



Student receptivity to new school meal offerings: Assessing fruit and vegetable waste among middle school students in the Los Angeles Unified School District



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ABSTRACT

Objective. We sought to characterize student receptivity to new menu offerings in the Los Angeles Unified School District by measuring the levels of fruit and vegetable waste after implementation of changes to the school lunch menu in fall 2011.

Methods. We measured waste at four randomly selected middle schools in the school district, using two sources: a) food prepared and left over after service (production waste); and b) food that was selected but not eaten by students (plate waste).

Results. 10.2% of fruit and 28.7% of vegetable items prepared at the four schools were left over after service. Plate waste data, collected from 2228 students, suggest that many of them did not select fruit (31.5%) or vegetable (39.6%) items. Among students who did, many threw fruit and vegetable items away without eating a single bite.

Conclusions. Our findings suggest that fruit and vegetable waste was substantial and that additional work may be needed to increase student selection and consumption of fruit and vegetable offerings. Complementary interventions to increase the appeal of fruit and vegetable options may be needed to encourage student receptivity to these healthier items in the school meal program.

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Introduction

To stem and reverse childhood obesity, a number of policymakers and public health authorities at the federal, state, and local levels have intensified their efforts to improve the nutritional quality of school meals through the establishment of institutional policies or practices that promote healthy food procurement (Institute of Medicine (IOM), 2010; United States Department of Agriculture (USDA), 2012). These practices have included such strategies as setting upper limits for calories, sodium, and other nutrients per serving in the contracts of food services vendors; institutional procurement of healthier options such as whole grains and plant-based foods; and/or complementary approaches such as nutrition education, signage, and product placement to increase student selection of healthy food. Collectively, these institutional practices aim to improve the quality of foods served in schools,

increase food security, and positively influence student dietary intake (IOM, 2010).

The Los Angeles Unified School District (LAUSD), the second largest school district in the United States, serves more than 650,000 meals per day. With such volume and purchasing power, LAUSD has become a national leader in increasing student access to healthy foods through changes to its school meal program (Cummings et al., 2014). In the 2011–2012 school year (SY), the LAUSD Food Services Branch (FSB) launched a new menu that included more fresh fruits and vegetables, whole grains, vegetarian items, and a range of ethnic foods; it also eliminated flavored milk. These menu changes currently exceed the USDA school Final Rule on school meal nutrition standards, released in 2012 (USDA, 2012). In developing the revised menu, LAUSD held community taste tests during the summer of 2011 at its central kitchen. While taste testing results suggest that students reacted favorably to the new menu options, there were anecdotal reports that students reacted negatively when the meals were served in the actual school cafeterias (Wantanabe, 2011).

The national *Communities Putting Prevention to Work* (CPPW) program, funded by the Centers for Disease Control and Prevention (CDC), supports increasing access to healthier food options, including establishing healthy food procurement practices in schools (Bunnell et al., 2012). Despite growing support for such school-based practices

Abbreviations: IOM, Institute of Medicine; USDA, U.S. Department of Agriculture; LAUSD, Los Angeles Unified School District; SY, School Year; FSB, Food Service Branch in the Los Angeles Unified School District; CPPW, Communities Putting Prevention to Work; CDC, Centers for Disease Control and Prevention.

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(IOM, 2010; Story et al., 2008), limited evidence exists to support the effectiveness of such efforts for changing student food selection and eating behaviors. A key question is how students react to these changes to the menu. Few studies have examined student receptivity to school menu changes and results of such studies have been mixed. Most studies have assessed student receptivity to procurement practice changes based on older meal standards and used only one method to assess student receptivity, such as the amount of food left on students' trays (plate waste) (Adams et al., 2005; Cashman et al., 2010; Templeton et al., 2005) or administrative records of unused food (Cohen et al., 2012).

Supported in part by CPPW, this study sought to examine student receptivity to school meals offered by the LAUSD in SY 2011–2012 that met the 2012 USDA school meal nutrition standards. It builds on current evidence by using both administrative records and plate waste data to provide a more comprehensive picture of student receptivity to new menu offerings. While food waste represents only one of several dimensions of student receptivity, it is a plausible and reliable proxy measure of student reactions to school menu changes. Because previous research suggests that plant-based options are the food category most frequently wasted by youth (Marlette et al., 2005; Reger et al., 1996), this study focused its analysis on describing fruit and vegetable waste.

Methods

To characterize student receptivity to adopted school meal changes in the LAUSD, we measured leftover fruit and vegetable items at four randomly selected middle schools, using two sources: a) food prepared and left over after service (production waste); and b) food selected but not eaten by students (plate waste).

Current USDA policy promotes the “offer versus serve” concept, where students are required, for purposes of government reimbursement, to choose at least three of five food components from a variety of categories (meat/meat alternate, grains, fruits, vegetables, and low-fat (1%) or fat-free milk). During any given lunch period, LAUSD schools offer multiple options for each of the categories (e.g., two entrées, two vegetable items, two fruit items). Therefore, we attempted to capture information about a) whether students selected the fruit and vegetable items and b) the extent to which students consumed these items.

Sample

Simple random sampling using a random number generator was used to select four of the 75 middle schools served by the FSB (Table 1). Plate waste studies are notoriously labor intensive, disruptive of school lunchtime routine and expensive to conduct. To ensure variability of student demographic characteristics within the study budget and thereby minimize type I error, the investigators emulated sample sizes used in recent literature (Cohen et al., 2012, 2013; Nozue et al., 2010; Yon et al., 2012) by including four schools in the study. Selected schools were comparable with estimates of the LAUSD student demographics for the 2011–2012 school year, which showed that 72.3% of students were Hispanic, and 76.7% were eligible for free/reduced price lunch (California Department of Education, 2014). All selected schools agreed to participate, in part due to district leadership, which heavily supported participation. Plate waste data collection took place each day, for five consecutive days (Monday through Friday) at each school in November or December of 2011. At each school, all lunch periods were observed. Waste data were collected only for

students who chose to eat in the primary eating areas immediately adjacent to the cafeteria food line.

Data collection: Food production records

Food production records were abstracted from administrative databases housed at the LAUSD. Data on food production are recorded by staff working in the school cafeteria and reported to the FSB using a standardized template. The following data fields were requested from LAUSD for this study: school, service date, service period (breakfast, snack or lunch), and a description and number of each food item (e.g., entrée, side, drink) projected, prepared, added, served and left over.

Data collection: Plate waste of food served

The goal of the plate waste assessment was to measure the amount of fruit, vegetable, and milk waste that remained on students' trays after they finished their school lunch. This analysis focuses on fruit and vegetable waste only. Prior to the first lunch period, the plate waste evaluation team obtained and recorded information from the cafeteria manager about the day's fruit and vegetable menu choices, including the names of the food items served (stock description) and their mean weights (5 samples for each item were weighed) as served (including container weight). Any entrée with more than 50% vegetables by weight (according to the school food service director) was included as a vegetable choice.

When students entered the lunch line, a unique, arbitrary study identification number was placed on each tray and a member of the evaluation team observed and recorded the students' sex and race/ethnicity (coded as African American, Asian/Pacific Islander, Latino, white, or other). As students left the cafeteria they were instructed (through signage and public announcements) to leave all remaining uneaten food items on their tray and deposit their tray at one of two staffed stations at opposite ends of the primary eating area. Once the majority of students had dropped off their trays, one team member at each station visually inspected each tray and recorded: the assigned identification number; the number of items that the student took (based on the presence of packaging or waste); and the amount of waste. Based on visual inspection, fruit and vegetable waste was recorded as: a) no evidence of the food component on the plate (i.e., that the student had not selected that food item); b) none (wrapper only or fruit residues (e.g. apple core)); c) one-quarter remaining; d) one half remaining; e) three quarters remaining; or f) all remaining. Using the study identification numbers, the demographic data observed at the start of the lunch period were linked with the observed plate waste data recorded at the end of the lunch period. Protocol for the collection of plate waste was comparable to previous studies (Cohen et al., 2012, 2013).

In addition to individual-level tray data, the aggregated waste was bagged and weighted using a calibrated scale. All data were collected by trained observers using standardized forms (see Fig. 1). Two members of the team, masters-level health educators with experience working with schools, were permanent members across all schools. Between two and four additional members, trained graduate student interns or the principal investigators, were also present during data collection. The permanent members received training on the detailed study protocol from a Ph.D.-level former food service director prior to any data collection. The permanent members then trained the additional members by having them shadow them for a day prior to letting them collect plate waste data. The study protocol and all study materials were reviewed and approved by the University of California, Los Angeles and the Los Angeles County Department of Public Health Institutional Review Boards prior to field implementation.

Table 1

Characteristics of the four Los Angeles Unified School District middle schools that participated in the plate waste assessment, 2011.

School	Total enrollment ^a	Percent Hispanic ^a	Percentage of students eligible for free or reduced price lunch ^a	Percentage of students who were obese ^b	Number of lunches served ^c	Number of students observed ^d
A	860	87%	85%	27.2%	1602	430
B	707	38%	76%	23.4%	1158	590
C	1686	67%	73%	19.7%	1795	840
D	1724	39%	53%	15.0%	1729	368

^a The Los Angeles Unified School District administrative data for 2011–2012.

^b Based on State-mandated fitnessgram body composition measures for students in the 7th grade during school year 2010–2011.

^c Estimated using the number of entrées served. Data extracted from five days of food production records from the Los Angeles Unified School District.

^d During the five days of on-site observation of student plate waste conducted as a part of this study.

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