

# Predictors of Nutrition Quality in Early Child Education Settings in Connecticut

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## ABSTRACT

**Objective:** This study assessed the dietary quality of lunches and feeding practices (family-style service, teacher role modeling) in Connecticut child care centers and made comparisons by center participation in the federal *Child and Adult Care Food Program* (CACFP).

**Design:** Plate waste methods and visual observation of lunches served and consumed.

**Setting:** A total of 97 randomly selected licensed Connecticut child care centers (53 CACFP and 44 non-CACFP).

**Participants:** A total of 838 preschool-aged children.

**Main Outcome Measures:** Total energy intake, macronutrient intake, and intake by CACFP meal component as well as use of family-style dining, management of additional helpings, and whether and what teachers consumed in view of children.

**Analysis:** Child dietary intake at lunch was compared with dietary and CACFP recommendations using a mixed linear regression model.

**Results:** The CACFP centers were more likely to offer family-style service and have staff eat the same foods as the children. Children in non-CACFP centers consumed more saturated fat (4.1 vs 2.7 g;  $P < .001$ ) and trans fats (0.1 vs 0.1 g;  $P = .02$ ) and less milk (3.5 vs 2.7 oz;  $P < .001$ ) than did children in CACFP centers. Caloric intake and dietary fiber were below recommendations in both groups. Participation in CACFP was a significant predictor of low-fat milk consumption.

**Conclusions and Implications:** The CACFP-participating centers confer some nutritional advantages in terms of provider behavior during meals, characteristics of food offerings, and child intake. Current feeding practices in child care settings require further exploration in the context of serving children at risk for food insecurity and in light of recent work on responsive feeding.

**Key Words:** CACFP, child care, dietary intake, ECE, preschool-aged children (*J Nutr Educ Behav.* 2018;■■■■-■■■.)

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## INTRODUCTION

The diets of most children in the US fail to meet dietary recommenda-

tions,<sup>1,2</sup> which places children at risk for developing obesity and diet-related noncommunicable diseases.<sup>3</sup> Early child education (ECE) settings provide

an important opportunity to influence children's eating habits and health; 64% of preschool-aged children (3- to 5-year-olds) receive non-relative care outside their homes.<sup>4</sup> Such ECE settings may influence children's diets by providing healthy food and beverages, nutrition education, and feeding practices and teacher role modeling that encourage healthy food choices.<sup>5,6</sup>

The federal *Child and Adult Care Food Program* (CACFP) provides financial support for food service in ECE settings, including child care centers and family day care homes. The program has become an important policy lever in addressing food security and improving nutrition in young children because it targets benefits to children from low-income families. Specifically, CACFP eligibility for free

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meals is set at 130% of the federal poverty line, which translates to an annual income of ≤\$31,980 for a family of 4 in US contiguous states for fiscal year 2017–2018.<sup>7</sup> The program regulates the types and quantity of foods served,<sup>8</sup> and many states require (but may not enforce) compliance with CACFP nutrition standards in all licensed child care centers.<sup>9</sup> In addition, CACFP subsidizes meals and snacks for 4 million children daily<sup>8</sup> and has been associated with positive nutritional outcomes, including higher fruit and vegetable consumption and recommended energy intake.<sup>10–12</sup>

Little is known about meals served in child care centers that do not participate in CACFP and how they compare with CACFP meals and CACFP nutrition standards. Survey data from California showed a significantly greater number of CACFP centers reporting nutritionally superior food offerings than in non-CACFP centers.<sup>10</sup> In a nationally representative sample, CACFP participation was associated with higher parent-reported milk and vegetable intake among attendant children.<sup>11</sup> A small study compared dietary intake among children attending 1 CACFP and 1 non-CACFP center, and reported higher intake of milk and vegetables and lower consumption of fatty and sweet food for CACFP.<sup>13</sup> Comparison of objectively measured nutrient intake data in large-scale studies is needed to understand fully how CACFP participation is related to diet.

Beyond the specific foods offered in child care, how foods are served and the environment created by caregivers can also have an important role in determining children's food intake. For example, family-style (defined as having children help themselves to food from communal serving dishes) and caregiver modeling of positive mealtime behaviors are considered reference standard feeding practices in early care.<sup>5,6</sup> Family-style service in particular is championed as a means to improving motor skills, social skills, and attendance to hunger and satiety cues.<sup>5,6</sup> Harnack et al<sup>14</sup> compared pre-plated portions (portioned by providers) with family-style service and found that children consumed more calories with provider-portioned plates

than when they served their own portions.

Over the past several years, research on responsive feeding has shown this paradigm to produce desirable weight trajectories and eating behaviors in early childhood.<sup>15–21</sup> Responsive feeding involves attention to the child's verbal or other signals of hunger and satiety, and responding with food only when the child communicates food needs. In other cases (a need for sleep, attention, or affection), caregivers are encouraged not to respond with food but rather address the nonfood issue.

This study assessed predictors of dietary intake at lunch among preschool-aged children in Connecticut child care centers. Specifically, overall energy, macronutrient intake, and intake by CACFP meal component were compared with CACFP requirements and recommendations from the Institute of Medicine (IOM). It was hypothesized that the dietary quality of food consumed would be better aligned with dietary recommendations in CACFP centers. The researchers also assessed the frequency of family-style service, along with its relationship to dietary intake outcomes. Because little is known about this relationship, *no a priori* hypotheses are offered. Results are discussed in the context of recent work on responsive feeding.

## METHODS

### Sample

The study sample was drawn from licensed child care centers in Connecticut in 2015 that served at least 13 preschool-aged children and were not part of the public-school system. From 1,447 centers, 924 were identified as meeting these criteria and not participating in CACFP; an additional 181 were CACFP centers. To be eligible, centers had to provide lunch rather than serve parent-made meals. Information on whether centers provided lunch and/or snacks was collected via phone calls to child care centers and website searches. From the sample of 924 non-CACFP centers, only 76 (8%) reported providing lunch. The majority of non-CACFP centers served only snacks; parents had to provide lunch (42%) or provided both

lunch and snacks (38%). About 12% of centers could not be identified. In contrast, most CACFP centers served lunch: 5 of 181 CACFP centers served only snacks.

All 76 non-CACFP centers that reported serving lunch were recruited; 44 agreed to participate (58%). For CACFP, 92 centers were randomly selected, 53 of which agreed to participate (58%). Randomization was completed by assigning a random number between 0 and 1, and recruiting centers with a random number ≥ 0.66. Certain CACFP centers (n = 22) were oversampled for the purpose of another longitudinal study. Centers were assessed between June, 2015 and July, 2016. A total of 370 preschool-aged children in non-CACFP centers and 468 in CACFP centers participated in the lunch observation.

### Procedures

The University of Connecticut Institutional Review Board approved study procedures. Directors distributed parental passive consent forms (in English and Spanish) to families in advance of the research team's visit. Children whose parents opted out were not observed. Directors reported the age range of children in participating classrooms; researchers recorded the gender of children. No other identifying information was recorded. All data collection for each center occurred within a single day and in 1 classroom of preschool-aged children per site.

Seven researchers with a background in public health nutrition or dietetics were trained to estimate visually the quantity of foods served (self-served by the child or served by the teacher) and consumed. Training involved 8 hours of practice using a method of visual estimation developed by Ball and colleagues,<sup>22</sup> in which observers estimate quantities for each food item to the nearest tablespoon, ounce, or number. In addition to using visual estimation methods, the study team arranged to receive a sample meal before lunch in centers that served pre-plated individual meals. This allowed researchers to visually estimate each meal component and check the accuracy of their estimation by weighing each food. Sample

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