

Salad Bars Increased Selection and Decreased Consumption of Fruits and Vegetables 1 Month after Installation in Title I Elementary Schools: A Plate Waste Study

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ABSTRACT

Objective: To evaluate the 1-month impact of salad bars on fruit and vegetable (FV) selection, intake, and waste.

Design: Pre-post quasi-experimental design.

Setting: Title I elementary schools in a large, urban district in central Virginia.

Participants: Students (grades 1–5; >95% African American) from 2 elementary schools participated in plate waste assessments (282 plates were rated at baseline, 443 at post-assessment); fourth- and fifth-grade students from 15 (of 18 eligible) schools (n = 1,193) responded to surveys.

Intervention: Digital imagery plate waste assessments were conducted before salad bars were installed (baseline) and 1 month afterward (post). Post-surveys examined student perceptions of salad bars.

Main Outcome Measures: Fruit and vegetable selection, consumption, and waste.

Analysis: General linear models (without considering clustering) examined changes in outcomes, controlling for school. Frequencies and qualitative analyses were applied to survey data.

Results: At post, students selected more types of FVs (1.81–2.58; $P < .001$), although FV consumption decreased by 0.65 cups ($P < .001$). Given the smaller portions selected, there was less FV waste (0.27 cups; $P < .001$) at post. Students liked the ability to choose FV from salad bars.

Conclusions and Implications: Short-term exposure to salad bars increased the number of FV students chose but decreased FV consumption. Additional strategies are needed to increase FV consumption.

Key Words: elementary school, *National School Lunch Program*, plate waste, salad bars (*J Nutr Educ Behav*. 2018;■■:■■–■■.)

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INTRODUCTION

The school food environment has a powerful role in shaping children's eating behaviors,^{1,2} particularly in schools serving children from low-income families. These children are most likely to rely on school meals for

a significant portion of their daily caloric intake³ and are also most likely to consume inadequate numbers of fruits and vegetables (FVs), which places them at increased risk for poor nutrition and chronic illnesses.^{4,5} School salad bars are cited as a strategy to increase FV intake within the

National School Lunch Program (NSLP).^{6,7} Indeed, *Let's Move Salad Bars to School* donated >5,000 salad bars via this movement⁶; furthermore, the Centers for Disease Control and Prevention cited school salad bars as a major strategy to address pediatric obesity,⁸ and the US Department of Agriculture promoted school salad bars, citing their potential to improve nutrition, increase FV consumption, and reduce waste.⁹ However, there is limited (and mixed) empirical support for these claims.¹⁰

In the only study that prospectively examined the impact of salad bars on elementary students' FV intake, Slusser and colleagues² reported a 1.12-serving increase in FV intake after salad bars were installed (assessed via self-reported 24-hour recalls). Similarly, in a cross-sectional study conducted with middle and high school students, self-reported vegetable consumption was

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48% greater in schools with a salad bar compared with schools serving pre-portioned FV only.¹¹ In contrast, the presence of a salad bar was not associated with increased FV intake in a cross-sectional study that used weighed plate waste methods with elementary school students.¹² Thus, there is still a great need to investigate the impact of salad bars empirically using longitudinal designs and objective dietary assessment methods that are not subject to self-report bias.¹⁰

Salad bars foster choice and thus might be particularly effective within the newer NSLP meal standards.¹³ Specifically, the 2010 Healthy Hunger Free Kids Act (HHFKA) requires all children to be served (vs offered) a fruit and/or vegetable with each meal (the serve model) and sets guidelines regarding the variety and quantity of FVs served.¹³ Strategies that allow children to choose have been demonstrated to increase their FV intake¹⁴; therefore, the serve model has the potential to reduce the perception of choice. Given the significant resources allocated to installing school salad bars and their potential to increase FV intake, there is a great need for systematic investigations to examine how salad bars affect consumption patterns in children within the NSLP. These investigations are particularly important in schools serving children from low-income and racial and ethnic minority backgrounds, who are most likely to rely on school meals and who are at greatest risk for obesity and related chronic diseases.^{15,16}

The current report describes results of *Eat Fresh*, a collaborative project led by Greater Richmond Fit4Kids, with an overall objective to increase access to and consumption of fresh FVs. *Eat Fresh* included the installation of salad bars in 18 elementary schools (17 of which were Title I) in a large, urban school district in central Virginia in the 2015–2016 school year. This district serves >90% racial and ethnic minority children (71% African American and 13% Hispanic) and has been participating in the Community Eligibility Provision of the HHFKA since 2014, allowing all students to receive free meals regardless of paperwork completion.¹⁷ Before opting into this policy, >75% of students were eligible for free and reduced meals. Over 90% of students in this district participate

in the NSLP (personal communication, District School Nutrition Services Director, September 2015). Thus, these schools have high rates of poverty, with many students living in food deserts with high food insecurity; therefore, changes to the school food environment can have a major impact on students' dietary intake.

The primary aim of this investigation was to compare FV selection (number and starting portion size) and waste/consumption (percent waste and portion size consumed) before and 1 month after salad bar installation, assessed via digital imagery (DI) plate waste methods.¹⁸ It was hypothesized that both FV selection and consumption would increase after salad bars were installed, and that waste would decrease. Students' perceptions of salad bars after they were installed were also evaluated using a brief survey. Results may inform the initial, 1-month effects of salad bars in low-income schools participating in the NSLP.

METHODS

Design

A pre-post quasi-experimental design was implemented. Two of the 17 Title I schools receiving salad bars were randomly selected for DI assessments before (fall, 2015) and 1 month after the salad bar launches at each school (spring, 2016). The 1 school that was not Title I was excluded from randomization because of the different population served, which had a lower percentage of racial and ethnic minority students. The 17 remaining schools were divided into large and small schools using a median split of enrollment. One large and 1 small school were then randomly selected using a random number generator. Baseline ratings occurred on the same day for both schools for menu consistency. Post-ratings were matched on length of exposure to salad bars (1 month), but occurred on different days. Items assessing student use and perception of salad bars were included as part of a post-only survey administered by their teachers in physical education class in spring, 2016 (after the first partial year of exposure to salad bars). Research staff instructed physical education teachers to read a short script to students about the

purpose, confidentiality, and voluntary and anonymous nature of the survey. All 18 schools receiving salad bars were provided with surveys and asked to facilitate students' completion.

Participants and Setting

There was high homogeneity within this district with respect to race, socioeconomic status, and NSLP participation, and all elementary schools used the same menus. All first-through fifth-grade students present on rating days who participated in the school lunch program (ie, selected a reimbursable meal) were eligible for plate waste assessments (total enrollment, $n = 564$). Kindergarten was excluded because students were not permitted to use the salad bars. All fourth- and fifth-grade students ($n = 2,329$ enrolled) in the 18 schools receiving salad bars were eligible to complete the brief survey. Surveys were limited to these grades to reduce literacy concerns with younger students.

Procedures

Parent notification. Parent notification letters were sent home via schools, which provided the opportunity for parents to opt out of ratings or surveys for their children. No parents opted out of ratings; 4 opted their child out of the survey. The Institutional Review Board of Virginia Commonwealth University approved this study.

Training. Cafeteria assessors (primarily undergraduate and graduate student volunteers) participated in a 2-hour training that included detailed instruction on cafeteria procedures, including assent procedures, tray preparation, and methods for taking the digital image (ie, from a 45° angle with all 4 corners of the tray in the image, for consistency). Raters viewed sample images of correctly and incorrectly obtained images to recognize the need to follow protocols for accurate data collection (eg, removing visual obstructions from the tray and using the proper angle). Training included practicing preparing mock trays and taking photographs of trays at the appropriate angle and distance, with feedback provided by the investigators until

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