

# A Plate Waste Evaluation of the *Farm to School* Program

Jaclyn D. Kropp, PhD<sup>1</sup>; Saul J. Abarca-Orozco, PhD<sup>2</sup>; Glenn D. Israel, PhD<sup>3</sup>;  
David C. Diehl, PhD<sup>4</sup>; Sebastian Galindo-Gonzalez, PhD<sup>3</sup>; Lauren B. Headrick, MS, RD<sup>5</sup>;  
Karla P. Shelnutz, PhD<sup>6</sup>

## ABSTRACT

**Objective:** To investigate the impacts of the *Farm to School* (FTS) program on the selection and consumption of fruits and vegetables.

**Design:** Plate waste data were recorded using the visual inspection method before and after implementation of the program.

**Setting:** Six elementary schools in Florida: 3 treatment and 3 control schools.

**Participants:** A total of 11,262 meal observations of *National School Lunch Program* (NSLP) participants in grades 1–5.

**Intervention:** The FTS program, specifically local procurement of NSLP offerings, began in treatment schools in November, 2015 after the researchers collected preintervention data.

**Main Outcome Measures:** The NSLP participants' selection and consumption of fruits and vegetables.

**Analysis:** Data were analyzed using Mann–Whitney U and proportions tests and difference-in-difference regressions.

**Results:** The NSLP participants at the treatment schools consumed, on average, 0.061 ( $P = .002$ ) more servings of vegetables and 0.055 ( $P = .05$ ) more servings of fruit after implementation of the FTS program. When school-level fixed effects are included, ordinary least squares and tobit regression results indicated that NSLP participants at the treatment schools respectively consumed 0.107 ( $P < .001$ ) and 0.086 ( $P < .001$ ) more servings of vegetables, on average, after implementation of the FTS program.

**Conclusions and Implications:** Local procurement positively affected healthy eating.

**Key Words:** *Farm to School*, children, fruit consumption, vegetable consumption, school lunch (*J Nutr Educ Behav.* 2017;■■:■■–■■.)

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## INTRODUCTION

In 2010, the Healthy, Hunger-Free Kids Act (HHFKA) was signed into law with the primary focus of improving nu-

trition for children. As part of this legislation, the US Department of Agriculture (USDA) established a *Farm to School* (FTS) program to help schools increase the amount of local foods

they procure and serve in their cafeterias.<sup>1</sup> The FTS programs typically consist of  $\geq 1$  of the following activities: local procurement of products served in school cafeterias, hands-on learning activities such as school gardens, and integrated nutrition education.<sup>2</sup> To measure progress of FTS activities, the USDA began conducting an FTS census in 2013. According to the most recent 2015 FTS census, which collected data from the 2013–2014 school year, more than 42,000 schools in over 5,200 school districts had FTS programs, reaching more than 23.6 million children.<sup>3</sup> Approximately 19% of all school districts served at least 1 locally-sourced product daily.<sup>2</sup> Although FTS programs help schools meet the updated nutrition standards that resulted from HHFKA, 66% of schools with FTS programs also reported other benefits such as increased participation in the *National School Lunch Program* (NSLP) and less food waste.<sup>4</sup> The FTS programs also support

<sup>1</sup>Department of Food and Resource Economics, University of Florida, Gainesville, FL

<sup>2</sup>Department of Family, Youth, and Community Sciences, University of Florida, Institute of Food and Agricultural Sciences Extension, Family Nutrition Program, Gainesville, FL

<sup>3</sup>Department of Agricultural Education and Communication, Program Development and Evaluation Center, University of Florida, Gainesville, FL

<sup>4</sup>Program Planning and Evaluation, University of Florida, Gainesville, FL

<sup>5</sup>Family Nutrition Program, University of Florida, Institute of Food and Agricultural Sciences Extension, Gainesville, FL

<sup>6</sup>Family and Nutrition Program, Family Youth and Community Sciences Department, University of Florida, Gainesville, FL

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Address for correspondence: Jaclyn D. Kropp, PhD, Department of Food and Resource Economics, University of Florida, PO Box 110240, Gainesville, FL; Phone: (352) 294-7631; Fax: (352) 846-0988; E-mail: [jkropp@ufl.edu](mailto:jkropp@ufl.edu)

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local economies<sup>3</sup> and aim to increase students' consumption of fruits and vegetables through increased exposure to fresh produce.<sup>5</sup>

Although FTS programs are expanding at a rapid rate across the country, several prior studies focusing on the effects of FTS programs on promoting healthy eating found mixed results. Joshi et al<sup>6</sup> reviewed 11 prior studies on the effects of FTS programs on dietary behaviors and found that 10 reported positive dietary changes; 4 of those studies reported increases in the consumption of fruits and vegetables outside school. However, the studies that were reviewed relied on production records from school cafeterias, self-reported behaviors, and dietary recall, and hence might have been less accurate than studies in which selection and consumption were observed directly. Recent research recommended that FTS programs use plate waste methodologies to measure impacts on fruit and vegetable consumption to decrease misreporting,<sup>7</sup> because observing and measuring plate waste is an increasingly common and more accurate method used to investigate the selection and consumption of foods, particularly in school cafeteria settings. Although 3 prior studies used plate waste methods to evaluate their FTS programs,<sup>8-10</sup> Yoder et al<sup>8</sup> did not include control schools not participating in the FTS program for comparison, Yoder et al<sup>9</sup> used only FTS program offerings as a control variable, and Jones et al<sup>10</sup> did not compare program effects over time.

Therefore, the objective of this study was to examine the effects of serving locally-procured produce as part of the Alachua County Public Schools (ACPS), FL, FTS program on the selection and consumption of fruits and vegetables served as part of the NSLP. This study advances the literature by using preintervention and postintervention plate waste data collected at control schools without FTS activities and treatment schools with FTS programs. Using Mann-Whitney U and proportions tests and difference-in-difference regression, the researchers tested the hypotheses that fruit and vegetable selection and consumption would increase at the treatment schools after implementation of the FTS program.

## METHODS

After the researchers obtained approval from the University of Florida's institutional review board, they collected preintervention data at 6 elementary schools in the ACPS system in October, 2015. Postintervention data were collected in April, 2016 after implementation of the FTS program at the treatment schools. The ACPS system was composed of suburban and rural schools with 22 elementary schools. Data were collected from 3 elementary schools receiving the treatment (FTS program) and 3 control schools (not receiving the FTS program). Although FTS programs frequently consist of local procurement, nutrition education, and school gardens, this analysis focused on procurement of NSLP offerings from local producers. One treatment and 1 control school had school gardens that were operational for >2 years before the study period, but none of the study schools had formal nutrition education programs during the normal school day during the study period. The products grown in the school gardens were for educational purposes only and were not served in the school cafeterias before or during the study period. Treatment schools began receiving FTS products in early November, 2015 shortly after baseline data were collected; however, owing to unseasonably warm weather, regular deliveries did not begin until January, 2016. When FTS products were offered in the cafeterias, these products were promoted using signage, which included the name of the local farm supplying the product. The FTS produce primarily consisted of raw vegetables including leafy greens, cucumbers, and peppers used mainly in NSLP salad offerings. The FTS products were offered approximately 50 days during the study period at each treatment school.

All schools in the sample except for 1 of the control schools were Title I schools, which meant that they had a high percentage of children from low-income families.<sup>11</sup> Low-income families were more likely to participate in the NSLP and also more likely to have limited access to fresh fruits and vegetables in the home because of the food environment or income constraints.<sup>12</sup> During the 2015-2016 school year, only Title I elementary

schools in the ACPS system had the opportunity to receive FTS products; however, not all Title I elementary schools in the ACPS system participated in the program. Three Title I elementary schools in the ACPS system did not participate because of logistical and distributional issues associated with delivering products to their rural locations; hence, assignment into the FTS program was not random. One of the Title I elementary schools not participating in the FTS program declined to participate in the study; therefore, a non-Title I school was included in the control set of schools (Control 3 in Table 1). Although this school was more affluent (lower proportion of students eligible for free and reduced-price lunch) than the other study schools, the demographic mix was similar (see Table 1).

Three days of preintervention and 3 days of postintervention data were collected at each school based on the conclusion of Martin et al<sup>13</sup> that measuring plate waste for 3 days was the statistically significant representation of a 5-day week. Data collection occurred on Tuesdays, Wednesdays, and Thursdays to avoid capturing potential weekend effects in which students may have exhibited different selection and consumption behaviors on Fridays and Mondays owing to food insecurity at home over the weekend. Preintervention data collection occurred over a 3-week period in October, 2015, with data collected at 1 treatment and 1 control school each week. The ACPS system set the menu at the district level; thus, data were collected from 1 treatment and 1 control school each week with the same menu. Postintervention data were collected in a similar manner in April, 2016. The district menu followed a 3-week menu cycle; for each school in the study, pre- and postintervention data were collected when the same menu items were offered at the school.

Schools that participated in the NSLP were required to offer all 5 meal components (meat/meat alternative, grain, fruit, vegetable, and low-fat milk) each day; for the school to receive federal reimbursement for the meal, a student had to select at least 3 of the 5 offered components.<sup>14</sup> Furthermore, NSLP guidelines required

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