



AN ELEMENTARY SCHOOL STUDENT WASTE CASE STUDY

2015-16 Plate Waste Study



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Introduction

In collaboration with a San Diego County elementary school, and UC San Diego Center for Community Health, an action plan was formulated to improve the service and dining spaces for students to influence their eating behavior to favor more fruit and vegetable selection and consumption. The main objectives of the action plan were to 1. Increase selection and consumption of salad bar produce and 2. Highlight featured menu items in the cafeteria. The action plan to achieve stated objectives were inclusive of installing a large white board in the service line dedicated to featuring the *Harvest of the Month* as well as produce being served from the school garden. Laminated arrows were placed throughout the service line as reminders to take a fruit or vegetable from the salad bar. Guidance stanchions were to be placed to guide foot traffic toward the salad bar at the end of the service line. Student-grown produce was featured on the outdoor menu board, indoor white board, and in a designated spot on salad bar with photo card. Nutrition and physical activity promotion posters were placed throughout service and dining areas as well as fruit and vegetable clings throughout service line. The effectiveness of these Smarter Lunchrooms Movement interventions were evaluated through the Smarter Lunchrooms scorecard, salad bar observation, and plate waste study. The following report highlights the outcomes of the plate waste study and details the scorecard interventions which were implemented. The information gathered from this plate waste study can be used to open up more dialogue around food waste with students, staff, and parents. The data provides valuable insight into student eating behavior and can guide efforts to support future menu design to support nutrition services bottom line and increase student participation in school meals.

Methods

Measurement:

The quarter waste method was used to code uneaten edible food and beverage thrown away by students. The quarter waste method assigns food items numbers 0-4 based on the portion of item left on plate:

0 = all eaten 1 = $\frac{1}{4}$ wasted 2 = $\frac{1}{2}$ wasted 3 = $\frac{3}{4}$ wasted 4 = all wasted

If there was evidence of an item being fully consumed like sauce left on a plate, wrapper from a sandwich, or an empty milk carton, "0" was assigned. The quarter waste method was developed by Cornell University's B.E.N Center and is validated as the most effective visual tray waste measurement method with 90% reliability.

Data Collection Protocol:

Day 1: February 8, 2016 (309 Trays Coded)
Day 2: February 9, 2016 (321 Trays Coded)
Day 3: March 7, 2016 (316 Trays Coded)
Day 4: March 8, 2016 (345 Trays Coded)

A team of six was assembled for the four plate waste study days. Three team members coded student trays, and the others assisted with traffic control, tray sorting, disposal, and salad bar observation. The plate waste team was inclusive of volunteers. The PTA President gave much appreciated guidance and support on all plate waste study days, as the school is waste conscious. The District Food Service Director was also involved in both pre and post study days with salad bar observation. A detailed protocol was approved by school administration and distributed to all team members prior to study implementation. One hundred percent of all trays were coded from each lunch period covering first through fifth grades; 1,291 total trays were coded during this study. Pre K and kindergarten students were excluded from the study.

An announcement was made five minutes before the end of each lunch period; the announcement informed students that there would be a change in the process for disposing of trash. Students were instructed to carry their trays to the assigned tray coding and sorting tables. On Days 1 and 2, students were instructed to go outside and hand their trays to the two assigned team members who then placed the trays on the outside tables for coding. Only those who brought their lunch from home were allowed to throw away their waste. After the trays were coded, the same team members brought the coded trays over the disposal table where the trays were sorted and food disposed in accordance to the school's waste disposal and recycling policies. On Days 3 and 4, students were instructed to place their trays directly on the coding tables. On Day 3 there was a school assembly in the cafeteria so students sat outside instead of inside. On day 4 there was inclement weather, so data collection and sorting were moved inside but procedures for data collection and disposal stayed the same. Data was collected on hardcopies of spreadsheets and then entered into the primary electronic Excel spreadsheet at the end of the study week.

Interventions

Implemented Smarter Lunchroom Strategies to influence student eating behavior

The following interventions were implemented from the Smarter Lunchrooms Movement scorecard. The interventions took place over a school break when students were off, but food service staff were still on site.

Entrée of the Day

- ✓ Daily targeted entrées were provided creative or descriptive names

Signage, Priming & Communication

- ✓ Posters displaying healthful foods were visible and readable within all service and dining areas
- ✓ Signage, posters and laminated arrows were available to direct students toward all service areas, especially the salad bar
- ✓ Signs promoting the lunchroom and featured menu items were placed in other areas of the school, such as the teacher's lounge
- ✓ All promotional signs and posters are rotated, updated or changed at least quarterly
- ✓ All creative and descriptive names are rotated, updated or changed at least quarterly

Lunchroom Atmosphere

- ✓ Cleaning supplies and utensils were returned to cleaning closet or were not visible during service and dining
- ✓ Staff were encouraged to model healthful eating behaviors to students
- ✓ Some students who did not have a full reimbursable meal were politely prompted to select and consume a fruit or vegetable option by staff

Waste and Consumption Trends

Waste Measurement by: Food Item

Waste Definition = 75% or more of the food item was thrown away

Waste by food item is a measure of how much each type of food and beverage was wasted, the percentages are weighted by how much the item was selected by students. For example, within Appendix A, waste per item is displayed as “36.1% (n=72)” which is the grilled cheese sandwich waste on Day 1. What this means is that of the 72 trays that had evidence of a grilled cheese sandwich, 36.1% of those trays had 75% or more of the sandwich left of the tray with the intention to be thrown away. The following results show total percentage of waste by food category, the Appendix A further breaks down each category and beverage type as well as how many times the item appeared on a tray (n=).

Fruit had the highest waste measurement of all food and beverage; 30.5% of all fruit was wasted. Almost half (45.1%) of all whole fruit was wasted. Vegetables followed closely behind fruit as the second highest wasted food category; 29.6% of all vegetables were wasted. Vegetables were also the least selected food item during the plate waste study. Of all entrées served, 26.7% were wasted. The turkey and cheese sandwich had the highest waste of all entrées, with one in two students (52.6%) throwing away this item who put it on their tray. Of the most selected entrées, ravioli with marinara sauce was wasted 39.9% of the time and turkey crisp tacos were wasted 14.2% of the time. Fat free chocolate milk had the lowest

waste at 10.7%. Fat free white milk and low fat white milk had similar waste measures of 30.9% and 30.8% respectively. See descriptive chart in Appendix A.

Waste Measurement by: Student and Grade Level

Since each lunch period is split up by grade level, we were able to measure average waste per student and by grade level. Average waste per student measures quantity of food and milk left on tray to be thrown away. For example, each first grader left an average of 23.8% of the food and milk they selected on the tray to be thrown away. What we found was a direct correlation between grade level and quantity of food waste. First graders wasted the most food and fifth graders wasted the least food. The student waste trend was consistent all 4 days of the study.

Average Food Waste Per Student

Grade	Pre	Post	Average
First	22.4%	24.7%	23.8%
Second	22.3%	22.7%	22.5%
Third	19.9%	18.6%	19.5%
Fourth	19.0%	18.7%	18.9%
Fifth	13.8%	15.3%	14.6%

Evaluation Findings

Percent change in food waste varied by food item and by student between pre and post intervention days. There was an average 2.6% increase in food waste per student between pre and post plate waste study dates. There was a 19.7% decrease in entrée waste at post intervention data collection dates, which was the most change among food categories. Although fruits were the most wasted item during the study, there was the least change in percentage of waste pre to post intervention. There was an increase in waste for vegetables and milk, 14.7% increase and 16.2% increase respectively.

Percentage Food Waste Per Item Pre and Post Intervention

Item	Pre	Post	% Change
Entrée	29.9%	24.0%	-19.7%
Vegetables	28.5%	32.7%	14.7%
Fruit	30.1%	30.5%	1.3%
Milk	18.5%	21.5%	16.2%

Limitations

All the promotion elements were not in place during the post study days; the guidance stanchions which were supposed to be used to guide foot traffic toward the salad bar had not been delivered by the post study dates. The salad bar items changed each day of the study. The entrée items were standardized on the menu, but the fruits and vegetables served were not always consistent with the menu. Four weeks may not have been sufficient time to see changes in student waste and consumption behavior due to the Smarter Lunchrooms interventions. On day 2 of the study, there was a school assembly and all students had to sit outside instead of inside to eat. On Day 3 there was bad weather; all students had to spend their recess time in the cafeteria and a movie was played. These factors may have played a role in student eating behavior and waste during the pre and post study days.

Recommendations

Substantial approaches to ensuring students select and consume all components of a reimbursable school meal are needed. These approaches may include moving the point of sale from the beginning of the line to end of the service line, consistent verbal prompts from cafeteria staff, and more nutrition education in the classroom to promote fruit and vegetable consumption. As a waste conscious school, there is already a great foundation to build upon lessons for preventing food waste. Additional plate waste studies should occur in the future to measure effectiveness of the implemented Smarter Lunchrooms Movement interventions.

Other Smarter Lunchroom Strategies that may nudge student eating and waste behavior:

Focusing on Fruit

- ✓ Kiwis should continue to be served in quarters and other whole fruit should be, at minimum, cut in half to prevent waste
- ✓ Provide creative and age appropriate names of fruit (i.e., *Brilliant Bananas*).
- ✓ Display fruit in at least 2 different locations on each service line. Provide a colorful bowl near the register/POS system in addition to the fruit on the salad bar.
- ✓ Display whole fruit in an attractive tiered basket on the salad bar.
- ✓ Write the daily fruit options on the menu board

Promoting Vegetables and Salad

- ✓ Give all available vegetables creative names on salad bar (i.e., *X-ray Vision Carrots*).
- ✓ Print all vegetable names on name cards to display next to each vegetable daily.
- ✓ Write the vegetables available that day on the menu board with the entrée.

- ✓ Display a pre plated example plate to remind students to take fruits and veggies. Have a combo meal with a fruit side and vegetable side.

Entrée of the day

- ✓ Place name cards next to the entrée items

Creating School Synergies

- ✓ Print out the monthly menu including the salad bar rotation. Print two, and place one at the cafeteria and one in teacher lounge.
- ✓ Feature today's meal components on menu boards as well as a menu board for tomorrow's menu items

Student Involvement

- ✓ Assign student volunteers to initiate student involvement.
- ✓ Have the students help develop creative descriptive names for the menu items.

Appendix A: Descriptive Table

Percent Waste by Food and Beverage Item					
	Day 1	Day 2	Day 3	Day 4	Totals
Total Trays Coded	(n= 309)	(n=321)	(n=316)	(n=345)	(n=1291)
Entrée	43.2% (n=264)	17.3% (n=277)	36.6% (n=292)	15.5% (n= 432)	26.7% (n=1265)
Grilled Cheese Sandwich	36.1% (n= 72)	N/A	41.2% (n=68)	N/A	38.5% (n=140)
Ravioli & Sauce	45.8% (n= 192)	25% (n= 4)	35.3% (n=224)	N/A	39.9% (n=420)
Turkey & Cheese Sandwich	N/A	50% (n= 28)	N/A	48.3% (n=29)	52.6% (n=57)
Turkey Crisp Tacos	N/A	13.5% (n = 245)	N/A	14.9% (n=282)	14.2% (n=527)
Tortilla Chips	N/A	N/A	N/A	9.1% (n=121)	9.1% (n=121)
Vegetables	34.0% (n= 50)	23.2% (n=56)	31.5% (n= 54)	29.8% (n= 47)	29.6% (n= 206)
Greens	0.9% (n=11)	19% (n=42)	24% (n=25)	18.2% (n=22)	19% (n=100)
Red/Orange	48.2% (n= 29)	20% (n= 10)	63.6% (n=11)	55.5% (n= 9)	47.4% (n= 59)
Legumes	50% (n= 2)	75% (n= 4)	33.3% (n= 6)	100% (n= 1)	53.8% (n= 13)
Other	37.5% (n= 8)	- (n= 0)	16.6% (n= 12)	26.6% (n= 15)	25.7% (n= 35)
Fruit	30.4% (n= 161)	30.4% (n= 184)	31.9% (n= 135)	29.6% (n= 226)	30.5% (n= 706)
Fresh Sliced	55.4% (n= 74)	19% (n= 121)	18.5% (n=81)	13.4% (n= 157)	20.8% (n= 433)
Whole	18.4% (n= 87)	52.4% (n= 63)	51.8% (n=54)	66.6% (n = 69)	45.1% (n= 273)
Milk	10.2% (n= 196)	28.3% (n= 166)	13.1% (n= 214)	33.1% (n= 154)	20% (n= 730)
White Milk Fat Free	28.6% (n= 7)	30.4% (n= 115)	37.5% (n = 8)	31% (n= 100)	30.9% (n= 230)
Chocolate Milk Fat Free	9.5% (n= 189)	N/A	11.8% (n= 204)	N/A	10.7% (n= 393)
White Milk Low Fat	N/A	23.5% (n= 51)	50% (n= 2)	37% (n= 54)	30.8% (n= 107)

Greens = Iceberg lettuce, mixed greens, spinach

Red/Orange = Beets, radish, carrots, tomatoes (cherry and sliced)

Legumes = Chickpeas, black beans, sugar snap peas

Other = Celery, broccoli, cucumber, cauliflower, veggie Soup

Fresh Sliced = Kiwi, honey dew, orange slices,

Whole = Apples, bananas, pears

N/A = Not Served

n = Number of Trays with Evidence of Item

Waste = 75% or more thrown away

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