoured, and nonfat chocolate) Although alternative entrees were available daily, we only used the main entrées for the analysis for a more representative score. We assumed that students would choose the main entrées over the alternatives (Chef salad, PBJ Sandwich).
KidChow (Out of business)	Students have a wide variety of side dish choices. They are allowed to choose up to 3 lunch sides. Not knowing their choices, we assumed students would generally choose a fruit, a veggie, and either a dessert, dairy, or chips.
Neil Cummins PTA/Good Earth	Good Earth does not have nutrition information for their meals. They do not participate in the School Lunch Program. Modified analysis used. Milk was served, but no additional information was provided. We used an average of 1% unflavoured, non-fat unflavoured, and non-fat chocolate milk. 2 choices of organic season fruit were offered, but not specified. We used the average of apples and oranges.
SNP	We used a modified method for analysis. We only analysed regular lunch options. We did not include the vegetarian options because they are very similar to the regular options. Vegetarian options remove the meat but do not substitute with meat alternatives. Contact history: Followed up on 1/20, Elvis relayed our request for nutrition information to the company and gave them our contact information. If we have not heard back, then we cannot get nutrition information.
CSU Chico	Teresa Noel provided a menu from April 2014, but does not have nutrition information. Contact history: We contacted CSU Chico catering, and was referred to past school lunch director, Matt Richter (530-898-5268). Matt referred to a past client, Four Winds Indian Education. I found their contact information online and emailed nutrition director, Teresa Noel (tnoel@bcoe.org) on 2/17/16.

C. Vendors that did not respond

Vendor	Resolution
Bellflower	Called 2/3. Left a message with Nutrition Director. Emailed M. Sarabia 2/10, called and left message with Lisa 2/16.
SFE	Emailed 2/10. No nutrition information was provided. Milk was served, but no additional information was provided on the menu. We used an average of 1% unflavoured, non-fat unflavoured, and non-fat chocolate milk. The amount of food served was unspecified. We used the USDA required amounts for sides and calculated amounts for entrees. Grain products were not specified if whole grain.

D. Vendors with problems related to the whole grains component

Vendor	Resolution
Choice Lunch	This vendor's cheese pizza uses a whole grain crust, but USDA database did not have whole grain crust pizza. Chicken tenders are also high in fiber, but the website does not indicate if whole grain is used for chicken tenders. USDA database did not have whole grain chicken tenders. Whole Grain component on HEI score may be underestimated.
Santa Clarita	Same as above. USDA database did not have whole grain pizza (pizza offered every day).
Sodexo	All grains are whole grain. USDA database did not have whole grain versions of many of their items.
Preferred Meals	All grains are whole grain. USDA database did not have whole grain versions of many of their items.
Preferred Choice	Has many whole grain items not available in USDA.

E. Vendors without elementary school menus

Vendor	Resolution
Royal Dining	Carlos Adan Saucedo (casaucedo@royaldiningcatering.com) sent us middle school and high school menus and nutrition information. The middle school menu was used for the analysis.
SNP	The menu for SNP is a middle school menu.

Results

Using the matching and HEI scoring methods described in previous sections, we created 16 scores for each vendor. Only results using the vendor given information for HEI scoring (for those vendors who provided the information) are displayed below. For all scoring, please see "Scores with supplemental.xlsx" in Dropbox.

Using the original HEI scores with added supplemental scores, the top six vendors remained the same position within in each method. Choice Lunch and Kid Chow remained at the bottom two. From method 1 to method 2 of matching foods in menus where vendors did not provide nutrition information, there were minor shuffling of positions between Aramark and SNP, and among CSU Chico, Good Earth, Compass, SFE, and Fieldbrook. Method 1 and method 4 both matched foods as closely as possible to foods available in the USDA food database by name and description and only differed in the estimated total calorie per meal that we assumed vendors offered. However the rankings in methods 1 and 4 were the same. Methods 2 and 3 used the average values derived from nutrition information from vendors who provided it and only differed in the estimated total calorie per meal that we assumed vendors offered. The rankings from these two methods differed between Aramark and SNP, and among Good Earth, SFE, and CSU Chico. (See Part 1)

Part 1: HEI scores with supplemental scores (not assuming vendors met all USDA requirements)

All vendors met the requirements (and got full HEI points) for Whole Fruit, Total Vegetables, and Dairy. All vendors, except Sodexo, received full HEI component points for Total Fruit.

Method 1 (USDA and 650)	
Vendor	Total Score
Rev Foods	92.3
Royal Dining	75.0
Blue Lake	72.2
Preferred Meals	71.4
Preferred Choice	70.0
Bellflower	69.1
SNP	67.8
Aramark	64.7
Sodexo	59.9
Santa Clarita	55.5
CSU Chico	51.9
Good Earth	50.2
Compass	45.6
SFE	43.2
Fieldbrook	39.7
Choice Lunch	37.1
Kid Chow	26.8

Method 2 (Average and 650)	
Vendor	Total Score
Rev Foods	92.3
Royal Dining	75.0
Blue Lake	72.2
Preferred Meals	71.4
Preferred Choice	70.0
Bellflower	68.3
Aramark	64.7
SNP	64.3
Sodexo	59.9
Santa Clarita	55.5
Good Earth	52.3
SFE	50.5
CSU Chico	50.0
Fieldbrook	47.6
Compass	45.6
Choice Lunch	37.1
Kid Chow	25.1

Method 3 (Average and 644)		Method 4 (USDA and 644)	
Vendor	**Total Score**	**Vendor**	**Total Score**
Rev Foods	92.3	Rev Foods	92.3
Royal Dining	75.0	Royal Dining	75.0
Blue Lake	72.2	Blue Lake	72.2
Preferred Meals	71.4	Preferred Meals	71.4
Preferred Choice	70.0	Preferred Choice	70.0
Bellflower	68.3	Bellflower	69.1
SNP	64.8	SNP	67.2
Aramark	64.7	Aramark	64.7
Sodexo	59.9	Sodexo	59.9
Santa Clarita	55.5	Santa Clarita	55.5
CSU Chico	52.8	CSU Chico	51.9
Good Earth	52.3	Good Earth	50.3
SFE	50.5	Compass	45.6
Field brook	47.6	SFE	43.4
Compass	45.6	Fieldbrook	39.9
Choice Lunch	37.1	Choice Lunch	37.1
Kid Chow	23.3	Kid Chow	27.0

*Vendors with info used vendor values for HEI "Adj_V_[Nutrient]". For scores created using USDA values "Adj_[Nutrient]", see "Scores with supplemental.xlsx")

Part 2: HEI scores with supplemental scores (Assuming vendors met all USDA requirements)

When we assumed that all vendors met the USDA school lunch requirements for whole grains, total protein foods, refined grains, and sodium, Rev Foods remained at the top of the list with the highest score and Kid Chow remained at the bottom. SNP rose to second or third healthiest depending on the method used. CSU Chico also rose slightly to become the eighth or ninth healthiest depending on the method used, while Sodexo dropped slightly in the list. (See Part 2)

Method 1 (USDA and 650)	
Vendor	Total Score
RevFoods	93.0
SNP	84.0
Preferred Choice	82.6
PreferredMeals	81.1
Royal Dining	81.0
Bellflower	79.4
BlueLake	75.8
CSUChico	75.4
Aramark	75.0
Santa Clarita	74.3
GoodEarth	73.7
Sodexo	69.3
Compass	68.0
Fieldbrook	67.8
ChoiceLunch	63.8
SFE	63.8
KidChow	40.0

Method 2 (Average and 650)	
Vendor	Total Score
RevFoods	93.0
Preferred Choice	82.6
SNP	82.1
PreferredMeals	81.1
Royal Dining	81.0
Bellflower	80.9
BlueLake	75.8
CSUChico	75.1
Aramark	75.0
Santa Clarita	74.3
GoodEarth	73.4
Fieldbrook	70.3
Sodexo	69.3
SFE	68.8
Compass	68.0
ChoiceLunch	63.8
KidChow	40.0

Method 3 (Average and 644)	
Vendor	Total Score
RevFoods	93.0
Preferred Choice	82.6
SNP	82.1
PreferredMeals	81.1
Royal Dining	81.0
Bellflower	80.9
BlueLake	75.8
Aramark	75.0
CSUChico	75.0
Santa Clarita	74.3
GoodEarth	73.3
Fieldbrook	70.3
Sodexo	69.3
SFE	68.8
Compass	68.0
ChoiceLunch	63.8
KidChow	39.5

Method 4 (USDA and 644)	
Vendor	Total Score
RevFoods	93.0
SNP	83.8
Preferred Choice	82.6
PreferredMeals	81.1
Royal Dining	81.0
Bellflower	79.3
BlueLake	75.8
CSUChico	75.4
Aramark	75.0
Santa Clarita	74.3
GoodEarth	73.6
Sodexo	69.3
Compass	68.0
Fieldbrook	67.9
ChoiceLunch	63.8
SFE	63.7
KidChow	40.0

*Vendors with info used vendor values for HEI "Adj_V_[Nutrient]". For scores created using USDA values "Adj_[Nutrient]", see "Scores with

Table 3. Supplemental Scores assigned to each vendor

Category	Aramark	Bellflower	BlueLake	ChoiceLunch	Compass	CSUChico	Fieldbrook	GoodEarth	KidChow	Preferred Choice	Preferred Meals	RevFoods	Royal Dining	Santa Clarita	SFE	SNP	Sodexo
Plus points																	
Salad bar	.	.	.	.	10	.	.	.	.	10	10	.	.	.	.	.	10
Minus points																	
Processed meat	-2	-2	.	-2	-10	-2	-2	.	-10	.	.	.	.	-2	.	-6	-6
Fast food	-8	-4	-4	-4	-8	-2	-4	-6	-10	-6	-8	-2	-4	-10	-6	.	-10
Fried potatoes	-2	-2	-2	.	-2	.	-2	.	.	-2	-2	.	-2	.	.	.	-2
Chocolate milk	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10	.	-2	-4	-10	.	-10
Sweets, desserts	.	.	-2	.	-2	.	.	.	-10	.	.	.	.	-2	-6	.	.
Chips and salty snacks	.	.	-4	-10	.	.	.	.	-10	.	.	.	.	.	.	.	.
Supplemental	-22	-18	-22	-26	-22	-14	-18	-16	-50	-8	-10	-2	-8	-18	-22	-6	-18

Supplemental scores summary: SNP was the only vendor that did not offer any fast food-type meals. Only 4 vendors offered salad bars (24%). Over three quarters of vendors offered chocolate milk (88%), over half offered processed meats (59%), and fried potatoes (53%). Only five vendors offered additional sweets or desserts, and three vendors offered additional chips or other salty snacks.

Limitations

There are several limitations to this analysis:

While most of the menus were for elementary schools, there were a few that were from different grade levels. Vendor menus also differed by year and/or seasonality. (In Part 2 of the results, we assumed that Fieldbrook and SFE met the USDA guidelines for school meals even though their menus are dated from before this regulation went into effect.)

For the matching process, the USDA database did not have many whole grain options for items that were whole grain in the vendor menus. Assumptions made for the Incomplete or missing information for half the vendors may not accurately reflect the healthfulness of their menus. The matching was also limited by the foods available in the What's In The Foods You Eat Search Tool.

In our analysis, the amount of food analyzed differed for vendors with set menus (no choice for students) and those with multiple options/choices (i.e. Kid Chow). Additionally, the rating is based on items offered on the menu, not on consumption or what is served. Our nutrition experts have pointed out that what appears on the menu may not be what is served at times based on the school's food availability.

The sample size of 17 vendors may be too small to assess whether vendors who provided nutrition information (n=8) were statistically different from those who did not (n=7). (Preferred Choice and Sodexo did not fit in either of these categories as these vendors provided limited nutrition information and a different matching method was used).

Summary

This menu analysis project was guided by previous published work that evaluated menus from different settings using the HEI scoring. However, we determined that the HEI score alone did not capture some of the more positive (and negative) to menu offerings. Therefore, we consulted nutrition experts to develop a supplemental scoring system to identify additional factors that were able to distinguish healthier school menus from those that were only meeting the minimum requirements. The results from using the supplemental scoring system in conjunction with the HEI score appear to better reflect the healthfulness of the vendor menus in the experts' opinions. However, the previously mentioned limitations will still have to be taken into account.

Final note

All documents developed for this project and data used are stored in Dropbox:
https://www.dropbox.com/sh/9f2njwvtvcaqloj/AABxoVG0F-ACipIcTFjUQ5PQa?dl=0

This link includes:

Documents Folder –

- Assumptions by Vendors.doc – detailed notes on assumptions made during matching, listed by vendor and by food item. Also includes notes on supplemental scoring and notes from meetings with nutrition experts.
- Food Average Defaults.xlsx – spreadsheet used to determine average values for food items using values from vendors that provided nutrition information.
- Scores with supplemental.xlsx – spreadsheet with HEI score, HEI score with supplement scores for vendors for each method used
- Scores with legislation.xlsx – spreadsheet with all scores for vendors assuming that they are meeting the USDA lunch guidelines.
- Vendor Menu List.xlsx – spreadsheet with vendor menu information (year, grade level, etc)
- Vendor Nutrient Sources for HEI Scoring.docx – document to map out information by vendor that are available for HEI scoring.

Menus Folder – includes all menus and nutrition information used.

SAS Folder – includes all food matching spreadsheets and SAS codes used. Note that folders may have been renamed after running the SAS codes.

Acknowledgements

Appendix: School Meal Standards

National School Lunch Program Meal Pattern		
Food Group	**Previous Requirements K-12**	**Current Requirements K-12** (as of 7/1/12)
Fruit and Vegetables	½ - ¾ cup of fruit and vegetables combined per day	¾ - 1 cup of vegetables plus ½ -1 cup of fruit per day Note: Students are allowed to select ½ cup fruit or vegetable under OVS.
Vegetables	No specifications as to type of vegetable subgroup	Weekly requirement for: • dark green • red/orange • beans/peas (legumes) • starchy • other (as defined in 2010 Dietary Guidelines)
Meat/Meat Alternate (M/MA)	1.5 – 2 oz eq. (daily minimum)	Daily minimum and weekly ranges: Grades K-5: 1 oz eq. min. daily (8-10 oz weekly) Grades 6-8 : 1 oz eq. min. daily (9-10 oz weekly) Grades 9-12 : 2 oz eq. min. daily (10-12 oz weekly)
Grains	8 servings per week (minimum of 1 serving per day)	Daily minimum and weekly ranges: Grades K-5: 1 oz eq. min. daily (8-9 oz weekly) Grades 6-8 : 1 oz eq. min. daily (8-10 oz weekly) Grades 9-12 : 2 oz eq. min. daily (10-12 oz weekly)
Whole Grains	Encouraged	At least half of the grains must be whole grain-rich beginning July 1, 2012. Beginning July 1, 2014, all grains must be whole grain rich.
Milk	1 cup Variety of fat contents allowed; flavor not restricted	1 cup Must be fat-free(unflavored/flavored) or 1% low fat (unflavored)

School Breakfast Program Meal Pattern		
Food Group	**Previous Requirements K-12**	**Current Requirements K-12** (as of 7/1/12)
Fruit	½ cup per day (vegetable substitution allowed)	1 cup per day (vegetable substitution allowed) Note: Quantity required SY 2014-15. Students are allowed to select ½ cup of fruit under OVS.
Grains and Meat/Meat Alternate (M/MA)	2 grains, or 2 meat/meat alternates, or 1 of each per day	Daily min. and weekly ranges for grains: Grades K-5: 1 oz eq. min. daily (7-10 oz weekly) Grades 6-8 : 1 oz eq. min. daily (8-10 oz weekly) Grades 9-12 : 1 oz eq. min. daily (9-10 oz weekly) Note: Quantity required SY 2013-14. Schools may substitute M/MA for grains after the minimum daily grains requirement is met.
Whole Grains	Encouraged	At least half of the grains must be whole grain-rich beginning July 1, 2013. Beginning July 1, 2014, all grains must be whole grain rich.
Milk	1 cup Variety of fat contents allowed; flavor not restricted	1 cup Must be fat-free (unflavored/flavored) or 1% low fat (unflavored)

Previous Nutrient Standards	Current Standards K-12 (as of 7/1/12)		
Sodium Reduce, no set targets	**Target I:** **SY 2014-15** Lunch ≤1230mg (K-5); ≤1360mg (6-8); ≤1420mg (9-12) Breakfast ≤540mg (K-5); ≤600mg (6-8); ≤640mg (9-12	**Target 2:** **SY 2017-18** Lunch ≤935mg (K-5) ≤1035mg (6-8); ≤1080mg (9-12) Breakfast ≤485mg (K-5); ≤535mg (6-8); ≤570mg (9-12	**Final target:** **SY 2022-23** Lunch ≤640mg (K-5); ≤710mg (6-8); ≤740mg (9-12) Breakfast ≤430mg (K-5); ≤470mg (6-8); ≤500mg (9-12)
Calories (min. only) *Traditional Menu Planning* Lunch: 633 (grades K-3) 785 (grades 4-12) 825 (optional grades 7-12) Breakfast: 554 (grades K-12) *Enhanced Menu Planning* Lunch: 664 (grades K-6) 825 (grades 7-12) 633 (optional grades K-3) Breakfast: 554 (grades K-12) 774 (optional grades 7-12) *Nutrient Based Menu Planning* Lunch: 664 (grades K-6) 825 (grades 7-12) 633 (optional grades K-3) Breakfast: 554 (grades K-12) 618 (optional grades 7-12)	**Calorie Ranges (min. & max.)** *Only food-based menu planning allowed* Lunch: 550-650 (grades K-5) 600-700 (grades 6-8) 750-850 (grades 9-12) Breakfast: 350-500 (grades K-5) 400-550 (grades 6-8) 450-600 (grades 9-12)		
Saturated Fat <10% of total calories	**Saturated Fat** <10% of total calories		
Trans Fat: no limit	**New specification:** zero grams per serving (nutrition label)		

Source: http://www.fns.usda.gov/sites/default/files/comparison.pdf