

# Child Care Provider Adherence to Infant and Toddler Feeding Recommendations: Findings from the Baby Nutrition and Physical Activity Self-Assessment for Child Care (Baby NAP SACC) Study

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## Abstract

**Background:** Identifying characteristics associated with the Institute of Medicine's (IOM) recommended feeding practices among infant and toddler care providers in child care centers could help in preventing childhood obesity.

**Methods:** In 2009, at baseline in a pilot intervention study of 29 licensed Massachusetts child care centers with at least 50% of enrolled children identified as racial minorities, 57 infant and 109 toddler providers completed feeding questionnaires. To assess provider adherence to six IOM-recommended behaviors, we used cluster-adjusted multivariable logistic regression models including provider type (infant or toddler), race, education, and center Child and Adult Care Food Program (CACFP) participation.

**Results:** In multivariable analysis, CACFP participation was associated with providers sitting with children at meals (odds ratio [OR], 5.2; 95% confidence interval [CI], 1.2–21.7), offering fruits and vegetables (OR, 3.3; 95% CI 1.7–6.2), and limiting fast food (OR, 3.5; 95% CI, 1.8–6.7). Providers at centers serving meals family style were less likely to allow children to leave food unfinished (OR, 0.27; 95% CI, 0.09–0.77). Infant providers were more likely than toddler providers to sit with children at meals (OR, 6.98; 95% CI, 1.51–32.09), allow children to eat when hungry (OR, 3.50; 95% CI, 1.34–9.16), and avoid serving sugary (OR, 8.74; 95% CI, 3.05–25.06) or fast foods (OR, 11.56; 95% CI, 3.20–41.80).

**Conclusions:** CACFP participation may encourage IOM-recommended feeding practices among infant and toddler providers. Child care providers may benefit from education about how to feed infants and toddlers responsively, especially when offering foods family style. Future research should explore ways to promote child-centered feeding practices, while addressing barriers to providing children with nutrient-rich foods.

## Introduction

In recent decades, the prevalence of childhood obesity in the United States has increased 3-fold among even the youngest children.<sup>1</sup> Despite recent plateaus in the prevalence of childhood obesity, nearly 1 in 10 children under the age of 24 months still exceeds the 95th percentile of weight

for length, and the threat to child health remains a significant concern.<sup>2–4</sup> Children who experience rapid weight gain before entering elementary school are more likely to be overweight or obese later in life, especially if they are African American, Latino/a, or come from low-income families.<sup>5–7</sup>

Seventeen percent of American children ages birth to 2 years spend time in center-based child care, making it the

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most utilized form of child care outside of the home.<sup>8</sup> In 2011, the Institute of Medicine (IOM) released a comprehensive report outlining evidence-based recommendations for preventing obesity in early child care settings serving children ages 0–5 years.<sup>9</sup> The IOM report identified two overarching nutrition-related goals for obesity prevention in child care: (1) promote the consumption of a variety of nutritious foods, and encourage and support breastfeeding during infancy, and (2) create a healthy eating environment by being responsive to children's hunger and fullness cues.<sup>9</sup>

Responsive feeding refers to caregiver behaviors that encourage children to self-regulate their food intake or allowing children to leave food unfinished.<sup>9–11</sup> For exclusively breast- or bottle-fed infants, responsive feeding might mean feeding based on an infant's cues to hunger. For weaned infants and toddlers, responsive feeding practices may include allowing children to leave food unfinished or serving meals family style so that children may choose which foods they would like to eat. The IOM recommends children begin self-serving foods family style, defined as, "allowing children to serve themselves when serving from common bowls" by 1 year of age in child care settings.<sup>9</sup> Nonresponsive feeding practices, such as urging children to eat more or using food to control behavior, are associated with both increased food intake and increased BMI in young children, including infants.<sup>10–15</sup>

Although current IOM feeding recommendations apply to all children ages 0–5 years, we hypothesized that providers caring for infants (age < 1 year) may practice more recommended behaviors than teachers caring for toddlers (ages 1–2 years), owing to infants' developmental needs requiring more attentive feeding and lower state-mandated caregiver-to-child ratios for infants compared to toddlers.<sup>16</sup> The IOM report called for enhanced training of early child care providers, but given that there are few studies describing feeding practices of providers serving children younger than 2 years, it is difficult to identify specific areas for training support.<sup>17</sup> In qualitative studies, child care providers indicate a desire to support healthy growth in children, but report often feeling ill prepared to carry out recommendations.<sup>18,19</sup> Additionally, the extent to which center-level factors may influence individual overall provider feeding practices remains unknown.

The aim of this article is to describe self-reported infant and toddler feeding practices among child care center providers at licensed centers in Massachusetts serving racially and ethnically diverse children just before release of the IOM recommendations. Specifically, we explored individual- and center-level characteristics that were associated with adherence to IOM recommendations along with differences in feeding practices among child care staff caring for infants versus toddlers in order to identify age-specific training needs. Although physical activity, screen time, and sleep are all important aspects of obesity prevention in early child care settings, our article focuses on nutrition and feeding practices.<sup>20–23</sup>

## Methods

### *Participants and Study Design*

This article presents cross-sectional baseline data collected in spring 2009 from an exploratory pilot intervention study called "Baby NAP SACC (Nutrition and Physical Activity Self-Assessment for Child Care)," an extension of the existing Nutrition and Physical Activity Self-Assessment for Child Care (NAP SACC) program.<sup>24,25</sup> The Baby NAP SACC study was a randomized, controlled trial to create healthier environments in child care centers serving a racially and ethnically diverse sample of young children under 24 months of age. The 6-month-long intervention took place in 32 licensed child care centers (16 intervention; 16 control) located in the Greater Boston area with enrollment of minority children at 50% or greater. A total of 29 centers provided baseline data used in this study. Although a small number of Head Start centers were identified through randomization and contacted, none participated in the intervention. Detailed information about the study and recruitment procedures is described elsewhere.<sup>26</sup> During the baseline visit, trained research assistants blinded to treatment assignment distributed questionnaires to infant and toddler providers and to center directors, and they measured the center environments. The human subjects committee of Harvard Pilgrim Health Care approved this study.

### *Measures*

*Primary outcomes.* To assess the feeding practices of care providers as part of the pilot intervention, we used the Infant Feeding Style Questionnaire (IFSQ) and Toddler Feeding Questionnaire (TFQ), the only validated instruments used for assessing caregiver feeding of infants and toddlers available at the time.<sup>15,27</sup> Because both tools were originally designed for use with parents, some questions were adapted slightly for use with child care providers, replacing "my child" with "infants" or "toddlers." Most items were identical for the infant and toddler versions of the questionnaires (*e.g.*, "I sit down with each [infant/toddler] while she/he is eating"), and providers rated agreement on a scale of 1–5 (1 = Disagree, 3 = Neutral, and 5 = Agree). A score of 4 or greater was categorized as agreement with a statement of a recommended behavior or disagreement with a statement of a discouraged behavior if an item was reverse coded. A brief demographic section was included with the IFSQ and TFQ collecting provider age, race/ethnicity, education, and years of experience in child care. For infant and toddler classroom providers, implied consent was obtained through completion of the survey. Reliability of the measures, as assessed by Cronbach's alpha, were at acceptable levels of 0.69 for the IFSQ and 0.77 for the TFQ.

The IFSQ and TFQ assessed 14 feeding practices that described caregivers' usual mealtime behaviors. Of these 14, six were selected as primary outcomes based on their representativeness of the two IOM goals for feeding that

could be assessed across both age groups. We included three outcomes related to promotion of nutritious foods: provider offers fruit and vegetables daily, avoids serving fast food, and avoids serving sugary foods and desserts; and three related to creating a responsive eating environment: provider allows children to eat when they are hungry, sits down with children during mealtime, and allows children to leave food unfinished.<sup>9</sup>

*Center-level characteristics.* Center directors provided written, informed consent to participate in the study and completed baseline questionnaires, which included items assessing center enrollment (*i.e.*, number of children, ages of children, and race/ethnicity of children), center participation in various programs (*i.e.*, Child and Adult Care Food Program; CACFP), and historical information (*i.e.*, staff attrition and years in operation). The questionnaire included an item about food service, with family style feeding identified using the Environment and Policy Assessment and Observation (EPAO) instrument's definition of meals/snacks served as "family style (children serve themselves)," distinct from "delivered and served on prepared trays," or "delivered in bulk and portioned by staff."<sup>28</sup> After using the EPAO tool to conduct on-site visits to validate director report of family-style meal service, we found that the correlation between the two was moderately strong (Spearman's  $r=0.45$ ).

### Statistical Analysis

To describe characteristics of child care centers and providers, we obtained frequencies for categorical variables and means and standard deviations (SDs) for continuous variables. To assess differences in infant and toddler provider response frequencies across 14 feeding practices, cluster-adjusted chi-squared tests for categorical variables were used, accounting for center-level variation. Missing data accounted for fewer than 5% of observations, with provider age being the only anomaly (15% missing), likely because it was at the end of questionnaires.

To identify characteristics associated with provider adherence to six primary outcomes, we used multivariable logistic regression models adjusted *a priori* for provider race, education, provider type (infant or toddler), and CACFP participation, based on existing research suggesting their probable influence on child feeding practices.<sup>29–31</sup> We controlled for center-level variation within providers at the same centers by adjusting for clustered errors by center. We report odds ratios (ORs) and 95% confidence intervals (CIs). All data analyses were conducted using Stata software (12; Stata Corporation, College Station, TX).

## Results

Demographic characteristics of child care centers ( $n=29$ ) and infant and toddler care providers ( $n=166$ ) are presented in Table 1. There were no substantial differences in demographic characteristics between infant and toddler providers.

**Table 1. Baseline Characteristics of 166 Child Care Providers from 29 Child Care Centers Participating in the Baby Nutrition and Physical Activity Self-Assessment for Child Care Pilot Intervention in 2009**

<b>Child care providers</b>		<b>(n=166)</b>
Infant <sup>a</sup> care provider, N (%)		57 (34.3)
Toddler <sup>b</sup> care provider, N (%)		109 (65.7)
Age in years, mean (SD)		32.2 (10.9)
Race (%)		
White		60.5
Black/African American		15.6
Latino/Latina/Hispanic		17.0
Education completed (%)		
High school education or less		19.2
Some college/college degree		63.6
Some graduate school or graduate degree		17.2
Years working at current center, mean (SD)		4.5 (4.5)
Years working in child care field, mean (SD)		7.2 (5.1)
<b>Child care centers</b>		<b>(n=29)</b>
Years center in operation, mean (SD)		13.5 (8.6)
Staff attrition in past 12 months (%)		20.9
Number of children enrolled, mean (range)		81 (20–590)
Race/ethnicity of children enrolled (%)		
White		48.1
Black/African American		17.5
Latino/Latina/Hispanic		14.9
Mixed race		8.3
Accepts government-subsidized slots, N (%)		26 (89.6)
Participates in CACFP, N (%)		8 (27.5)
NAEYC accredited, N (%)		13 (44.8)
Food served family style at meals, N (%)		22 (76.7)

<sup>a</sup>Infant defined as child < 1 year of age.

<sup>b</sup>Toddler defined as child ≥ 1 and < 3 years of age.

SD, standard deviation; CACFP, Child and Adult Care Food Program; NAEYC, National Association for the Education of Young Children.

Overall, the majority of care providers were female (98%), had some college education (64%), and worked in child care for less than 10 years (67%). The majority of providers identified as white (61%), with 17% as Latino/a or Hispanic and 16% as Black/African American. Across 29 centers, eight (28%) participated in CACFP and 13 (45%) were accredited by the National Association for the Education of Young Children (NAEYC), with only six (20%) participating in both programs. Many centers (77%) reporting serving meals family style.

Table 2 shows center-adjusted differences in 14 self-reported feeding practices between infant and toddler care providers. Infant providers were more likely than toddler providers to report that they allowed children to eat when they were hungry (82% vs. 54%;  $p < 0.001$ ), sat with

children during meals (95% vs. 73%;  $p < 0.05$ ), and continued to offer a new food after a child initially disliked it (87% vs. 65%;  $p < 0.01$ ). Though both infant and toddler providers stated that they offered fruits and vegetables daily (69% vs. 70%;  $p = 0.90$ ), fewer reported allowing children to decide how much to eat at meals (51% vs. 46%;  $p = 0.57$ ).

Toddler providers reported more IOM-discouraged feeding practices than infant providers, including trying to get children to finish their food (78 vs. 68%;  $p = 0.21$ ), encouraging children to eat in the absence of hunger (54% vs. 26%;  $p < 0.01$ ), pressuring a child to try a disliked food during a meal (79% vs. 56%;  $p < 0.05$ ), providing dessert as a reward for finishing a meal (27% vs. 11%;  $p < 0.01$ ), and offering sugary foods (52% vs. 13%;  $p < 0.01$ ) or fast foods

**Table 2. Differences in Self-Reported Child Care Provider Feeding Practices, According to Age of Child, among 166 Providers at 29 Child Care Centers Participating in the Baby Nutrition and Physical Activity Self-Assessment for Child Care Pilot Intervention**

	Infant <sup>a</sup> care providers (n=57) Agree <sup>c</sup> n (%)	Toddler <sup>b</sup> care providers (n=109) Agree n (%)	p value <sup>d</sup>
<b>Practice recommended by IOM</b>			
I allow each (infant/toddler) to eat when she/he is hungry.	45 (81.8)	57 (53.8)	<0.001
I let each (infant/toddler) decide how much to eat.	29 (50.9)	49 (46.2)	0.57
I sit down with each (infant/toddler) while she/he is eating.	53 (94.6)	77 (73.3)	0.02
If an (infant/toddler) will not try a new food I've given her/him, I will try it again with her/him later on.	46 (86.8)	88 (64.8)	0.006
I make sure each (infant/toddler) eats fruits and vegetables every day.	38 (69.1)	73 (70.2)	0.90
<b>Practice discouraged by IOM</b>	<b>Agree n (%)</b>	<b>Agree n (%)</b>	<b>p value</b>
I watch TV while feeding (infants/toddlers).	3 (5.4)	9 (8.6)	0.62
I try to get each (infant/toddler) to finish her/his food.	38 (67.9)	82 (77.4)	0.21
I try to get each (infant/toddler) to eat even if she/he seems not hungry.	15 (26.3)	55 (53.9)	0.005
I offer (infants/toddlers) a sweet like ice cream, cookies, or cake if they finish their food.	6 (11.1)	29 (27.1)	0.05
I let (infants/toddlers) eat fast food.	5 (8.9)	49 (47.6)	<0.001
I let (infants/toddlers) eat sugary food, like candy, ice cream, cakes, or cookies.	7 (12.5)	53 (52.0)	<0.001
If (infants/toddlers) will not try a new food, I will work hard to have her/him try it during that meal.	32 (56.1)	83 (79.1)	0.01
When infants have bottles, I sometimes prop them up.	15 (28.9)	NA	—
I give infants cereal in the bottle.	12 (22.6)	NA	—

<sup>a</sup>Infant defined as child < 1 year of age.

<sup>b</sup>Toddler defined as child  $\geq 1$  and < 3 years of age.

<sup>c</sup>Participants rated their agreement with item on a scale of 1–5 ( $\geq 4$  indicates agreement with statement of a recommended practice, or disagreement with statement of a discouraged practice when reverse coded).

<sup>d</sup>Chi-squared test comparing self-reported feeding practices among infant versus toddler providers, adjusted for center-level clustering. IOM, Institute of Medicine; TV, television.

(48% vs. 9%;  $p < 0.01$ ). Few providers (<10%) reported watching television (TV) while feeding children. Although infant providers adhered to more of the IOM recommendations than toddler providers, some still reported propping infants up to bottle feed themselves (29%) and providing cereal mixed into bottles (23%).

Table 3 presents the results of multivariable logistic regression for 6 of the 14 feeding practices, which were selected based on their representativeness of the IOM feeding guidelines. Being an infant versus toddler care provider was associated with allowing children to eat when hungry (OR, 3.5; 95% CI, 1.3–9.2), sitting with children at meals (OR, 7.0; 95% CI, 1.5–32.1), and limiting child access to fast food (OR, 11.6; 95% CI 3.2–41.8) and sugary foods (OR, 8.8; 95% CI 3.0–25.1). Provider-specific characteristics, such as age, race/ethnicity, years of experience, and level of education, were largely unrelated to these outcomes, with two exceptions. When compared to African American or Latino providers, white providers were more likely to let children leave food unfinished (OR, 4.3; 95% CI 1.2–16.0) and providers with a high school education or less were less likely to feed children only when hungry (OR, 0.32; 95% CI 0.1–0.9).

Center-specific characteristics were associated with providers' reported feeding practices. Providers at CACFP-participating centers were more likely to sit with children at meals (OR, 5.2; 95% CI, 1.2–21.7), offer fruits and vegetables daily (OR, 3.3; 95% CI, 1.7–6.2), and limit children's access to fast food (OR, 3.5; 95% CI, 1.8–6.7). Providers at centers serving meals family style were less likely to allow children to leave food unfinished (OR, 0.3; 95% CI, 0.1–0.8), but more likely to limit the service of sugary foods (OR, 5.4; 95% CI, 1.4–20.5). Centers serving a majority of nonwhite children (>60%) were more likely to limit the service of fast food to infants and toddlers (OR, 2.4; 95% CI, 1.1–5.2). Center years of operation, enrollment size, acceptance of government-subsidized slots, provider staff attrition, and center NAEYC accreditation were not associated with primary outcomes after adjusting for *a priori* covariates.

## Discussion

To our knowledge, no other studies have described infant- and toddler-specific feeding practices in child care, with recent studies focusing on children 2 years and older, or general feeding practices across groups of children ages 0–5 years.<sup>31,32</sup> Using the 2011 IOM recommendations for feeding in child care as a benchmark, we found that center participation in CACFP was associated with multiple recommended feeding practices among infant and toddler providers, including being more likely to serve fruits and vegetables, less likely to offer fast food, and more likely to sit with children at meals than providers at non-CACFP centers. Because CACFP requires adherence to specified meal patterns for food reimbursement (*e.g.*, recommended daily fruit servings), our finding that providers at CACFP

centers offered better-quality foods to infants and toddlers are consistent with existing literature describing CACFP centers serving children ages 2–5 years.<sup>29,31</sup>

The association between CACFP participation and the practice of sitting with infants and toddlers at meals is also consistent with a study of CACFP centers serving preschoolers in Western states.<sup>33</sup> In addition to setting meal patterns, the USDA is required to offer technical assistance to CACFP-participating centers, including staff education regarding nutrition and child feeding.<sup>34</sup> Given that individual child care providers' knowledge and beliefs are associated with corresponding feeding practices,<sup>17,35</sup> greater opportunities for training and education are likely to be influential, and our study suggests that participation may benefit even the youngest children in care.

We found that providers working at centers with family-style meal service were less likely to allow children to leave food unfinished than providers at centers serving preportioned meals. The practice of family-style feeding of children is almost unanimously recommended by numerous health agencies, such as the IOM, Academy of Nutrition and Dietetics, and American Academy of Pediatrics, because most experts believe that it allows children to self-regulate their own food intake, improve motor skills, and engage with other children and staff.<sup>9,36–38</sup> However, our findings with infant and toddler providers suggest that family-style meal service for infants and toddlers may result in some providers encouraging children to finish all the food they have self-served.

Child care providers have previously expressed concern about food waste, especially in the context of family-style meal service, which is predominantly defined as children selecting and self-serving their food, consistent with the definition used in our study.<sup>39,40</sup> One plate waste study of preschoolers served family-style meals showed that the youngest children self-served larger portions and wasted more food than older children,<sup>41</sup> although another study of preschooler snack time did not find significant food waste using family-style feeding.<sup>42</sup> Perhaps concerned providers exert more pressure on children to finish their food to avoid throwing it away. Infants or toddlers may be especially vulnerable to overserving themselves owing to a lack of dexterity or understanding of proper portion sizes.<sup>39</sup> A recent qualitative study found that providers serving children ages 2–5 years described development inappropriateness and the youngest children being prone to overserving themselves as possible barriers to serving foods family style.<sup>43</sup> Another study of preschoolers in Pennsylvania found that children who served themselves excessively large portions during family-style meals also consumed significantly more food than children who self-served a moderate portion.<sup>36</sup> Even in the absence of overt pressure from providers, family-style meal service may lead some children to inadvertently overeat, suggesting a possible need for providers to offer gentle guidance to young children who serve themselves.

Overall, a majority of both infant and toddler providers reported some nonresponsive feeding practices, such as

**Table 3. Individual and Center-Level Characteristics Associated with IOM-Recommended Feeding Practices for 166 Providers Caring for Infants and Toddlers from 29 Child Care Centers Participating in the Baby Nutrition and Physical Activity Self-Assessment for Child Care Pilot Intervention, Using Multivariable Adjusted Models<sup>a</sup>**

	Practicing responsive feeding			Increasing healthy eating		
	Allows children to eat when they are hungry (n=102)	Sits down with children during mealtime (n=130)	Allows children to leave food unfinished (n=120)	Offers fruit and vegetables to children daily (n=111)	Avoids serving fast food to children (n=105)	Avoids serving sugary foods and desserts to children (n=98)
<b>Child care provider (n=166)</b>	<b>AOR<sup>a</sup> (95% CI)</b>	<b>AOR (95% CI)</b>	<b>AOR (95% CI)</b>	<b>AOR (95% CI)</b>	<b>AOR (95% CI)</b>	<b>AOR (95% CI)</b>
Age in years	0.99 (0.96, 1.03)	1.04 (0.98, 1.09)	1.00 (0.95, 1.05)	1.02 (0.98, 1.06)	0.99 (0.95, 1.02)	1.00 (0.97, 1.04)
Years of experience						
Working at current center	1.04 (0.95, 1.13)	1.09 (0.99, 1.21)	1.05 (0.97, 1.14)	1.08 (0.97, 1.19)	0.95 (0.86, 1.05)	0.95 (0.86, 1.04)
Working in child care field	1.04 (0.95, 1.14)	1.06 (0.96, 1.16)	1.04 (0.98, 1.10)	1.01 (0.94, 1.09)	0.96 (0.89, 1.04)	1.01 (0.91, 1.12)
Provider type						
Toddler care provider	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)
Infant care provider	<b>3.50 (1.34, 9.16)</b>	<b>6.98 (1.51, 32.09)</b>	1.54 (0.70, 3.38)	1.00 (0.40, 2.54)	<b>11.56 (3.20, 41.80)</b>	<b>8.74 (3.05, 25.06)</b>
Race/ethnicity						
White	1.59 (0.56, 4.47)	0.78 (0.23, 2.72)	<b>4.30 (1.16, 15.96)</b>	1.81 (0.68, 4.33)	0.83 (0.24, 2.83)	1.32 (0.30, 5.83)
Black	1.10 (0.41, 2.99)	1.61 (0.49, 5.26)	<b>0.22 (0.07, 0.70)</b>	0.63 (0.30, 1.32)	1.26 (0.41, 3.81)	0.69 (0.20, 2.40)
Latino/Latina/Hispanic	0.29 (0.08, 1.04)	2.51 (0.42, 15.20)	2.31 (0.36, 14.92)	0.58 (0.17, 1.96)	2.12 (0.41, 0.94)	1.47 (0.33, 6.54)
Education						
Greater than high school education	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)	1.00 (ref)
High school education or less	<b>0.32 (0.11, 0.86)</b>	1.18 (0.45, 3.09)	0.56 (0.13, 2.37)	1.18 (0.40, 3.51)	0.70 (0.20, 2.49)	0.36 (0.10, 1.27)

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**Table 3. Individual and Center-Level Characteristics Associated with IOM-Recommended Feeding Practices for 166 Providers Caring for Infants and Toddlers from 29 Child Care Centers Participating in the Baby Nutrition and Physical Activity Self-Assessment for Child Care Pilot Intervention, Using Multivariable Adjusted Models<sup>a</sup> continued**

Child care center (n=29)									
Years center in operation	1.03 (0.99, 1.08)	0.99 (0.94, 1.03)	1.00 (0.95, 1.05)	1.03 (1.00, 1.07)	1.02 (0.98, 1.06)	0.97 (0.91, 1.03)			
Staff attrition >20% in past 12 months <sup>b</sup>	1.55 (0.73, 3.26)	0.74 (0.23, 2.37)	1.53 (0.58, 3.99)	1.83 (0.84, 4.02)	1.64 (0.69, 4.54)	0.59 (0.18, 1.84)			
Enrollment									
Enrollment of > 70 children <sup>b</sup>	1.60 (0.84, 3.06)	0.71 (0.28, 1.80)	1.37 (0.57, 3.28)	1.31 (0.67, 2.56)	1.43 (0.57, 3.59)	1.06 (0.36, 3.11)			
Majority of children are nonwhite	1.80 (0.94, 3.45)	1.86 (0.65, 5.31)	0.64 (0.28, 1.48)	0.91 (0.47, 1.75)	<b>2.40 (1.11, 5.17)</b>	1.94 (0.71, 5.35)			
Accepts government-subsidized slots	0.92 (0.44, 1.91)	1.61 (0.57, 4.57)	1.58 (0.52, 4.78)	1.84 (0.91, 3.72)	0.90 (0.32, 2.57)	3.12 (0.71, 13.74)			
Food served family style at meals	0.85 (0.40, 1.77)	1.26 (0.31, 5.17)	<b>0.27 (0.09, 0.77)</b>	1.90 (0.89, 4.07)	3.89 (0.92, 16.49)	<b>5.36 (1.40, 20.52)</b>			
Participates in CACFP	0.90 (0.38, 2.14)	<b>5.17 (1.23, 21.68)</b>	2.23 (0.96, 5.21)	<b>3.27 (1.73, 6.19)</b>	<b>3.46 (1.78, 6.73)</b>	2.66 (0.70, 10.28)			
NAEYC accredited	1.28 (0.59, 2.78)	1.15 (0.44, 3.05)	1.03 (0.44, 2.38)	1.38 (0.77, 2.45)	1.33 (0.52, 3.41)	1.17 (0.42, 3.21)			

<sup>a</sup>Adjusted for provider race, education, age group of children served (infants vs. toddlers) and Child and Adult Care Food Program participation, controlling for center-level clustering using a multivariable logistic regression model.

<sup>b</sup>Median split.

IOM, Institute of Medicine; CACFP, Child and Adult Care Food Program; NAEYC, National Association for the Education of Young Children; AOR adjusted odds ratio; 95% CI, 95% confidence interval.

Bold items signify statistically significant odds ratios,  $p < 0.05$ .

encouraging children to finish all their food (infant 68%, toddler 78%) or repeatedly encouraging them to try disliked foods during a mealtime (infant 56%, toddler 79%). Qualitative studies of child care providers reveal a desire to encourage healthy choices,<sup>44</sup> concerns that a child does not get enough food to eat at home,<sup>40</sup> or beliefs that young children will not eat enough as key motivations to encourage children to eat more.<sup>17</sup> However, despite these nurturing motivations, caregiver feeding practices such as encouraging disliked foods, negotiating, or rewarding children at mealtime have all been associated with higher weight and poorer diet quality among children and adolescents.<sup>45–48</sup>

When compared to toddler providers, infant care providers reported more recommended feeding practices and fewer discouraged feeding practices. Although IOM feeding guidelines apply equally to both groups of children, operational challenges and children's development differences must be considered. In Massachusetts, the caregiver-to-child ratio is 1:3 for infants and 1:4 for toddlers.<sup>16</sup> With a lower staff-to-child ratio, infant care providers may be more able to adopt responsive practices, such as feeding on-demand, as evidenced by infant providers being more likely than toddler providers to let children eat when hungry (82% vs. 54%).<sup>9</sup> In addition, infants' developmental needs sometimes necessitate child-centered feeding, such as assistance being bottle or spoon fed. Therefore, age of the child may also explain why more infant providers reported sitting with children at meals than toddler providers (95% vs. 73%). However, even with a lower provider-to-child ratio, some infant providers may still struggle to follow feeding guidelines. Some providers (23%) reported putting cereal in infants' bottles, a practice discouraged owing to developmental inappropriateness and a possible association with excessive weight gain.<sup>9,49,50</sup> Nearly 30% of infant providers also reported occasionally propping bottles up for babies to feed themselves. Propping bottles up with a blanket or towel is discouraged because it prevents an infant from turning their head from the bottle when finished and also poses a significant choking hazard.<sup>49,51</sup>

Once infants begin eating solid foods, the guidelines for nutrient quality do not differ materially from toddlers—children should be consistently offered healthy foods, and unhealthy foods should be limited. Infant providers were nearly 9 times more likely to avoid serving sugary foods and 11 times more likely to avoid serving fast food to children than toddler providers. Owing to the fact that most infants begin consuming solids by 6 months of age,<sup>50</sup> a drawback to comparison is the smaller window of time to introduce infants to new foods, when compared to toddlers. However, despite age differences, some providers still reported offering sweets (13%) and fast food (9%) to infants.

Our study has some limitations. The use of self-reported data allows for possible desirability bias among study participants. Because this was a pilot project, the child feeding questionnaires required adaptation for use with child care

providers and no additional testing on the instrument was conducted. We attempted to mitigate these challenges by using existing validated feeding questionnaires available at the time, though there remains some question to their validity and a need for greater testing of instruments assessing infant and toddler feeding practices.<sup>52</sup> Given that the feeding practices of infant and toddler teachers have rarely been described in the literature, we believe it is important to present them separately, but acknowledge that there are limitations to comparing two groups with different developmental needs.

Finally, our sample did not include Head Start centers, which do serve a significant number of low-income children of color. Future studies should include Head Start centers to determine the impact of center-level policy, given that these centers are more highly monitored and regulated than non-Head Start centers.<sup>53</sup> Examination of early childhood feeding practices warrants further exploration, given that child-to-staff ratios and provider knowledge about the role of modeling during mealtime may also influence individual provider behavior. Future investigations should explore ways to overcome barriers to recommended feeding practices in both age groups, as well as identify nuances in family-style feeding practices among providers caring for infants and toddlers.

## Conclusions

Center participation in CACFP was associated with recommended feeding practices among both infant and toddler care providers. Nutrition professionals working in early child care settings should encourage center administrators to adopt policies that promote healthy practices and provide ongoing education to staff and parents in order to reinforce positive behaviors.<sup>9,54</sup> Wherever possible, infant providers should be encouraged to bottle feed only one child at a time, possibly by staggering feeding times for babies who have not been weaned. Center policies should also explicitly prohibit propping bottles or putting anything into bottles other than breast milk or formula, unless otherwise indicated by a medical professional.<sup>9</sup>

Educational and policy approaches should also take into account realistic mealtime eating scenarios. For example, if children must be fed on a set schedule that prohibits on-demand feeding, then providers should be allowed adequate time for meals and snacks so that children may eat without being rushed to finish quickly. If provider-to-child ratios limit caregivers' ability to sit with individual children throughout an eating occasion, especially in classrooms serving toddlers, providers may still serve as role models by talking positively about, and eating healthy foods in front of, children.<sup>55</sup> Children are more likely to try new foods, such as fruits and vegetables, if they see a parent or caregiver enjoying them.<sup>56</sup>

Child care providers may also benefit from training on best practices for feeding, especially when offering foods family style. When serving meals and snacks, providers

should be instructed to offer gentle assistance to teach proper portion sizes, while still allowing children to choose how much and which items go on their plates.<sup>55,56</sup> Possible responsive practices during family-style feeding include physical cues, such as using utensils that encourage infant- or toddler-sized portions (e.g., a tablespoon instead of a ladle), or offering visual cues, such as showing children a plate with appropriate portions of all the foods served. The IOM report also recommends that providers give verbal cues to describe recommended portion sizes, while still communicating that children may eat to fullness, such as, “You can take one spoonful, and then you can have more if you are still hungry.”<sup>9</sup> Future investigations in child care settings should continue to explore ways to promote recommended feeding practices for infants and toddlers in day care settings, while addressing the demands of serving groups of children at meal- and snacktime.

#### Author Disclosure Statement

No competing financial interests exist.

R.E.B. was supported as a doctoral candidate by a National Institutes of Health Doctoral Training Grant in Cancer Epidemiology: T32 CA 0900 at the Harvard T.H. Chan School of Public Health.

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