Nutrition Practices of Family Child Care Home Providers and Children’s Diet Quality

Qianxia Jiang, PhD 1; Patricia Markham Risica, DrPH 2,3; Alison Tovar, PhD 2,3; Kristen Cooksey Stowers, PhD 4; Marlene B. Schwartz, PhD 5,6; Caitlin Lombardi, PhD 5; Kim Gans, PhD 2,3,4

ABSTRACT

Objective: To examine the relationship between the diet quality of children aged 2–5 years cared for in family child care homes (FCCHs) with provider adherence to nutrition best practices.

Design: Cross-sectional analysis.

Participants: Family child care home providers (n = 120, 100% female, 67.5% Latinx) and children (n = 370, 51% female, 58% Latinx) enrolled in a cluster-randomized trial.

Main Outcome Measures: Data were collected over 2 days at each FCCH. The Environment and Policy Assessment and Observation tool was used to document whether providers exhibited nutrition practices on the basis of the Nutrition and Physical Activity Self-Assessment for Child Care. Each practice was scored as either present or absent. Children’s food intake was observed using Diet Observation at Child Care and analyzed with the Healthy Eating Index−2015.

Analysis: Multilevel linear regression models assessed the association between providers exhibiting best practices regarding nutrition and children’s diet quality. The model accounted for clustering by FCCH and controlled for provider ethnicity, income level, and multiple comparisons.

Results: Children in FCCHs in which more of the best practices were implemented had higher diet quality (B = 1.05; 95% confidence interval [CI], 0.12−1.99; P = 0.03). Specifically, children whose providers promoted autonomous feeding (B = 27.52; 95% CI, 21.02−34.02; P < 0.001) and provided nutrition education (B = 7.76; 95% CI, 3.29−12.23; P = 0.001) had higher total Healthy Eating Index scores.

Conclusions and Implications: Future interventions and policies could support FCCH providers in implementing important practices such as autonomy feeding practices, talking informally to children about nutrition, and providing healthful foods and beverages.

Key Words: family child care homes, nutrition practices, diet quality

INTRODUCTION

Childhood obesity is a serious public health problem in the US 1,2 with 12.7% of children aged 2–5 years categorized as obese between 2017 and 2020. 3 Thus, it’s important to improve nutrition and activity environments in which these children spend time, such as Early Care and Education (ECE) settings. 4 Currently, in the US, approximately 60% of preschoolaged children with working parents are in some form of ECE, with most in full-day care. 5 Given the frequency and duration that children spend in ECE settings, child care providers are important influencers in shaping the food preferences and other health behaviors of young children. 6–10

Compared with center-based ECE settings, fewer studies have been conducted in family child care homes (FCCH) serving 1.6 million US children. 11 In this type of ECE setting, 1 provider cares for a small group of children in their home. 12 Depending on individual state regulations, providers in FCCHs may or may not be required to be licensed. Family child care homes have different environments than ECE centers, such as...
Providers reported their FCCHs.22,31 Children and often have low income and are ethnically diverse.14,15

Social Cognitive Theory, which defines behavior as a dynamic and reciprocal interaction of personal factors, behavior and the environment, can provide a framework for factors that affect children’s diet.16 Children’s dietary behaviors are influenced by the foods that ECE providers serve and the nutrition-related practices that providers implement in center-based ECE settings,8,17 and FCCHs.22,31–33 Despite what we know about the importance of serving nutritious foods in ECE, several studies show that the diet quality of the foods being served in FCCH may need improvement and that providers may engage in nutrition-related feeding practices that may interfere with the development of healthy eating habits in children.6,31–36 It is important to assess FCCPs’ nutrition-related practices because the foods and beverages served and how they are served to children at FCCHs may contribute to unhealthy dietary habits for preschoolers and increase the risk of childhood obesity.6 Responsive feeding practices (eg, not pressuring children to eat and encouraging self-feeding) have been found to help children develop eating self-regulation and accept new foods.37 According to a recent study, pressuring a child to finish their food was observed more frequently in FCCHs compared with ECE centers.38

Overall, US children aged 2-4 years do not meet dietary recommendations, with an average Healthy Eating Index (HEI) score of 60 (maximum 100).39 Two studies found that the mean HEI score among children in FCCHs was well below the recommended score for diet quality,31,40 although the average HEI score of the children in these studies (ie, 58 and 61) was close to the average score for children in this age group in the US.19 Several studies have shown that children in FCCHs may be at higher risk for obesity than those in center-based care.41–43 Although there is growing evidence that ECE providers’ nutrition-related practices can influence children’s diets,18,30,31 few studies have been done in FCCH, and no studies have included Hispanic FCCPs, who often care for Hispanic children that are at higher risk for obesity.1,2

Therefore, this study aimed to examine differences in children’s diet quality in FCCHs on the basis of whether FCCPs met or did not meet best practice nutrition guidelines from the Nutrition and Physical Activity Self-Assessment for Child Care (NAPSACC). We hypothesized that children in FCCHs in which the providers met more NAPSACC best practice nutrition guidelines would have higher diet quality while in their care than children in FCCHs in which the providers met fewer best practices.

METHODS

Participants and Recruitment

This study used baseline data from the Healthy Start study, an 8-month cluster-randomized controlled trial examining the efficacy of a multi-component intervention to improve nutrition and physical activity environments in English and Spanish-speaking FCCH. Details about study recruitment, intervention and evaluation have been described in full elsewhere,44 but methods relevant to these analyses are described below. The Institutional Review Boards of Brown University and the University of Connecticut approved all study procedures and materials (full board review).

To meet study eligibility requirements, FCCHs in Rhode Island and Massachusetts had to be within 60 miles of Providence, Rhode Island and in operation for at least 6 months. Providers had to read and speak Spanish or English, provide meals and snacks for children, and care for at least 2 children aged 2–5 years for at least 10 h/wk. We collected data from 120 FCCPs from November 2015 to July 2018 (precoronavirus disease 2019 restrictions). Eligible providers completed a baseline telephone survey and in-person survey at the FCCH. Once we received consent from at least 1 parent of an eligible child aged 2–5 years being cared for in the FCCH, a 2-day observation and measurement session was scheduled. All measures were administered by trained project staff. Providers received $25 for completing the baseline in-person survey and $50 for the 2-day observation. Children received a reusable water bottle as a thank-you gift, and parents received a $20 gift card.

Measures

Demographics and other provider characteristics. Providers reported their gender (male, female, or refuse to answer), race (White, Black or African American, American Indian or Alaska Native, Asian, Native Hawaiian or Other Pacific Islander, other races not mentioned above, unknown),45 ethnicity (Hispanic/non-Hispanic),45 and ethnic subgroups (Dominican, Puerto Rican, Colombian, Guatemalan, Mexican, Other) in a telephone survey and the following variables on an in-person survey: age, household income (<$25,000, $25,000–$49,999, $50,000–$74,999, $75,000–$100,000, or >$100,000), marital status (single, married or living with a partner, divorced, separated, widowed), education (less than high school, high school or GED, associate’s degree, bachelor’s degree, master’s degree or higher), years in the US, country of origin (US/non-US), years as a child care professional, number of children currently in their care (and how many are their children or grandchildren) and whether the FCCH was enrolled in the Child and Adult Care Food Program (CACFP).

Family child care home observation. Field research staff used the Environment and Policy Assessment and Observation (EPAO), developed by the University of North Carolina, to observe ECE settings, environments, policies, and providers’ practices that influence children’s health-related behaviors.46–50 The EPAO for FCCH had good interrater reliability and validity for most nutrition measures.32 Environment and Policy Assessment and Observation variables calculated from the observations included the types and frequency of foods and beverages served; the feeding environment; feeding practices;
and nutrition education. This tool was slightly adapted on the basis of formative research to reflect cultural differences in our population.\textsuperscript{51,52}

We added food items such as yautia, yucca, and plantains to the starchy vegetable section.

\textbf{Meeting NAPSACC guidelines.} The list of 26 nutrition best practices was from the NAPSACC,\textsuperscript{53} which was designed to assess and improve nutrition and physical activity environments in ECE settings.\textsuperscript{46,54,55} Nutrition and Physical Activity Self-Assessment for Child Care's recommended nutrition best practices were derived from a strong scientific evidence base.\textsuperscript{46,54--58} To determine whether FCCPs met NAPSACC nutrition guidelines, we compared EPAO data collected for each nutrition practice to its associated NAPSACC guideline using simple algorithms (see Table 1).\textsuperscript{35} If staff observed the guideline using simple algorithms practice to its associated NAPSACC data collected for each nutrition guidelines, we compared EPAO each provider was calculated.

\textbf{Data Collector Training}

The DOCC and EPAO observations were conducted by the same observers over the same 2 days. Field observers underwent extensive DOCC and EPAO training and had to achieve 80% interrater reliability with a gold standard observer to be certified before field data collection.\textsuperscript{62} Technical error of the measures was calculated quarterly, and data collectors were retrained as needed to maintain an 80% agreement level throughout. One or 2 field observers (2 observers were required for FCCHs with > 3 children) conducted the observations in each FCCH for 2 full child care days. Each observation day began before children ate breakfast and ended when children left for the day and included at least 2 eating occasions (breakfast, morning snack, lunch, afternoon snack, and sometimes dinner).

\textbf{Children's diet.} Children's dietary quality was measured using the 2015 HEI score,\textsuperscript{59} which was calculated on the basis of dietary intake data collected during the 2-day observation using the University of North Carolina-developed Dietary Observation in Child Care (DOCC), a reliable, valid visual observation technique.\textsuperscript{60,61} Dietary Observation in Child Care data were entered into the Nutrition Data System for Research, a windows-based dietary analysis program. Each child's daily averaged data among observation days and the total HEI and component scores were calculated on the basis of the HEI−2015 algorithm.\textsuperscript{59} The total HEI score is a sum of 13 dietary components subscores, with higher scores indicating better diet quality (range, 0−100).\textsuperscript{59} Healthy Eating Index component scores are calculated as intake/1,000 calories (except for fatty acids, which is scored as a ratio of unsaturated to saturated fatty acids), including total vegetables (5), greens/beans (5), total fruit (5), whole fruit (5), whole grains (10), dairy (10), total proteins (5), seafood and plant protein (5), fatty acids (10), sodium (10), refined grains (10), added sugars (10), and saturated fats (10).\textsuperscript{60}

\textbf{RESULTS}

\textbf{Participants}

The sample consisted of 120 female FCCPs (67.5% Hispanic, 75% married or living with a partner). Participants were, on average aged 48.9 ± 9.0 years, and about 13.3% had yearly household income < $25,000; 43.3% had a high school degree/GED or less. Most (82.5%) accepted CACFP subsidies (see Table 2).

The sample consisted of 370 children, 51% girls, 58% Hispanic, 47% White, and 10% Black. Children were, on average aged 3.5 ± 1.0 years. Most children ate breakfast (84%) and lunch (97%) at the FCCH. They spent 7.6 ± 0.9 h/d at the FCCH (see Table 3).

\textbf{Associations Between Providers' Nutrition Practices and Children's Overall HEI Scores}

Providers implemented 11.0 ± 2.3 of 26 nutrition best practices. The mean HEI−2015 score was 62.2 ± 12.1. Providers who met more best practices cared for children with higher total HEI scores. Children cared for by providers who met best practices related to allowing children to self-serve food and providing nutrition education at least once per week had higher total HEI scores than children in FCCHs in which these best practices were unmet (see Table 4).

\textbf{Associations Between Providers’ Nutrition Practices and Children’s Related HEI Subcomponent Scores}

Children cared for by providers who offered fruits ≥ 2 times a day had higher total fruit and whole fruit HEI component scores than those cared for by providers who did not engage in this practice. Children cared for by providers who offered high fiber, whole-grain foods ≥ 2 times/d had higher (better) refined grain scores than those who did not engage in this practice. Children cared for by providers who met 4 best practices related to added sugar had a higher mean added sugar score (indicating less sugar intake) (see Table 5). However, we did not find significant associations between providers’ feeding
Table 1. Best Practices from NAPSACC and Algorithm for Meeting Best Practices Based on EPAO Observational Data

<table>
<thead>
<tr>
<th>Domain</th>
<th>Best Practice</th>
<th>Requirements to Meet Best Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>Make drinking water available for children at all times</td>
<td>Observer indicates that children have self-service access to water in the FCCH (including from filled cups that are always accessible)</td>
</tr>
<tr>
<td>Water</td>
<td>Prompt children to drink water during each indoor and outdoor playtime</td>
<td>Observer indicates that the provider reminds children to drink water at least once during every outdoor play time and every active indoor playtime</td>
</tr>
<tr>
<td>Juice</td>
<td>Limit 100% fruit juice to no more than 2 servings (4–6 oz)/wk</td>
<td>Observer indicates that 100% fruit juice served to a single child across the 2 d of observation does not exceed 12 oz AND 100% fruit juice that the provider reports serving the children does not exceed 12 oz/wk</td>
</tr>
<tr>
<td>Juice</td>
<td>Only serve 100% fruit juice that has no sugar added</td>
<td>The observer indicates that the provider does not serve juice that is &lt; 100% fruit juice at any meal or snack time</td>
</tr>
<tr>
<td>Milk</td>
<td>Children aged ≥ 2 y should only be served skim or 1% milk</td>
<td>The observer does NOT indicate that the provider serves 2% or whole milk at any meal or snack time</td>
</tr>
<tr>
<td>Milk</td>
<td>Never serve flavored milk (milk with chocolate or strawberry syrup or with added sugar)</td>
<td>The observer does NOT indicate that the provider serves flavored milk at any meal or snack time</td>
</tr>
<tr>
<td>Sugary drinks</td>
<td>Never serve sugary drinks</td>
<td>Observer does NOT indicate that the provider serves sugary drinks (eg, fruit-flavored drinks, lemonade, sports drink, soda, sweetened tea, or homemade drink with added sugar) at any meal or snack time</td>
</tr>
<tr>
<td>Vegetables</td>
<td>Offer children vegetables ≥ 2 times/d</td>
<td>The observer indicates that the provider offers vegetables at &gt; 1 meal or snack time on each observation day</td>
</tr>
<tr>
<td>Vegetables</td>
<td>Do not prepare vegetables with added fat; a small amount of vegetable oil is the healthiest option</td>
<td>Observer does NOT indicate that vegetables are fried or prepared with lard, butter, margarine, or cheese sauce at any meal or snack time</td>
</tr>
<tr>
<td>Fruit</td>
<td>Offer children fruit ≥ 2 times/d</td>
<td>The observer indicates that the provider offers fruit at ≥ 1 meal or snack time on each observation day</td>
</tr>
<tr>
<td>Fruit</td>
<td>Never serve fruit in syrup or with added sugar</td>
<td>The observer does NOT indicate that fruit served at any meal or snack time was canned in syrup or sweetened with added sugar</td>
</tr>
<tr>
<td>Whole grains</td>
<td>Offer children high fiber, whole-grain foods ≥ 2 times/d</td>
<td>The observer indicates that FCCP offered a whole-grain food (including whole grain bread, pasta, cereals, crackers, and granola bars) ≥ 2 times/d on both observation days (at any combination of morning meal, morning snack, lunch, and afternoon snack)</td>
</tr>
<tr>
<td>Snack foods</td>
<td>Limit offering children sugary, salty, or fatty foods to &lt; 1 time/wk or never</td>
<td>The observer indicates that the provider does NOT serve crackers, pretzels, chips, dessert items, sugary cereal, granola bars, pastries, or Pop-Tarts at any meal or snack time, AND the provider reports serving such items &lt; 1 time/wk</td>
</tr>
<tr>
<td>High-fat meats</td>
<td>Limit serving high-fat meats to &lt; 1 time/wk or never</td>
<td>The observer indicates that the provider does NOT serve bacon, ham, hot dogs, bologna, salami, regular sausage, or other high-fat meat at any meal or snack time, AND the provider reports serving such items &lt; 1 time/wk</td>
</tr>
<tr>
<td>Fried and prefried foods</td>
<td>Limit offering children fried or prefried foods to &lt; 1 time/wk or never</td>
<td>The observer indicates that the provider does NOT serve fried meat, fried potatoes, or other fried foods at any meal or snack time, AND the provider reports serving such items &lt; 1 per wk</td>
</tr>
</tbody>
</table>

(continued)
<table>
<thead>
<tr>
<th>Domain</th>
<th>Best Practice</th>
<th>Requirements to Meet Best Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mealtime environment</td>
<td>Always sit at the table and eat with the children</td>
<td>Observer indicates that FCCP sat with the children a lot at every observed meal on both days (morning meal, morning snack, lunch, and afternoon snack)</td>
</tr>
<tr>
<td>Mealtime environment</td>
<td>Teach children how to serve themselves or, in the case of older children, allow them to serve themselves</td>
<td>Observer indicates that “children served themselves most or all foods and decided what size portions to take” at every observed meal and snack time</td>
</tr>
<tr>
<td>Self-regulation</td>
<td>Always ask children if they are full before removing an unfinished meal or snack plate</td>
<td>Observer indicates that the provider never removes an unfinished plate without asking a child if they are full at any observed meal and snack time</td>
</tr>
<tr>
<td>Self-regulation</td>
<td>Always ask children if they are hungry before serving more food</td>
<td>Observer indicates that the provider does the following behavior a lot at every observed meal and snack time in which seconds are served—serves seconds only after a child requests them and after asking if the child is still hungry</td>
</tr>
<tr>
<td>Self-regulation</td>
<td>Never pressure children to eat more food than they want</td>
<td>Observer indicates that the provider never required a child who ate less than half of a meal or snack to sit at the table until they cleaned their plate at any observed meal or snack time</td>
</tr>
<tr>
<td>Self-regulation</td>
<td>Do not use food or sweets as a reward or reward children for finishing their plate</td>
<td>Observer indicates that the provider never uses food or sweets as a reward or rewards children for finishing their plate at any meal or snack time</td>
</tr>
<tr>
<td>Role modeling</td>
<td>Enthusiastically role model eating and drinking healthy foods</td>
<td>Observer indicates that the provider enthusiastically role models eating and drinking healthy foods at least a little at &gt; 75% of observed meal and snack times</td>
</tr>
<tr>
<td>Encouragement</td>
<td>Always prompt and praise children for trying new or less preferred foods</td>
<td>Observer indicates that the provider prompts and praises children for trying new, less preferred, or healthy foods at least a little at ≥ 50% of observed meal and snack times</td>
</tr>
<tr>
<td>Nutrition education</td>
<td>Lead a planned nutrition education lesson ≥ 1 time/wk</td>
<td>Provider reports leading a planned nutrition education lesson 1 time/wk</td>
</tr>
<tr>
<td>Nutrition education</td>
<td>Talk with children informally about nutrition and healthy eating as often as possible</td>
<td>Observer indicates that the provider talks with children informally about nutrition at least a little at every observed meal and snack time</td>
</tr>
<tr>
<td>Parent communication</td>
<td>Provide families with information on child nutrition to help them continue healthy practices at home</td>
<td>Provider reports sharing information with families about child nutrition topics, including (1) types of foods and drinks children should eat, (2) recommended serving sizes, (3) the importance of serving a variety of foods, and (4) a healthy mealtime environment</td>
</tr>
</tbody>
</table>

EPAO indicates Environment and Policy Assessment and Observation; FCCP, family child care home provider; NAPSACC, Nutrition and Physical Activity Self-Assessment for Child Care.
Table 2. Family Child Care Provider Demographics

<table>
<thead>
<tr>
<th>Demographics</th>
<th>All, n = 120</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
</tr>
<tr>
<td>female</td>
<td>120 (100)</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>81 (67.5)</td>
</tr>
<tr>
<td>Non-Hispanic</td>
<td>39 (32.5)</td>
</tr>
<tr>
<td><strong>Ethnic subgroup</strong></td>
<td></td>
</tr>
<tr>
<td>Dominican</td>
<td>48 (40.0)</td>
</tr>
<tr>
<td>Puerto Rican</td>
<td>9 (7.5)</td>
</tr>
<tr>
<td>Colombian</td>
<td>11 (9.2)</td>
</tr>
<tr>
<td>Guatemalan</td>
<td>2 (1.7)</td>
</tr>
<tr>
<td>Mexican</td>
<td>1 (0.8)</td>
</tr>
<tr>
<td>Other</td>
<td>49 (40.8)</td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td></td>
</tr>
<tr>
<td>White/Caucasian</td>
<td>51 (42.5)</td>
</tr>
<tr>
<td>Black or African American</td>
<td>18 (15)</td>
</tr>
<tr>
<td>American Indian or Alaska Native</td>
<td>4 (3.3)</td>
</tr>
<tr>
<td>Native Hawaiian or Other Pacific Islander</td>
<td>3 (2.5)</td>
</tr>
<tr>
<td>Other</td>
<td>28 (23.3)</td>
</tr>
<tr>
<td>Multirace</td>
<td>3 (2.5)</td>
</tr>
<tr>
<td>Unknown</td>
<td>13 (10.8)</td>
</tr>
<tr>
<td><strong>Country of birth</strong></td>
<td></td>
</tr>
<tr>
<td>US</td>
<td>35 (29.2)</td>
</tr>
<tr>
<td>Non-US</td>
<td>85 (70.8)</td>
</tr>
<tr>
<td><strong>State</strong></td>
<td></td>
</tr>
<tr>
<td>Rhode Island</td>
<td>71 (59.2)</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>49 (40.8)</td>
</tr>
<tr>
<td><strong>Marital status</strong></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>11 (9.2)</td>
</tr>
<tr>
<td>Married or living with a partner</td>
<td>90 (75.0)</td>
</tr>
<tr>
<td>Divorced</td>
<td>10 (8.3)</td>
</tr>
<tr>
<td>Separated</td>
<td>5 (4.2)</td>
</tr>
<tr>
<td>Widowed</td>
<td>4 (3.3)</td>
</tr>
<tr>
<td><strong>Annual household income, $</strong></td>
<td></td>
</tr>
<tr>
<td>&lt; $25,000</td>
<td>16 (13.3)</td>
</tr>
<tr>
<td>$25,000–$49,999</td>
<td>57 (47.5)</td>
</tr>
<tr>
<td>$50,000–$74,999</td>
<td>24 (20.0)</td>
</tr>
<tr>
<td>$75,000–$100,000</td>
<td>12 (10.0)</td>
</tr>
<tr>
<td>&gt; $100,000</td>
<td>7 (5.8)</td>
</tr>
<tr>
<td><strong>Highest level of education</strong></td>
<td></td>
</tr>
<tr>
<td>Less than high school</td>
<td>13 (10.8)</td>
</tr>
<tr>
<td>High school or GED</td>
<td>39 (32.5)</td>
</tr>
<tr>
<td>Associates degree</td>
<td>46 (38.3)</td>
</tr>
<tr>
<td>Bachelor’s degree</td>
<td>18 (15.0)</td>
</tr>
<tr>
<td>Master’s degree or higher</td>
<td>4 (3.3)</td>
</tr>
<tr>
<td><strong>Age, y</strong></td>
<td>48.9 ± 9.0</td>
</tr>
<tr>
<td><strong>Accept CACFP subsidies</strong></td>
<td>82.5 ± 99.0</td>
</tr>
<tr>
<td><strong>Hours of work per week as a provider</strong></td>
<td>62.4 ± 13.8</td>
</tr>
<tr>
<td><strong>No. of children in the care (including own children or grandchildren)</strong></td>
<td>7.7 ± 3.1</td>
</tr>
<tr>
<td><strong>No. observed in the pre-COVID-19</strong></td>
<td>120 ± 100</td>
</tr>
<tr>
<td><strong>Experience working in early child care, y</strong></td>
<td>12.8 ± 8.4</td>
</tr>
<tr>
<td><strong>Count of best practices met by providers</strong></td>
<td>11.1 ± 2.3</td>
</tr>
</tbody>
</table>

CACFP indicates *Child and Adult Care Food Program*; COVID-19, coronavirus disease 2019.

Note: Values are presented as n (%) or mean ± SD.
practices related to vegetables and saturated fat and children’s associated HEI component scores.

**DISCUSSION**

This study examines the influences of providers’ nutrition practices on children’s diet quality in FCCHs with a high proportion of Hispanic providers. The findings of this study add to the growing literature that highlights the importance of ECE provider nutrition-related practices on child diet quality.

Overall, providers in this study met less than half of the NAPSSC best practices for nutrition. Details about practices met and unmet by FCCPs in the Healthy Start study have been published; many providers did not serve children enough vegetables and whole grains or adequately limit salty, sugary, and fatty snacks. In addition, many providers did not role model eating healthy foods, sit at the table and eat with children, talk with children informally about healthy eating, and teach children how to serve themselves or allow them to serve themselves. Other studies assessing foods served and feeding practices in FCCHs have found similar results. In this study, we found that providers meeting best practices related to serving certain foods or beverages were associated with better related HEI sub-scores for total fruit, whole fruit, whole grains, refined grains, and added sugar.

We found that children cared for by providers who practiced having “children serve themselves most or all foods and deciding what size portions to take at every observed meal and snack time” had higher overall mean HEI diet quality scores in their FCCH. Findings from the Keys study, conducted in North Carolina FCCHs, which also collected 2-day EPAO observation and DOCC data, indicated that FCCPs who engaged in responsive feeding practices that supported children’s self-regulation of eating had children with higher HEI diet quality scores. Other research has found that children serving their food is associated with less food waste and more appropriate portions, which may help self-regulate hunger and satiety. Studies with parents have also shown that engaging in more responsive feeding practices is associated with better diet quality in children.

In our study, we found that children cared for by providers who “talked with children informally about nutrition at least a little at every observed meal and snack time” had higher overall mean HEI scores. Although few studies have explored the association between providing children informal nutrition education and child diet in FCCHs, a 2-day observational study suggested that providing nutrition education for both children and parents in North Carolina FCCHs was associated with higher children’s overall HEI scores.

Other responsive feeding practices (eg, asking children if they are hungry before serving more food, encouraging children to try new foods, and not using food as a reward) were not significantly associated with children’s diet quality in our sample. Although limited research has examined the associations between specific responsive feeding practices and children’s diet quality in FCCHs, previous observational studies had inconsistent findings. One study conducted in North Carolina did not observe that more provider-responsive feeding practices were associated with children’s diet quality. However, another observational study found that several feeding practices supporting children’s autonomy were the only feeding practices significantly associated with children’s HEI scores. The inconsistent findings among these studies may be because some responsive feeding practices are more promotive of children’s diet quality than others. It may be more difficult to detect a significant association when examining these practices as a subscore rather than examining them separately, or each practice may be less meaningful than capturing an overall feeding style.

Providers in FCCHs may face various barriers such as financial and structural challenges, stress and overwork, parental conflict, and lack of storage and food preparation equipment when following nutrition best practice guidelines. Improving the nutritional quality of foods requires higher food spending. For
example, a study in Washington that
linked food receipt and child care
menu data found that higher daily
food expenditures were associated
with the number of whole grains and
fresh fruits and vegetables served to
children in FCCHs.69

Because of the high proportion
of Hispanic providers (67.5%) in our
sample, we considered cultural factors
that might account for some of our
findings. Previous studies have re-
ported differences in the feeding prac-
tices implemented between Hispanic
and non-Hispanic providers.35,52,68,70

Cultural norms may influence ECE
providers’ implementation of nutri-
tion best practices. Previous analyses
from the Healthy Start study found
that some nutrition best practices
were more likely to be implemented
by Hispanic FCCPs, whereas others
were more likely to be implemented
by non-Hispanic FCCPs.35 Further-
more, children cared for by Hispanic
FCCPs had better total HEI scores
than those cared for by non-Hispanic
providers.40

The NAP-SACC best practice nutri-
tion guidelines are evidence-
based,36,54,55 but generally stricter
than most national and state nutrition
regulations for ECE. Thus, ECE pro-
viders are not required to follow NAP-
SACC guidelines to be licensed.
Opportunities to use policy to im-
prove the nutrition environment in
FCCHs exist at many levels. At the fed-
eral level, there are opportunities to
strengthen the nutrition environment
through the CACFP,71 which most of
our providers use. Currently, CACFP
requires ECE providers to follow
national nutrition standards for meals
and snacks served in their settings,
which supports the service of a greater
variety of vegetables and fruit, whole
grains, lean meats, and low-fat and
free dairy while limiting added sugar
and saturated fat.72 Although this is a federal program, some states
require that all licensed ECE settings
follow CACFP standards, even if they
do not participate. Other state regula-
tions require or ban specific foods or
beverages. For example, Arizona, Col-
orado, Illinois, Maryland, Mississippi,
New Jersey, New York, North

### Table 4. Associations Between Providers’ Practices and Children’s Overall Diet Quality (n = 370)

<table>
<thead>
<tr>
<th>Providers’ Practice</th>
<th>Total HEI Score B</th>
<th>P</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total score</td>
<td>1.05</td>
<td>0.03</td>
<td>0.12–1.99</td>
</tr>
<tr>
<td>Making drinking water available for children at all times</td>
<td>2.29</td>
<td>0.44</td>
<td>−3.55 to 8.13</td>
</tr>
<tr>
<td>Prompt children to drink water during each indoor/outdoor play</td>
<td>4.56</td>
<td>0.24</td>
<td>−3.05 to 12.18</td>
</tr>
<tr>
<td>Limit 100% fruit juice to ≤ 2 servings (4–6 oz)/d</td>
<td>3.24</td>
<td>0.10</td>
<td>−0.59 to 7.06</td>
</tr>
<tr>
<td>Only serve 100% fruit that has no sugar added</td>
<td>1.22</td>
<td>0.85</td>
<td>−11.90 to 14.34</td>
</tr>
<tr>
<td>Children aged ≥ 2 y should only be served skim or 1% milk</td>
<td>1.02</td>
<td>0.67</td>
<td>−3.69 to 5.74</td>
</tr>
<tr>
<td>Never serve flavored milk</td>
<td>4.75</td>
<td>0.03</td>
<td>0.40–9.10</td>
</tr>
<tr>
<td>Never serve sugar drinks</td>
<td>4.49</td>
<td>0.46</td>
<td>−7.56 to 16.54</td>
</tr>
<tr>
<td>Offer children vegetables ≥ 2 times/d</td>
<td>4.40</td>
<td>0.08</td>
<td>−0.54 to 9.34</td>
</tr>
<tr>
<td>Do not provide vegetables with added fat</td>
<td>1.52</td>
<td>0.70</td>
<td>−6.45 to 9.39</td>
</tr>
<tr>
<td>Offer children fruit ≥ 2 times/d</td>
<td>6.00</td>
<td>0.01</td>
<td>1.70–10.31</td>
</tr>
<tr>
<td>Never serve fruit in syrup or with added sugar</td>
<td>−2.66</td>
<td>0.24</td>
<td>−7.10 to 1.77</td>
</tr>
<tr>
<td>Offer children high fiber whole-grain food ≥ 2 times/d</td>
<td>3.39</td>
<td>0.18</td>
<td>−1.53 to 8.31</td>
</tr>
<tr>
<td>Limit offering children sugary, salty or fatty foods to &lt; 1 time/d</td>
<td>−2.11</td>
<td>0.18</td>
<td>−5.20 to 0.95</td>
</tr>
<tr>
<td>Limit serving high-fat meat to &lt; 1 time/wk or never</td>
<td>2.61</td>
<td>0.16</td>
<td>−1.03 to 6.24</td>
</tr>
<tr>
<td>Limit serving fried/prefried foods to &lt; 1 time/d</td>
<td>3.16</td>
<td>0.14</td>
<td>−1.06 to 7.37</td>
</tr>
<tr>
<td>Always sit at the table and eat with the children</td>
<td>4.82</td>
<td>0.09</td>
<td>−0.68 to 10.46</td>
</tr>
<tr>
<td>Teach children how to serve themselves or allow them to serve themselves</td>
<td>27.52</td>
<td>&lt; 0.001</td>
<td>21.02–34.02</td>
</tr>
<tr>
<td>Always ask children if they are full before moving an unfinished meal or snack plate</td>
<td>2.78</td>
<td>0.18</td>
<td>−1.26 to 6.82</td>
</tr>
<tr>
<td>Always ask children if they are hungry before serving more food</td>
<td>−2.25</td>
<td>0.28</td>
<td>−6.39 to 1.89</td>
</tr>
<tr>
<td>Never pressure children to eat more food than they want</td>
<td>2.49</td>
<td>0.34</td>
<td>−2.62 to 7.61</td>
</tr>
<tr>
<td>Do not use food or sweets as a reward or reward children for finishing their plate</td>
<td>−0.05</td>
<td>0.98</td>
<td>−4.14 to 4.03</td>
</tr>
<tr>
<td>Lead a planned nutrition education lesson ≥ 1 time/wk</td>
<td>−1.01</td>
<td>0.62</td>
<td>−4.99 to 2.97</td>
</tr>
<tr>
<td>Talk with children informally about nutrition</td>
<td>7.76</td>
<td>0.001</td>
<td>3.29–12.23</td>
</tr>
<tr>
<td>Enthusiastically role model eating and drinking healthy foods</td>
<td>2.65</td>
<td>0.47</td>
<td>−4.55 to 9.85</td>
</tr>
<tr>
<td>Always prompt and praise children for trying new food</td>
<td>0.64</td>
<td>0.76</td>
<td>−3.42 to 4.70</td>
</tr>
<tr>
<td>Provide families with information on child nutrition to help them continue</td>
<td>−2.89</td>
<td>0.12</td>
<td>−6.50 to 0.72</td>
</tr>
</tbody>
</table>

CI indicates confidence interval; HEI, Healthy Eating Index; B, unstandardized regression coefficient.

Note: All models were controlled for provider ethnicity, income and Bonferroni correction (except for the total practice score).

The adjusted critical value was 0.002. The reference group for each practice is not implementing this best practice.
As mentioned earlier, CACFP nutrition guidelines changed during this study. Two-thirds of the enrolled FCCPs had baseline measurements before CACFP guidelines changed and one-third after. However, it is unlikely that the changes to the CACFP guidelines affected the relationship between children’s diets and FCCP practices in our study. In addition, 2 prior analyses of our data examined the relationship between the CACFP status of the FCCHs and baseline children’s dietary quality, and whether CACFP status as a moderator of intervention effects, and both studies found no association.

This study was conducted before the coronavirus disease 2019 pandemic, so our results may not represent the situation during or after the pandemic. Family child care homes closed during the lockdown, which affected providers’ livelihoods. When they were allowed to reopen, providers that returned to work faced harsher working conditions and greater stressors, including stricter hygiene guidelines, uncertainty about

<table>
<thead>
<tr>
<th>Providers’ Practice</th>
<th>HEI Subscore B</th>
<th>P</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offer children vegetables ≥ 2 times/d</td>
<td>0.77</td>
<td>0.37</td>
<td>−0.90 to 2.43</td>
</tr>
<tr>
<td>Offer children vegetables ≥ 2 times/d</td>
<td>0.59</td>
<td>0.43</td>
<td>−2.08 to 0.89</td>
</tr>
<tr>
<td>Offer children fruit ≥ 2 times/d</td>
<td>0.59</td>
<td>0.03</td>
<td>0.05–1.13</td>
</tr>
<tr>
<td>Offer children fruit ≥ 2 times/d</td>
<td>0.73</td>
<td>0.01</td>
<td>0.20–1.26</td>
</tr>
<tr>
<td>Offer children high fiber, whole-grain foods ≥ 2 times/d</td>
<td>2.40</td>
<td>0.09</td>
<td>−0.39 to 5.20</td>
</tr>
<tr>
<td>Limit serving high-fat meat to &lt; 1 time/wk or never</td>
<td>0.70</td>
<td>0.19</td>
<td>−0.35 to 1.75</td>
</tr>
<tr>
<td>Offer children high fiber, whole-grain foods ≥ 2 times/d</td>
<td>2.47</td>
<td>0.01</td>
<td>0.52–4.42</td>
</tr>
<tr>
<td>Never serve sugar drinks</td>
<td>3.24</td>
<td>0.02</td>
<td>0.45–6.02</td>
</tr>
<tr>
<td>Make drinking water available for children at all times</td>
<td>0.37</td>
<td>0.35</td>
<td>−0.41 to 1.16</td>
</tr>
<tr>
<td>Prompt children to drink water during indoor and outdoor playtime</td>
<td>0.84</td>
<td>0.003</td>
<td>0.29–1.39</td>
</tr>
<tr>
<td>Limit 100% fruit juice to ≤ 2 servings (4–6 oz)/d</td>
<td>0.91</td>
<td>0.01</td>
<td>0.18–1.64</td>
</tr>
<tr>
<td>Only serve 100% fruit that has no sugar added</td>
<td>2.42</td>
<td>0.03</td>
<td>0.24–4.59</td>
</tr>
<tr>
<td>Never serve flavored milk</td>
<td>0.41</td>
<td>0.35</td>
<td>−0.46 to 1.29</td>
</tr>
<tr>
<td>Limit serving high-fat meat to &lt; 1 time/wk or never</td>
<td>0.33</td>
<td>0.41</td>
<td>−0.46 to 1.13</td>
</tr>
<tr>
<td>Children aged ≥ 2 y should only be served skim or 1% milk</td>
<td>0.93</td>
<td>0.11</td>
<td>−0.21 to 2.08</td>
</tr>
</tbody>
</table>

CI indicates confidence interval; HEI, Healthy Eating Index; B, unstandardized regression coefficient.
Note: All models control for provider ethnicity and income. Refined grains, sodium, added sugars, and saturated fats components were reversed scored. The reference group for each practice is not implementing this best practice. Multilevel linear regression models were run separately by each best practice and HEI subscore. The critical value was 0.05.

Carolina, Oklahoma, Rhode Island and California have laws prohibiting licensed ECE settings from serving beverages with added sweeteners. Studies have shown that statewide nutrition policies for ECE can affect children’s diet quality in child care centers. Federal, state and facility-level policies for ECE systems could all be leveraged to provide optimal nutrition early in life.

Our study has some limitations to consider as we examine this work. The study sample may not represent all FCCPs, as this sample is only from RI and MA and has a higher proportion of Hispanic providers than other studies conducted in FCCHs. Therefore, the results may not be generalizable to FCCPs in other states. In addition, because of the cross-sectional design, causality cannot be inferred in this study. We did not find significant relationships between some nutrition-related provider practices and children’s diet quality, but that does not mean those practices are not important for children’s diets. Our results could be due to the cross-sectional nature of this study, the small sample size, and the specific study location. Binary scores in this study may not capture the variability of nutrition practices in FCCHs.

Furthermore, the 2-day observation data may not fully represent usual nutrition practices. Providers may have altered their behaviors on the observation days to reflect their perceptions of desired practices. The additional provider-reported data could be biased by social desirability and recall. However, the prevalence of meeting the best practice nutrition guidelines was generally quite low. Similarly, 2 days of children’s diet data may not represent their usual diet; however, it likely corresponds to the FCCPs’ practices on those days.

Our study has some limitations to consider as we examine this work. The study sample may not represent all FCCPs, as this sample is only from RI and MA and has a higher proportion of Hispanic providers than other studies conducted in FCCHs. Therefore, the results may not be generalizable to FCCPs in other states. In addition, because of the cross-sectional design, causality cannot be inferred in this study. We did not find significant relationships between some nutrition-related provider practices and children’s diet quality, but that does not mean those practices are not important for children’s diets. Our results could be due to the cross-sectional nature of this study, the small sample size, and the specific study location. Binary scores in this study may not capture the variability of nutrition practices in FCCHs.

Furthermore, the 2-day observation data may not fully represent usual nutrition practices. Providers may have altered their behaviors on the observation days to reflect their perceptions of desired practices. The additional provider-reported data could be biased by social desirability and recall. However, the prevalence of meeting the best practice nutrition guidelines was generally quite low. Similarly, 2 days of children’s diet data may not represent their usual diet; however, it likely corresponds to the FCCPs’ practices on those days.

Table 5. Associations Between Provider Nutrition-related Practices and Related Children’s HEI Subcomponent Scores (n = 370)

<table>
<thead>
<tr>
<th>Providers’ Practice</th>
<th>HEI Subscore B</th>
<th>P</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offer children vegetables ≥ 2 times/d</td>
<td>0.77</td>
<td>0.37</td>
<td>−0.90 to 2.43</td>
</tr>
<tr>
<td>Offer children vegetables ≥ 2 times/d</td>
<td>0.59</td>
<td>0.43</td>
<td>−2.08 to 0.89</td>
</tr>
<tr>
<td>Offer children fruit ≥ 2 times/d</td>
<td>0.59</td>
<td>0.03</td>
<td>0.05–1.13</td>
</tr>
<tr>
<td>Offer children fruit ≥ 2 times/d</td>
<td>0.73</td>
<td>0.01</td>
<td>0.20–1.26</td>
</tr>
<tr>
<td>Offer children high fiber, whole-grain foods ≥ 2 times/d</td>
<td>2.40</td>
<td>0.09</td>
<td>−0.39 to 5.20</td>
</tr>
<tr>
<td>Limit serving high-fat meat to &lt; 1 time/wk or never</td>
<td>0.70</td>
<td>0.19</td>
<td>−0.35 to 1.75</td>
</tr>
<tr>
<td>Offer children high fiber, whole-grain foods ≥ 2 times/d</td>
<td>2.47</td>
<td>0.01</td>
<td>0.52–4.42</td>
</tr>
<tr>
<td>Never serve sugar drinks</td>
<td>3.24</td>
<td>0.02</td>
<td>0.45–6.02</td>
</tr>
<tr>
<td>Make drinking water available for children at all times</td>
<td>0.37</td>
<td>0.35</td>
<td>−0.41 to 1.16</td>
</tr>
<tr>
<td>Prompt children to drink water during indoor and outdoor playtime</td>
<td>0.84</td>
<td>0.003</td>
<td>0.29–1.39</td>
</tr>
<tr>
<td>Limit 100% fruit juice to ≤ 2 servings (4–6 oz)/d</td>
<td>0.91</td>
<td>0.01</td>
<td>0.18–1.64</td>
</tr>
<tr>
<td>Only serve 100% fruit that has no sugar added</td>
<td>2.42</td>
<td>0.03</td>
<td>0.24–4.59</td>
</tr>
<tr>
<td>Never serve flavored milk</td>
<td>0.41</td>
<td>0.35</td>
<td>−0.46 to 1.29</td>
</tr>
<tr>
<td>Limit serving high-fat meat to &lt; 1 time/wk or never</td>
<td>0.33</td>
<td>0.41</td>
<td>−0.46 to 1.13</td>
</tr>
<tr>
<td>Children aged ≥ 2 y should only be served skim or 1% milk</td>
<td>0.93</td>
<td>0.11</td>
<td>−0.21 to 2.08</td>
</tr>
</tbody>
</table>

CI indicates confidence interval; HEI, Healthy Eating Index; B, unstandardized regression coefficient.
Note: All models control for provider ethnicity and income. Refined grains, sodium, added sugars, and saturated fats components were reversed scored. The reference group for each practice is not implementing this best practice. Multilevel linear regression models were run separately by each best practice and HEI subscore. The critical value was 0.05.
their business, higher food prices, and mental health issues of families. These issues might affect their ability to provide healthy food and activity environments for children cared for in FCCHs.

IMPLICATIONS FOR RESEARCH AND PRACTICE

Given the results of this study, it is clear that foods served to children and the feeding practices of FCCPs are related to children’s dietary quality in the family child care setting. Based on the results, some of the most important practices for providers to improve children’s diet quality may be autonomy feeding practices, talking informally to children about nutrition, and providing healthful foods and beverages. Therefore, future research and intervention projects could focus on how to help providers implement these best practices through the provision of more training opportunities and resources. Policy and intervention efforts need to focus directly on the foods and beverages served to children, such as increasing the servings of healthy foods, decreasing the number of unhealthy foods, and fostering positive feeding practices. Furthermore, supporting FCCPs in providing nutrition education to children might be a promising intervention target for improving child diet quality in ECE settings. Future interventions could also include food or beverage-specific components to support adherence to the related guidelines, which could improve the comparable areas of a healthy child’s diet. Future studies with larger samples could further examine the relationship between provider ethnicity, their likelihood to meet best practice nutrition guidelines and how that relates to children’s dietary quality.

Policy changes at the federal or state level could strengthen nutrition guidelines and/or mandate that providers follow best practice nutrition guidelines, but must also recognize the barriers that may be involved and include more training opportunities, support and resources for FCCPs. Future research and intervention projects could focus on how to help providers to implement these best nutrition practices, including a better understanding of what motivates or supports the needed changes.

ACKNOWLEDGMENTS

This project was funded by the National Institutes of Health (grant no. R01HL123016).

REFERENCES

17. Benjamin Neelon SE, Copeland KA, Ball SC, Bradley L, Ward DS.


48. Erinosho T, Vaughn A, Hales D, Mazzucca S, Gizlice Z, Ward D. Participation in the Child and Adult Care Food Program is associated with healthier


**ORCIDs**

Qianxia Jiang: http://orcid.org/0000-0003-2230-6097

Patricia Markham Risica: http://orcid.org/0000-0002-2868-1931

Marlene B. Schwartz: http://orcid.org/0000-0002-8939-1954

Caitlin Lombardi: http://orcid.org/0000-0003-0261-8210