Examining Food Procurement Characteristics in Washington State Child Care Settings

Monica Ashwini Lazarus

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Jennifer J. Otten

Pooja S. Tandon

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Abstract

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Monica Ashwini Lazarus

Chair of the Supervisory Committee:

Assistant Professor Jennifer J. Otten

Department of Health Services

Background: Early care and education (ECE) settings serve as primary eating environments for young children. Approximately 60% of U.S. children aged 5 years old and under are enrolled in some form of ECE and receive up to two-thirds of their daily nutrition in these settings. Many factors impact nutrition in ECE settings. While most studies have focused on the association between Child and Adult Care Food Program (CACFP) and nutrition, little is known about the relationship between procurement practices (where and how childcare providers purchase food) and nutrition in ECE settings. This information may guide purposeful interventions that promote

healthy procurement and improve access to healthy foods, ultimately improving the nutritional quality of meals children receive in ECE settings.

Objective: The purpose of this analysis is to characterize the food procurement practices of licensed center (Centers)- and family home-based (FHCCs) ECE programs in Washington State and to explore the relationships of these practices with the nutritional quality of meals served to children in their care.

Methods: In 2013, the University of Washington Center for Public Health Nutrition invited all Washington State licensed Centers and FHCCs (1,522 Centers; 4,013 FHCCs) serving children aged 2-5 years old to participate in a 152-item survey. This analysis focuses on 48 questions from these topic areas: 1) Socio-Demographics, 2) Nutrition Best Practices and, 3) Procurement Characteristics. Chi-square tests were used to test for difference in response distributions for categorical responses, while two-sample t-tests were used to test for mean differences in the continuous responses. Linear regressions examined the bivariate associations of Composite Nutrition Scores with key socio-demographic, child care program characteristics, and procurement variables. A series of multivariable linear regression models explored the relationship between each procurement variable (i.e., Main Store and Main Mode, the primary independent variables) and the Composite Nutrition Score (i.e., the dependent variable).

Results: Centers had a 46% response rate (692 out of 1,522 Centers) and FHCCs had a 32% response rate (1,281 out of 4,013 FHCCs). In terms of food procurement mode, most programs prefer in-person shopping compared to phone and online shopping modes, regardless of CACFP participation (91% CACFP vs. 92% non-CACFP from the full sample). Both CACFP and non-CACFP centers shop primarily at Megastores (Costco, Target, Walmart, Sam's Club) (41% CACFP Centers vs. 53% non-CACFP Centers). CACFP FHCCs use both Megastores as well as

grocery stores (Albertsons, QFC, Safeway, Trader Joes etc.) at similar rates (31% Megastores vs. 34% Grocery Stores), while non-CACFP FHCCs primarily use Megastores (40%). Race/ethnicity, education, and years employed in the childcare field are associated with the nutritional quality of foods served to children. CACFP enrollment is also positively associated with the quality of nutrition in childcare. Multivariate analysis models found that in this sample, after taking into account key socio-demographic variables and child care program characteristics, food procurement characteristics were not predictors of nutritional quality of foods offered to children, .

Conclusion: Although food procurement characteristics were not significantly associated with the nutritional quality of foods in ECE settings, this paper identifies where and how meals are purchased for childcare programs in Washington State, thus illuminating potential points of interventions to improve access to healthy and affordable foods for ECE settings.

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SECTION ONE: INTRODUCTION

Early care and education (ECE) settings affect children's growth and development, and shape their physical, social, and emotional habits (Black et al., 2017; Herman et al., 2014; Peisner-Feinberg, 2011). Black et al. state that "*Children's early development requires nurturing care—defined as health, nutrition, security and safety, responsive caregiving, and early learning—provided by parent and family interactions, and supported by an environment that enables these interactions*" (Black et al., 2017). The first few years of life present a window for developing healthy dietary patterns, since taste preferences are established then, and because younger children are typically more receptive than older children when it comes to trying novel foods (Birch, 1999; Mura Paroche, Caton, Vereijken, Weenen, & Houston-Price, 2017).

Young children spend a considerable amount of time under non-parental care. Sixty percent of children under 5 years of age in the U.S. are enrolled in one form of child care or another at least once weekly, and receive up to two-thirds of their daily nutrition in these settings (Benjamin Neelon & Briley, 2011). In the U.S. in 2012, 34% of children under non-parental care were enrolled in child care centers, 26% were under the care of relatives, and the remaining 14% under the care of family child care homes (Redford, Desrochers, Hoyer, & Ralph, 2017). In Washington State in 2014, over 150,000 children were enrolled in licensed child care, with 85% of them using child care centers (Centers) and 15% using licensed family homes (FHCCs). Preschoolers (i.e., generally ages 3 to 5 years) utilize child care most, with 1 in 4 preschoolers being enrolled in licensed care (Moore & Gertseva, 2015).

Benjamin et al. found that the risk for higher BMI increased with more time spent in ECE settings (Benjamin, Sheryl, & Care, 2009). Another study found that limited childcare use between the ages of three and five was correlated with less risk of being overweight from six to 12 years (Lumeng, Gannon, Appugliese, Cabral, & Zuckerman, 2005). Thus, given the extent to which child care programs are used in the U.S. and their associations with nutrition outcomes, these settings present an opportunity to positively support the dietary patterns of children and set them up for a successful and healthy future (Lynch & Batal, 2011).

Research has illustrated that nutrition in these settings is impacted by a variety of factors, including but not limited to individual-level factors (i.e., providers perceptions; values; nutrition knowledge of staff), interpersonal factors (i.e., children' and parents' food preferences; teacher practices at mealtimes), institutional characteristics (i.e., budgets; kitchen space; institutional policies), community-level factors (i.e., food environment/availability; professional organizations) and societal factors (i.e., culture – organic, gluten-free; policy – Child and Adult Care Food Program [CACFP]; licensing requirements etc.) (Henderson et al., 2014; Lynch & Batal, 2011; Otten, Hirsch, & Lim, 2017). Within the context of childcare, most of the extant research literature focuses on the association between CACFP and nutrition. CACFP is a federal program that is administered by each state, often with additional requirements, which aims to improve the nutritional quality of meals served to children in ECE settings; it was recently updated by the Institute of Medicine in 2011 to reflect the *Dietary Guidelines for Americans* (Liu, Graffagino, Leser, Trombetta, & Pirie, 2016; The National Academies of Sciences, 2010). Participating programs receive reimbursements for meals and snacks that meet the state's CACFP meal pattern guidelines. Research demonstrates that CACFP-participating programs are

associated with better nutrition outcomes, both in Centers and FHCCs (Korenman, Abner, Kaestner, & Gordon, 2013; Liu et al., 2016; Monsivais, Kirkpatrick, & Johnson, 2011).

To the best of our knowledge, no studies have investigated the relationship between procurement practices and nutrition outcomes within the context of ECE settings. Food procurement, in this case, refers to where (i.e., source) and how (i.e., mode) childcare sites purchase food (Robles, Wood, Kimmons, & Kuo, 2013). Good procurement strategies have the potential to provide foods that are high quality, healthy and affordable to promote positive dietary choices (Elliot, Carr, & Nettles, 2005; Robles et al., 2013). Outside the context of childcare, research has been done to understand how procurement characteristics impact food choices, dietary quality, and consumption (The Pew Charitable Trusts, 2017). Aggarwal et al. found that fruit and vegetable consumption was not related to the physical distance of supermarkets, but instead supermarket choice (Aggarwal et al., 2014). Another study found that urban supermarkets, which typically carry more nutritious foods, were associated with lower rates of obesity, while convenience stores were associated with higher rates of obesity (Morland, Roux, & Wing, 2006). These studies illustrate that procurement characteristics have the potential to impact nutritional outcomes.

At an individual level, food purchasing decisions are influenced by taste, nutrition, convenience, price, healthfulness, branding, portion sizes and reliability, among other factors (Aggarwal, Rehm, Monsivais, & Drewnowski, 2016; Gao, Costanza, & Schraefel, 2012; Kalnikaite, Bird, & Rogers, 2013). While these studies examine how factors impact food procurement choices at an individual-level, there is a thin literature on how child care providers and caregivers approach

procurement. A recent qualitative study on interactive systems design that was conducted among Puget Sound child care providers underlined the complexities of food purchasing behavior. The authors stressed that providers and caregivers have to consider their own standards, national and state-level policies, and limited budgets and resources, to provide healthy meals that are acceptable to children under their care (Hirsch, Lim, & Otten, 2016; Otten et al., 2017). Child care providers in this study indicated that food source was an essential component related to the quality, price, and trustworthiness of food and that purchasing mode was related to time management (Hirsch et al., 2016; Otten et al., 2017). However, the study only interviewed 16 ECE providers - 12 child care directors and 4 FHCC providers – and was unable to provide an overall sense of where and how most child care providers shopped for food. This type of information would be helpful in identifying the current state of child care food procurement, to inform purposeful interventions that promote access to healthy foods in ECE settings, and ultimately improve the nutritional quality of foods served in child care settings.

In 2013, the Washington State Department of Health and Public Health—Seattle & King County, in partnership with the University of Washington Center for Public Health Nutrition (UW CPHN), administered the 2013 Washington Child Care Survey. The goal of the survey was to understand the state of nutrition and physical activity practices in licensed child care programs in the state that care for 2 to 5-year-old children. The purpose of this secondary analysis is to use data from this survey to:

1. Characterize child care food procurement practices, by licensed Centers and FHCCs in WA state.

2. Explore the relationships between childcare procurement practices and the nutritional quality of foods served to children under their care.

The findings of this secondary analysis will be helpful in identifying if and how food procurement could be used as a point of intervention to better support ECE providers in identifying, accessing, and purchasing affordable, healthy foods.

SECTION TWO: METHODS

Overview

This secondary analysis uses data from a 2013 Washington State survey of statewide licensed child care sites that assessed nutrition, physical activity, and screen time practices and environments with the aim of developing policies and interventions to improve healthy food access and physical activity in child care. The complete methodology of this survey and select results have been published previously (Tandon, Walters, Igoe, Payne, & Johnson, 2017; University of Washington Center for Public Health Nutrition (CPHN), 2013). The cross-sectional, self-report survey invited all licensed child care sites serving children between 2 and 5 years of age in WA state to participate and was administered by the University of Washington Center for Public Health Nutrition (UW CPHN). Briefly described below are survey tool development, administration, and measures relevant to this analysis.

Survey Tool Development

The survey was designed and developed using input from an Advisory Team composed of child care, health, and evaluation experts, such as Child Care Aware of WA, YMCA, Seattle Children's Hospital, and the WA Office of Superintendent of Public Instruction (OSPI) among others. Survey design was informed by an extensive literature review of current nutrition, physical activity, and screen time guidelines, research and standards that promote healthy growth in ECE, such as the *Caring for Our Children, 3rd Edition: National Health and Safety Performance Standards: Guidelines for Early Care and Early Education Programs* (CFOC3), the *2015 Let's Move! Child Care* guidelines, and the Nemours Foundation (American Academy of Pediatrics, American Public Health Association, 2011; Boyle, Celano, Cooper, & Phillips,

2013; Nemours Foundation, 2017; Hughes et al., 2013). Previously published validated assessment tools were incorporated into the survey or were used to design robust survey questions, including the Nutrition and Physical Activity Self-Assessment for Child Care (NAP SACC), Rudd Center's Child Care Nutrition and Physical Activity Assessment Survey, Oregon Public Health institute's Right from the Start, and UC Berkeley's CA Survey of Child Care Providers of 2-5 Year Old Children (Atkins Center for Weight and Health, UC Berkeley and Samuels & Associates, 2011; Bellanca, 2011; Ward et al., 2014; Yale Rudd Center, 2007). The final survey tool consisted of 153 total questions. This analysis focuses on 48 of these questions from the following topic areas: 1) Socio-Demographics (Respondent & Program Characteristics), 2) Nutrition Best Practices (Foods Provided to Children Ages 2 – 5, Beverages Provided to Children Ages 2 – 5, Meal and Snack Time Environment & Director's Views on Healthy Eating) and, 3) Procurement Characteristics, each of which is described in the measures section below. Two versions of the survey were developed by UW CPHN—one for Center directors and one for FHCC owners/providers—with subtle variation to account for the unique settings of Centers and FHCCs. The surveys were available online or on paper, and in English or Spanish.

Survey Administration

The WA DEL provided UW CPHN with a complete list of all licensed programs that cared for children from birth to 13 years of age. This extensive list served as the survey sampling frame and contained information about the providers' names, contact details, child capacity, and age range of children served. The survey was administered from October to December 2013. UW CPHN followed Dillman's Tailored Design Method for internet and mail surveys to administer the survey to participants, to get high response rates (Hoddinott & Bass, 1986). Child care sites

with valid email addresses received the survey online unless they specifically requested for paper surveys, while sites without email addresses on record were sent paper surveys via mail. Survey participation was encouraged with the use of incentives in the form of access to an online resource guide for child care programs on nutrition and physical activity, and eligibility to enter a drawing for prizes, including three iPads worth $1,000 each, 20 gift cards worth $50 each, and 350 gift cards worth $10 each. The human subjects division at the University of Washington determined that the study survey procedures and analysis were exempt from IRB review.

Measures

Respondent Characteristics

The survey asked for participants' socio-demographic information, including race/ethnicity, education, and number of years employed in ECE. For the analysis, race and ethnicity were combined and recoded into 4 categories: Non-Hispanic Whites, Non-Hispanic Blacks, Hispanics and other race. Education was also recoded and categorized into 4 categories: less than High School (HS), HS graduate, Some college, and greater than an Associate's Degree. Number of years employed was broken down into 4 categories: 0 - 5 years, 6 - 10 years, 11 - 20 years, and > 20 years. The question on respondents' roles at their respective child care programs was worded differently in the Centers and FHCC survey, due to the type of childcare and size differences.

Child Care Programs Characteristics

The survey also asked respondents about their child care program characteristics, including the type of childcare (Centers vs. Homes), CACFP status (enrolled or not enrolled) and program length (half-day, full-day or both). Other questions included Head Start and Early Achievers

participation. Centers were also asked additional questions about kitchen availability, profit status, and number of sites as these questions were not relevant to home-based care.

Procurement Characteristics

The procurement-related questions asked survey respondents about their main mode of shopping and their main shopping store. Option responses to the mode of shopping question included in-person, online, and over the phone. The main shopping store question asked respondents which stores they frequented most to purchase food for their program and respondents could select from an extensive list of grocery stores, markets and shops; food service distributors; and, caterers. Respondents could also write in where they got most of their foods from if it was not included in the provided options. Centers had the option of selecting Food Service Distributors as their main store for purchasing food, but FHCCs did not as FHCCs care for a smaller group of children and would not have qualified to use a Food Service Distributor to obtain food. Answers to main shopping store were recoded into six distinct categories: No Main Store, Megastores, Food Service Distributors, Other Stores, Grocery Stores, and > 2 Stores.

Nutrition Best Practices

Nutrition best practice survey questions asked respondents how many times they served different types of specific foods and beverages to children ages 2 – 5 years old, and what their meal and snack time environments were like. For example, "*How often does your Center offer fruit canned in syrup (heavy or lite syrup)?*", "*What type of milk is offered to children ages 2 years and older?*" and "*Are children allowed to decide how much or how little food they will eat?*". These questions were categorized into five content areas: fruits and vegetables (n = 5), whole grains,

snack foods and sweets (n = 5), fried foods and processed meat (n = 3), beverages (n = 4), and supporting healthy eating (n = 5). **Figure 1** shows a graphic representation of the Composite Nutrition Score. Most of these questions had four to five response choices scored on a scale of 1 to 5, with 5 corresponding to a national best-practice child care standard, and hence the highest score attainable. The scores for each content area were then summed and averaged, resulting in a single composite nutrition score for each child care program. Composite Nutrition Score tabulation from five distinct content areas.

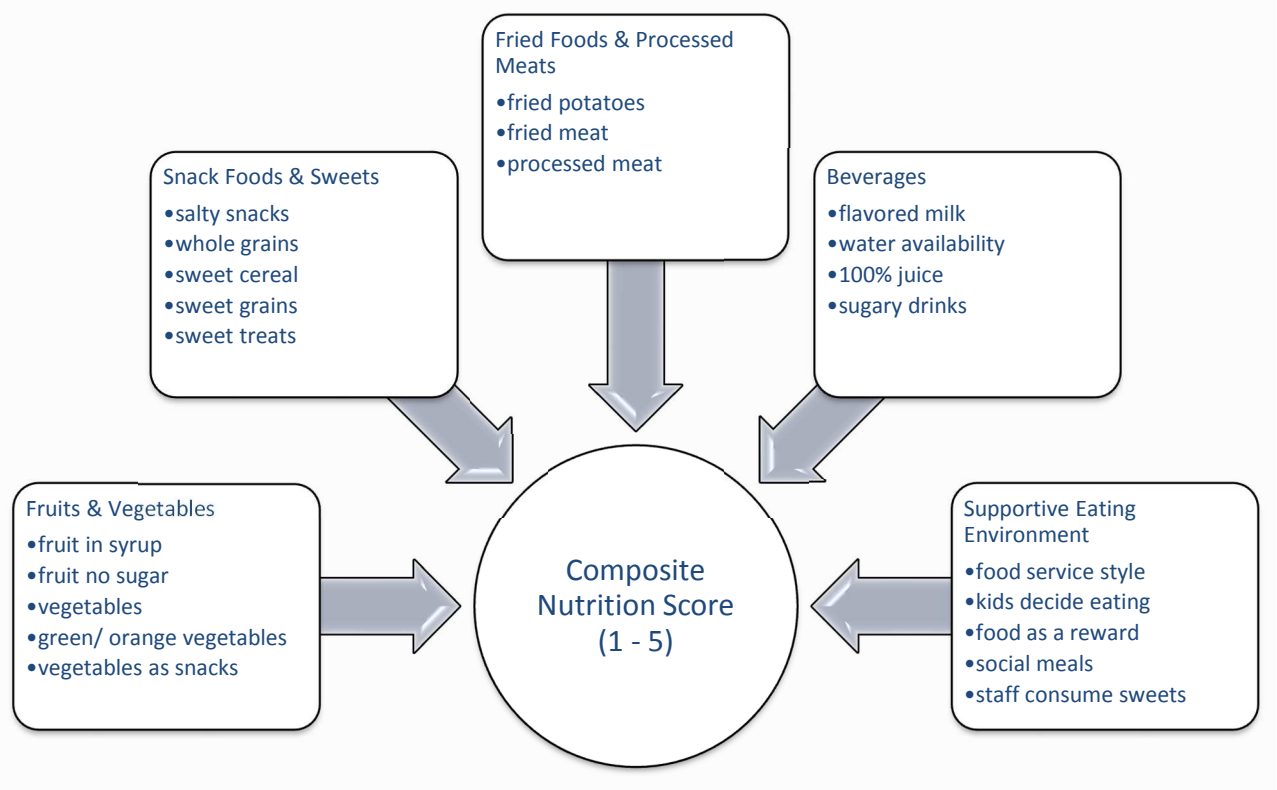

Figure 1: Composite Nutrition Score tabulation from five distinct content areas

Statistical Analysis

Descriptive analyses for relevant survey items, including the frequencies and proportion for categorical response items and the means and standard deviations (SD) for continuous response items were tabulated. Chi-square tests were used to test for difference in response distributions for categorical responses, while two-sample t-tests were used to test for mean differences in the continuous responses. These descriptive statistical tests were done to compare Centers and FHCCs.

Linear regressions examined the bivariate associations of Composite Nutrition Scores with key socio-demographic, child care program characteristics, and procurement variables. A series of multivariable linear regression models explored the relationship between each procurement variable (i.e., Main Store and Main Mode, the primary independent variables) and the Composite Nutrition Score (i.e., the dependent variable). The reference groups in all the models were the groups that had the largest proportion of responses. Model 1 adjusted for race/ethnicity, education, and years employed; Model 2 added type of childcare; and, Model 3 added CACFP enrollment. The variance inflation factor (VIF) test was run to check for collinearity across all the variables in the regression models. An alpha significance level of 0.05 was used for all statistical tests.

Original datasets were in separate SPSS files for Centers and FHCCs. Analysis was conducted after merging these two datasets to facilitate comparison between Centers and FHCCs. Data analysis was conducted between August - October 2017. Chi-square tests and two-sample t-tests were run using SPSS 19 and STATA 14.1, while linear regressions were run on STATA 14.1.

SECTION THREE: RESULTS

Out of 5,540 programs invited to participate in the study, representatives of 1,973 Centers and FHCCs in WA state took the survey. The overall response rate was 36%, with the Center Director Survey having a 46% response rate and the FHCC Provider Survey having a 32% response rate. Survey responses were filtered to only include programs that cared for at least one child between the ages of 2 - 5, resulting in a final sample of 1,950 respondents from 690 Centers and 1,260 FHCCs.

Respondent and Program Characteristics by Type of Child Care

Table 1 shows the descriptive characteristics of the survey respondents while **Table 2** shows the child care program characteristics. Most respondents from Centers and FHCCs worked as Center Directors and FHCC Owners/Providers, respectively (70% Center Directors at Centers vs. 97% FHCC Owners/Providers at FHCC). Center and FHCC respondents were mostly Non-Hispanic White (80% in Centers and 66% in FHCCs). Close to 25% of respondents from Centers and FHCCs had some college-level education, but Centers had more respondents with an Associate Degree or higher level of education (77% Centers vs. 33% FHCCs). A large percentage of respondents had 20 over years of experience working in ECE settings (36% for Centers vs. 33% for FHCCs).

Table 1: Demographic characteristics of the 2013 WA State Survey of Nutrition and Physical Activity in Child Care respondents[a]

Demographic Characteristic	Centers[b] (N = 690) n (%)	FHCCs[b] (N = 1,260) n (%)	P-value[c]
Primary Role[d]			
Center Director	485 (70)	N/a	
Center Owner	48 (7)	N/a	
Other (Assistant, Supervisor, Manager, Teacher, Volunteer)	17 (2)	N/a	N/a
Two Roles	84 (12)	N/a	
Three or more roles	56 (8)	N/a	
Family Home Child Care Owner/ Provider	N/a	1,216 (97)	
Family Home Child Care Teacher, Assistant or Volunteer	N/a	6 (0.5)	
Two Roles	N/a	30 (2)	
Three or more roles	N/a	5 (0.4)	
Race/Etnicity			
Non-Hispanic White	544 (80)	822 (66)	
Non-Hispanic Black	21 (3)	72 (6)	**< 0.001**
Hispanic	67 (10)	261 (21)	
Other Race	49 (7)	90 (7)	
Highest Level of Education			
Less than high school	1 (0.1)	115 (9)	
Completed high school	10 (1)	260 (21)	**< 0.001**
Some college-level or advanced courses	151 (22)	459 (37)	
Associate degree and higher	528 (77)	414 (33)	
Years Employed in Child Care			
0 - 5 years	82 (12)	184 (15)	
6 - 10 years	119 (17)	227 (18)	0.241
11 - 20 years	243 (35)	432 (35)	
20 + years	246 (36)	406 (33)	

[a]Only includes programs that reported to care for children ages 2-5.
[b]Column totals do not sum up because missing data (Unreadable, no response and "*I don't know*" responses) were excluded.
[c]Comparisons of study groups made with Pearson's x2 test. P-values < 0.05 were considered significant.
[d]Separate questions were asked of Centers and FHCCs.

As for program characteristics (**Table 2**), over half of the Centers and FHCCs surveyed offered both full-day and half-day care to children (62% Centers vs. 53% FHCCs), but more FHCCs were exclusively full-day sites as compared to Centers (46% FHCCs vs. 35% Centers). More Centers participated in Early Achievers, Washington state's child care quality rating and improvement system (63% Centers vs. 38% FHCCs). Current enrollment in CACFP was higher among FHCCs as compared to Centers (67% FHCCs vs. 56% Centers). More Centers accepted DSHS subsidies as compared to FHCCs (76% Centers vs. 59% FHCCs).

Table 2: Program characteristics of the 2013 WA State Survey of Nutrition and Physical Activity in Child Care survey respondents[a]

Program Characteristic	Centers[b] (N = 690) n (%)	FHCCs[b] (N = 1,260) n (%)	P-value[c]
Center has multiple sites[d]	190 (28)		
Center has on-site kitchen facility[d]	610 (89)		
Program length			
Both full-day and half-day	427 (62)	662 (53)	
Full-day	242 (35)	579 (46)	**< 0.001**
Half-day	21 (3)	17 (1)	
Profit status[d]			
For-profit	343 (50)		
Non-profit	306 (44)		
Government (tribal, military sponsored, Head Start, community college)	33 (5)		
College or university affliated	8 (1)		
Enrolled in Early Achievers	425 (63)	438 (38)	**< 0.001**
Child and Adult Care Food Program (CACFP)[e]			
Currently enrolled	378 (56)	820 (67)	**< 0.001**
DSHS child care subsidy program			
Has one or more families using a DSHS subsidy	521 (76)	743 (59)	
Does not accept DSHS subsidies	120 (18)	201 (16)	**< 0.001**
Accepts DSHS subsidies, but has no families who use subsidies enrolled in child care	44 (6)	308 (25)	

[a]Only includes programs that reported to care for children ages 2-5.
[b]Column totals do not sum up because missing data (Unreadable, no response and "*I don't know*" responses) were excluded.
[c]Comparisons of study groups made with Pearson's x2 test. P-values < 0.05 were considered significant.
[d]These questions were only applicable to Centers.
[e]Included respondents who had participated in CACFP in the past but not currently participating and those that had never participated in CACFP.

Procurement Characteristics by Type of Child Care and CACFP Status

Tables 3 and 4 show the procurement characteristics of survey respondents. **Table 3** shows the main shopping mode (Main Mode) of Centers and FHCCs, while **Table 4** shows where respondents shop most (Main Store) for the foods that they serve children under their care. Regarding the Main Mode, it is evident that both Centers and FHCCs prefer in-person shopping, regardless of CACFP participation (91% CACFP vs. 92% non-CACFP from the full sample). Equal percentages of CACFP and non-CACFP sites used online resources as their primary mode of purchase (7% respectively for CACFP and non-CACFP from the full sample). None of the FHCC respondents reported using phones as their preferred mode of shopping, but 6% CACFP Centers and 2% non-CACFP Centers reported using phones to shop. Both CACFP and non-CACFP Centers shop primarily at Megastores (Costco, Target, Walmart, Sam's Club) (41% CACFP Centers vs. 53% non-CACFP Centers). CACFP FHCCs use both Megastores as well as grocery stores (Albertsons, QFC, Safeway, Trader Joes etc.) at similar rates (31% Megastores vs. 34% Grocery Stores) while non-CACFP FHCCs primarily use Megastores (40%).

Table 3: Mode of shopping for WA child care programs by child care type[a]

	Full Sample[b] (N = 1,950)			Centers[b] (N = 690)			FHCCs[b] (N = 1,260)		
Main Mode of Shopping	**CACFP n (%)**	**non-CACFP n (%)**	**P-value[c]**	**CACFP n (%)**	**non-CACFP n (%)**	**P-value[c]**	**CACFP n (%)**	**non-CACFP n (%)**	**P-value[c]**
In-person	1,017 (91)	539 (92)		233 (71)	170 (80)		784 (100)	369 (100)	
Online	78 (7)	39 (7)	0.358	76 (23)	38 (18)	**0.038**	2 (0.3)	1 (0.3)	0.961
Phone	19 (2)	5 (1)		19 (6)	5 (2)		0 (0)	0 (0)	

[a]Only includes Centers and FHCCs that serve or cater at least one meal or snack to children ages 2-5.

[b]Column totals do not sum up because missing data (Unreadable, no response, "*I don't know*" and "*Not Applicable*" responses) were excluded.

[c]Comparisons of study groups made with Pearson's chi-2 test. P-values < 0.05 were considered significant.

Table 4: Main stores where WA child care programs purchase food by type of child care[a]

	Full Sample[b] (N = 1,950)			Centers[b] (N = 690)			FHCCs[b] (N = 1,260)		
Main Store for Shopping	**CACFP n (%)**	**non-CACFP n (%)**	**P-value[c]**	**CACFP n (%)**	**non-CACFP n (%)**	**P-value[c]**	**CACFP n (%)**	**non-CACFP n (%)**	**P-value[c]**
Megastores[d]	367 (32)	225 (35)		147 (41)	137 (53)		251 (31)	153 (40)	
No main Store	289 (25)	185 (29)		38 (11)	32 (12)		220 (27)	88 (23)	
Food Service Distributors[e]	109 (9)	28 (4)	**0.001**	109 (31)	28 (11)	**< 0.001**	0 (0)	0 (0)	**0.034**
Other[f]	16 (1)	7 (1)		0 (0)	2 (1)		16 (2)	5 (1)	
Grocery Stores[g]	321 (28)	172 (27)		48 (14)	53 (21)		273 (34)	119 (31)	
2 Stores & more	55 (5)	20 (3)		13 (4)	6 (2)		42 (5)	14 (4)	

[a]Only includes Centers and FHCCs that serve or cater at least one meal or snack to children ages 2-5.
[b]Column totals do not sum up to 1,950 because missing data (Unreadable, no response and "*I don't know*" responses) were excluded.
[c]Comparisons of study groups made with Pearson's x2 test. P-values < 0.05 were considered significant.
[d]Megastores = Costco, Target, Walmart, Sam's Club
[e]Food Service Distributors = Sysco, FSA, FSI, US Foods, URM, Amazon Fresh, UNFI, Charlie's Produce, NW Deli
[f]Other = Wildly Organic, Commissary, vendors, Farmers Markets
[g]Grocery stores = Albertsons, QFC, Safeway, Trader Joes etc.

Composite Nutrition Scores by Child Care Type and CACFP Status

Table 5 shows the mean and standard deviation (SD) of nutrition scores by content area as well as the Composite Nutrition Scores by child care type and CACFP status. Overall, the mean nutrition scores for all nutrition areas ranged between 3.37 (CACFP Centers Fruits & Vegetable score) and 4.51 (CACFP Centers Beverages score). The maximum score attainable was 5.00, which indicates meeting best practice standards. Nutrition scores for fruits and vegetables were not significantly different between Centers and FHCCs, regardless of CACFP participation (3.67±0.7 vs. 3.66±0.8, $P = 0.810$ for the full sample CACFP vs. non-CACFP). CACFP Centers have significantly higher nutrition scores for snack foods and sweets as compared to non-CACFP Centers (3.79±0.40 for CACFP Centers vs. 3.66±0.47 for non-CACFP Centers, $P < 0.001$). Non-CACFP Centers and FHCCs had substantially higher nutrition scores for fried foods and processed meats as compared to their CACFP counterparts ($P < 0.001$). Regarding beverages, CACFP sites score significantly higher compared to non-CACFP programs, both for Centers and FHCCs ($P < 0.001$). CACFP Centers and FHCCs performed markedly better in supporting healthy eating as compared to their non-CACFP counterparts ($P < 0.05$). Finally, CACFP sites have significantly higher overall Composite Nutrition Scores compared to non-CACFP sites, both for Centers and FHCCs ($P < 0.001$).

Table 5: Nutrition Scores by Content Area and Composite Nutrition Score by child care type and CACFP status[a]

Content Area	Full Sample[b] (N = 1,950)			Centers[b] (N = 690)			FHCCs[b] (N = 1,260)		
	CACFP (n = 1,198)	non-CACFP (n = 704)		CACFP (n = 378)	non-CACFP (n = 301)		CACFP (n = 820)	non-CACFP (n = 403)	
	Mean ± SD		P-value[c]	Mean ± SD		P-value[c]	Mean ± SD		P-value[c]
Fruits & vegetables	3.67±0.7	3.66±0.8	0.810	3.37±0.69	3.4±0.8	0.543	3.81±0.66	3.85±0.75	0.306
Snack foods & sweets	3.66±0.43	3.63±0.51	0.123	3.79±0.40	3.66±0.47	**< 0.001**	3.6±0.44	3.6±0.53	0.949
Fried foods & processed meat	3.7±0.68	4.07±0.81	**< 0.001**	3.93±0.65	4.39±0.7	**< 0.001**	3.6±0.67	3.84±0.82	**< 0.001**
Beverages	4.38±0.55	3.83±0.67	**< 0.001**	4.51±0.47	4.01±0.59	**< 0.001**	4.32±0.57	3.7±0.69	**< 0.001**
Supporting healthy eating	4.01±0.63	3.94±0.62	**0.028**	4.43±0.53	4.22±0.54	**< 0.001**	3.82±0.58	3.74±0.61	**0.042**
Composite score	3.90±0.36	3.81±0.41	**< 0.001**	4.01±0.33	3.9±0.39	**< 0.001**	3.85±0.35	3.74±0.42	**< 0.001**

[a]Only includes Centers and FHCCs that serve or cater at least one meal or snack to children ages 2-5.
[b]Table excludes respondents who did not respond to CACFP participation. 2% (n=42) FHCCs and Centers said "I don't know" and .3% (n=6) FHCCs and Centers had unreadable responses to CACFP participation.
[c]Comparison of study groups done using independent sample t-test and and analysis of variance. P-values < 0.05 were considered significant.

Nutrition Composite Scores by Key Socio-Demographic Measures

Table 6 reports the bivariate association of Composite Nutrition Scores and key socio-demographic variables as well as procurement characteristics among Centers and FHCCs. There was a significant association between Composite Nutrition Scores and key socio-demographics (race/ethnicity, education and years employed), child care program characteristics (child care type and CACFP enrollment) and procurement characteristics (main store for shopping and main mode of shopping). The Composite Nutrition Score decreased by 0.17 points among non-Hispanic Blacks when compared to non-Hispanic Whites ($P < 0.001$). Scores increased by 0.05 points among Hispanics when compared to non-Hispanic Whites ($P < 0.05$). There was a significant decrease in nutrition scores with lower levels of education ($P < 0.001$). Longer years of employment in ECE (> 20 years) significantly increased composite nutrition scores, only when compared to respondents who had 6 - 10 years of work in ECE ($P < 0.05$).

Program characteristics influence Composite Nutrition Scores in that Centers were associated with a 0.15 point increase in Composite Nutrition Score, compared to FHCCs ($P < 0.001$). The Composite Nutrition Score significantly decreased by 0.09 points for sites that did not participate in CACFP, when compared to CACFP sites ($P < 0.001$).

Both Main Mode and Main Store had relationships with Composite Nutrition Scores. Not having a Main Store reduced Composite Nutrition Score by a significant 0.05 points ($P < 0.05$), while shopping via a Food Service Distributor was significantly associated with a 0.18 point increase in Composite Nutrition Score when compared to buying food at Megastores ($P < 0.001$). Shopping at Grocery Stores was significantly associated with a 0.06 point decrease in Composite

Nutrition Score ($P < 0.05$) compared to purchasing food at Megastores. For Main Mode, online shopping was associated with a 0.26 point increase in Composite Nutrition Score, compared to in-person shopping ($P < 0.001$).

Table 6: Bivariate association of composite nutrition scores and key socio-demographic variables and procurement characteristics among child care Centers and FHCCs.

	Coef. (SE)	**P > |t|**
Mean Composite Nutrition Score	3.86	
Race/Ethnicity		
Non-Hispanic White	ref	
Non-Hispanic Black	-0.17 (0.04)	**<0.001**
Hispanic	0.05 (0.02)	**0.028**
Other Race[a]	-0.06 (0.03)	0.083
Education		
> Associate Degree	ref	
< High school	-0.14 (0.04)	**<0.001**
High school	-0.21 (0.03)	**<0.001**
Some college	-0.95 (0.02)	**<0.001**
Years Employed		
> 20 years	ref	
0 – 5 years	-0.05 (0.03)	0.055
6 – 10 years	-0.07 (0.03)	**0.006**
11 – 20 years	-0.04 (0.02)	0.136
Main Store for Shopping		
Megastores[b]	ref	
No main store	-0.05 (0.02)	**0.048**
Food Service Distributors[c]	0.18 (0.04)	**<0.001**
Other stores[d]	0.04 (0.08)	0.591
Grocery stores[e]	-0.06 (0.02)	**0.007**
> 2 stores	0.14 (0.05)	**0.001**
Main Shopping Mode		
In-person	ref	
Online	0.26 (0.04)	**<0.001**
Phone	0.11 (0.08)	0.17

Type of Childcare		
FHCC	ref	
Center	0.15 (0.02)	**<0.001**
CACFP Enrollment		
Enrolled	ref	
Not enrolled	-0.09 (0.02)	**<0.001**
Early Achievers		
Not enrolled	ref	
Enrolled	0.11 (0.02)	**< 0.001**
DSHS Subsidy		
> 1 family using subsidy	ref	
Does not accept subsidy	0.08 (0.02)	**< 0.001**
Accepts subsidy, but no families currently enrolled	-0.03 (0.02)	0.249

[a]Other race = Includes Asians, Pacific Islanders, American Indians, unique races and mixed races.
[b]Megastores = Costco, Target, Walmart, Sam's Club
[c]Food service distributors = Sysco, FSA, FSI, US Foods, URM, Amazon Fresh, UNFI etc.
[d]Other stores = Wildly Organic, Commissary, vendors, Farmers Markets
[e]Grocery stores = Albertsons, QFC, Safeway, Trader Joes, Winco etc, co-ops etc.
Bold data indicates significant p-value < 0.05.

Procurement Characteristics and Composite Nutrition Scores

Table 7 reports the multivariate analyses of composite nutrition scores with procurement variables (i.e., Main Store and Main Mode, the primary independent variables) and the Composite Nutrition Score (i.e., the dependent variable). Upon adjusting for race/ethnicity, education and years employed in Model 1, shopping at 2 or more main stores and online shopping were positively associated with Composite Nutrition Scores. Shopping at 2 or more main stores significantly increased Composite Nutrition Score by 0.14 points ($P < 0.05$), while online shopping significantly increased Composite Nutrition Score by 0.11 points ($P < 0.05$). In Model 2 (adjusted for race/ethnicity, education, years employed, and type of childcare), shopping at 2 or more main stores remained positively associated with higher Composite Nutrition Scores,

increasing Composite Nutrition Score significantly by 0.15 points ($P < 0.001$). Online shopping was still positively associated with Composite Nutrition Scores, although this relationship was no longer significant ($P = 0.074$). Finally, in Model 3 (adjusted for race/ethnicity, education, years employed, type of childcare, and CACFP participation), shopping at 2 or more main stores and online shopping were both positively associated with Composite Nutrition Scores. Shopping at 2 or more main stores increased Composite Nutrition Score significantly by 0.05 points ($P < 0.05$), while online shopping significantly increased Composite Nutrition Score by 0.10 points. ($P < 0.05$).

Table 7: Multivariable associations of composite nutrition scores with procurement characteristics (main store for shopping & main shopping mode) after adjusting for select covariates.

	Model 1 (n = 1,662)			Model 2 (n = 1,662)			Model 3 (n = 1,625)		
Procurement Characteristics	**Coef.**	**95% CI**	**p-value**	**Coef.**	**95% CI**	**p-value**	**Coef.**	**95% CI**	**p-value**
Main Store for Shopping									
Megastores[a]	ref			ref			ref		
No main store	-0.02	-0.06, 0.03	0.486	0.004	-0.04, 0.05	0.868	0.01	-0.04, 0.05	0.794
Food service distributors[b]	0.09	-0.01, 0.19	0.071	0.07	-0.03, 0.17	0.167	0.04	-0.06, 0.14	0.476
Other[c]	0.07	-0.09, 0.24	0.379	0.1	-0.06, 0.26	0.236	0.09	-0.07, 0.25	0.29
Grocery stores[d]	-0.04	-0.09, 0.01	0.093	-0.02	-0.07, 0.03	0.371	-0.02	-0.07, 0.03	0.409
>2 stores	0.14	0.05, 0.23	**0.003**	0.15	0.06, 0.24	**0.001**	0.14	0.05, 0.23	**0.002**
Main Shopping Mode									
In person	ref			ref			ref		
Online	0.11	0.02, 0.21	**0.015**	0.09	-0.01, 0.18	0.074	0.1	0.005, 0.19	**0.04**
Phone	-0.03	-0.20, 0.14	0.707	-0.06	-0.23, 0.11	0.515	-0.04	-0.21, 0.12	0.621

[a]Megastores = Costco, Target, Walmart, Sam's Club

[b]Food service distributors = Sysco, FSA, FSI, US Foods, URM, Amazon Fresh, UNFI etc.

[c]Other stores = Wildly Organic, Commissary, vendors, Farmers Markets

[d]Grocery stores = Albertsons, QFC, Safeway, Trader Joes, Winco etc, co-ops etc.

Model 1. Adjusted for race/ethnicity, education and years employed.

Model 2. Adjusted for race/ethnicity, education, years employed and type of childcare.

Model 3. Adjusted for race/ethnicity, education, years employed, type of childcare and CACFP enrollment.

Bold data indicates significant p-value < 0.05.

SECTION FOUR: DISCUSSION

This secondary analysis aimed to identify food procurement practices (i.e., food source and mode) across child care settings and by licensed Centers and FHCCs in WA state; and, to explore the relationships between food procurement practices and the nutritional quality of meals served to children in these settings. To our knowledge, this study was the first to look at child care food procurement practices, and the relationship between procurement practices and the nutritional quality of foods served in ECE settings.

First, in terms of food procurement sources, this study found that childcare programs use Megastores most, followed by Grocery Stores, regardless of CACFP participation. Megastores are typically larger than traditional markets and grocery stores, averaging 180,000 square feet (Demmler, Ecker, & Qaim, 2017; Taillie, Ng, & Popkin, 2016). These stores also stock a wide variety of food and nonfood products, unlike supermarkets or grocery stores, which primarily sell food items (Demmler et al., 2017; Taillie et al., 2016). Prices at Megastores are also typically the lowest in the market, averaging at 7% lower than grocery stores (Taillie et al., 2016). Our study shows that Grocery Stores are strong contenders of Megastores, and this may be because while Megastores offer more categories of products, these stores offer less assortment within these categories compared to traditional grocery stores, likely due to distinct marketing policies and strategies between these different retail platforms (Fox et al., 2016; Taillie et al., 2016). Grocery stores offer more than three times the variety of Megastores with the trade-off that there are fewer product categories in these type of stores (Fox et al., 2016). Although the average prices at Megastores are more stable and lower than grocery stores, the frequency of grocery

store promotion efforts and product variety within grocery stores makes this type of platforms very appealing to customers. Nonetheless, Fox et al. argue that the more extensive assortments of products within grocery store may be a double-edged sword, because this may increase shopping time, burdening shoppers who are short on time (Fox et al., 2016). Childcare providers at both Centers and FHCCs have cited time constraints as factor when it comes to purchasing choices (Otten et al., 2017). Fresh food typically takes longer to prepare and requires more staff time, automatically influencing the decision to buy fresh food to make from scratch or to purchase prepared food from food service distributors and caterers (Hirsch et al., 2016). Nonetheless, as childcare staff become more experienced and with the availability of appropriate kitchen appliances to prepare meals, the time allocation for food preparation becomes more efficient (Hirsch et al., 2016).

In this study, Food Service Distributors were less commonly used. The Farm to Table (F2T) Partnership which was funded by Public Health Seattle-King County had the goal of creating sustainable purchasing models for the senior meal and ECE settings found that purchases made through food service distributors had unique considerations. The partnership underlined that one challenge with procuring food through food service distributors was the issue of minimum orders, which can range from $100 per order for small distributors to $750 per order for large distributors (Mauden, 2012). According to the Partnership, the food service distributor model for ECE settings will work if ECE sites serve at least 20 meals, excluding snacks per day in addition to having storage space. While food service distributors may also offer the option of purchasing bulk items, this option may only appeal to larger national-chain ECE programs that have the space to store a significant quantity of items safely (Hirsch et al., 2016; Mauden, 2012). Previous

qualitative studies have found that multi-site Centers may have limited choice and autonomy when using food service distributors, due to centrally-established contracts with select vendors (Hirsch et al., 2016; Otten et al., 2017). Requesting local produce from food service distributors, for example, can be challenging since distributors have the final say in deciding what produce they purchase and when they purchase them (Mauden, 2012).

Second, in terms of food procurement mode, this study found that a vast majority of programs prefer in-person shopping. This is consistent with a 2015 National Bureau of Economic Research (NBER) working paper, which found that the proliferation of online retailers in the marketplace had not decreased the traditional in-person shopping mode (Hortaçsu & Syverson, 2015). The study found that while music and videos accounted for most of online retail, food and beverages accounted for the least; study authors concluded that physical in-person shopping is likely to stay the norm for the next couple of years, if not decades (Hortaçsu & Syverson, 2015). Brick and mortar stores offer the benefit of fulfilling immediate shopping needs without the need to pay for shipping, as well as providing a space for unique sensory experiences — smells, colors, and touch, which have yet to be replicated in the online world (The Nielsen Company, 2015). It also encourages shoppers to step out of their usual work and home environment, and benefit from human interactions (when shopping with another individual or when talking with a sales representative). Nielson also found that almost two-thirds of the global customer base enjoyed in-person shopping (The Nielsen Company, 2015).

In their qualitative study, Hirsch and Otten have found that most ECE programs were doubtful of purchasing food online (Hirsch et al., 2016; Otten et al., 2017). Interviews with several child care

directors and providers revealed that online shopping made product substitutions challenging, due to stocking issues and also because a retailer's notion of comparable food may not meet the child care director or providers' standards or legal requirement (Hirsch et al., 2016). The minimum requirements for online purchasing was another conundrum and was particularly tricky for FHCCs, due to limited storage spaces in these settings (Hirsch et al., 2016). Although we did not have data on the age of the providers in both Centers and FHCCs, it is possible that the older generation of child care providers may be more averse to online shopping. Globally, the Millennials (ages 21-34) and Generation Z (ages 15-20), who grew up in the age of digital technology, are more comfortable shopping online as compared to the older generations (The Nielsen Company, 2015).

Third, bivariate associations in these analyses indicate that socio-demographics, including race/ethnicity, education, and years employed in the childcare field impact the nutritional quality of foods served to children. Generally, caregivers and providers who have worked in ECE settings longer and those who have higher levels of education were associated with higher nutrition scores. This study found that FHCC providers had lower education levels as compared to Center caregivers, and this may be explained by the Washington Administrative Code (WAC) that requires different levels of education for Center directors and FHCC providers. While Center directors are required to have at least some college-level education in the area of early childhood and development, FHCC providers must have at minimum a high school diploma or equivalent education (Washington State Legislature, 2017a, 2017b). Although research generally supports that well-educated professionals promote high-quality ECE settings, the relationship between education and nutrition quality is complex, considering the various depth and breadth of how

education is gauged (i.e., education attainment, proficiency scores, critical thought, cognitive development etc.) (Cohen, Rai, Rehnkopf, & Abrams, 2014; Zimmerman, Woolf, & Haley, 2015).

It is conceivable that better education and training of child care providers leads to better nutrition outcomes in ECE settings, but this relationship is not necessarily linear (Zimmerman et al., 2015). Researchers have emphasized the importance of potential confounders and mediators such as race, class, gender, age, educational opportunity, workplace experiences, health care, and policy in understanding the relationship between education and health (Cohen et al., 2014). Child care providers in both Centers and FHCCs have the power to model healthy behaviors, and they can be encouraged to do this if they have the opportunity for education and training, particularly in the area of early childhood and development (Organisation for Economic Co-operation and Development (OECD), 2006). In WA state, the WAC specifies that both Center and FHCC caregivers must receive at least 10 hours of ongoing training annually (Washington State Legislature, 2017a, 2017b). A report published using the same dataset as this study found that more FHCCs had completed ongoing training (both State Training And Registry System (STARS) and non-STARS accredited) in the past three years when compared to Centers (University of Washington Center for Public Health Nutrition (CPHN), 2013). STARS is Washington's required training program for child care providers. US Food & Nutrition Services certainly see the importance of nutrition education and have equipped state agencies and local child nutrition operators with resources to advance further their efforts to promote nutrition education. Efforts include competitive training grants that awarded to state agencies to develop sustainable infrastructures for better nutrition and physical activity practices as well as online

resources such as the Healthy Meals Resource System, an online tool that offers locally developed nutrition education materials and a Directory of Chefs who offer to work in ECE settings to promote nutrition (Food and Nutrition Service, 2010). These efforts can be improved upon by better coordination of nutrition education efforts across Centers and FHCCs, and sustained collaboration between all stakeholders. Further research and evaluation of the efficacy of child care provider education and training in ECE settings would also be beneficial.

Fourth, this study found that CACFP enrollment is positively associated with the quality of nutrition in child care; other studies have reported a similar relationship (Korenman et al., 2013; Liu et al., 2016; Monsivais et al., 2011). In this study, CACFP sites had higher Nutrition Scores for beverages and for environments that support healthy eating, both for Centers and FHCCs. Nationally, CACFP serves 3.3 million children every day, and participating sites must comply with specific meal patterns to be eligible (United States Department of Agriculture (USDA), 2014). The literature shows that CACFP participation is positively associated with the consumption of milk and vegetables, as well as lower Body Mass Index (BMI), particularly among low-income children. State agencies that are invested in CACFP can promote nutrition best practice standards in ECE settings that participate in the program by providing continuous nutrition training and education (Food Research & Action Center (FRAC), n.d.-b; Sigman-grant et al., 2011). A national survey by Food Research Action & Action Center found that while all CACFP state agencies serving a total of 98% CACFP participants in the country offered nutrition education, only 63% required participation by CACFP sites (Food Research & Action Center (FRAC), n.d.-a). In WA, the OSPI provides technical support and mandatory annual training to new and currently participating Centers and FHCC sponsors. Sponsoring organizations are

responsible for monitoring all FHCCs that participate in CACFP and during their three times a year site visits, nutrition training is offered to FHCCs (University of Washington Center for Public Health Nutrition (CPHN), 2013). Efforts are also evident in other states like California, where the Department of Education launched a CACFP recognition program called Preschools Shaping Healthy Impressions through Nutrition and Exercise (SHINE) to enhance nutrition standards, mealtime environments and classroom nutrition education among other areas. ECE settings that aspire to become a SHINE site are required to complete an online training, attend Preschools SHINE Forums, conduct self-assessment of their environments, and establish relevant policies and practices (Food Research & Action Center (FRAC), n.d.-b). This suggests that CACFP offers a wealth of expertise and resources, and is an ideal program to improve to alleviate disparities in health outcomes (Food Research & Action Center (FRAC), n.d.-a, n.d.-b; Korenman et al., 2013; Liu et al., 2016). In this study sample, CACFP enrollment was less than 70%, both for Centers and FHCCs, indicating there is room for incorporating more sites into this program. Future research and efforts should focus on increasing child care program participation in CACFP to ensure that all children have access to nutritious food in ECE settings.

Finally, in terms of understanding the relationship between procurement characteristics and the nutritional quality of foods served in child care programs this analysis indicates that food procurement characteristics may not be predictors of nutritional quality of foods offered to children after taking into account key socio-demographic variables and child care program characteristics. This may be because caregivers depend on select retailers for specific products, are influenced by cost, and often change their main store preference based on sales promotions (Hirsch et al., 2016). Additionally, although online shopping was positively associated with

Composite Nutrition Score, the relationship became weaker as more socio-demographic variables were considered. This study is informative however, as it shows us where and how a majority of child care providers and caregivers procure the food that they serve to children, possibly informing interventions that might be aimed at food source and shopping mode.

Because CACFP has been so positively related to nutrition in child care settings, one way to use procurement information to improve nutrition might be through the use of nutrition labels and signage that indicate foods and beverages meet CACFP standards at locations where child care caregivers shop the most, such as Megastores and Grocery Stores. Evidence demonstrates that front of package (FOP) and simple shelf-labeling systems are beneficial to consumers, especially low-literacy populations (Gordon et al., 2014). In fact, customers desire support in purchasing healthy products, preferring information to be conveyed in a simple, straight-forward manner (i.e., shelf-labels identifying healthy products, in-store product sampling or tasting, healthy meal ideas and recipes, etc.) (The Food Trust & Robert Wood Johnson Foundation, 2011). However, there are currently no labels that are specific to child care, particularly regarding whether a particular item meets nutrition best practices. One label that exists for child nutrition programs, in general, is the Child Nutrition (CN) labeling, which is run by Food & Nutrition Service (FNS), in collaboration with commercial food processing firms and other USDA agencies. Unfortunately, this system of nutrition labeling does not identify which products are more nutritious (United States Department of Agriculture (USDA), 2017a). Instead, the CN label identifies merely if the contribution of a product toward meal pattern requirements, using yields from USDA's Food Buying Guide for Child Nutrition Programs (United States Department of Agriculture (USDA), 2017a, 2017b) Moreover, childcare programs are not federally-mandated to

purchase CN foods. Instead, purchasing decisions are locally determined (United States Department of Agriculture (USDA), 2017a). There is thus an opportunity here for childcare licensing departments, such as the Washington Department of Early Learning, to collaborate with Megastores and Grocery Stores to develop childcare-specific nutrition labels for foods that meet best practice standards to make purchasing decisions easier. Randomized control trials (RCTs) should be designed to investigate the effectiveness of this type of intervention and to establish policies.

Because the majority of participants used Megastores and Grocery Stores and shopped in-person, interventions aimed at in-store food retail environments may also be an important point of intervention. Evidence shows that retailers across the US are already working towards modifying their product offerings, in-store environments, and marketing strategies to make the healthy choice the easier choice. Effective marketing strategies have the potential to influence shoppers to think beyond price, focusing more on product benefits on the package and shelf-signage (The Food Trust & Robert Wood Johnson Foundation, 2011). Research has repeatedly shown that healthy diets cost more, amplifying socioeconomic inequalities in diet quality (Darmon & Drewnowski, 2015). We were not able to collect good data on food expenditures through this study, but future studies should focus on how governments and business industries can establish policies to ensure that high-quality diets are accessible to everyone at no additional cost.

More stores are willing to use wellness and health as a competitive strategy to attract customers. Some retailers have also hired Registered Dietitians (RDs) to conduct store tours to help customers understand how best to navigate the nutrition labeling systems to identify healthier

choices (Gordon et al., 2014; The Food Trust & Robert Wood Johnson Foundation, 2011). Financial incentives for childcare providers is another area worth exploring. Evidence from the Supplemental Nutrition Assistance Program (SNAP) has shown that the Healthy Incentives Pilot (HIP), a program that provides financial incentives to SNAP recipients at the point of sale in Hampden County, Massachusetts resulted in higher consumption of fruits and vegetables among SNAP recipients (Centers for Disease Control & Prevention (CDC), 2014). Thus, state and federal agencies should look into working with retailers and building partnerships to establish healthy retail initiatives.

Another area child care programs could gain traction in is the area of healthy procurement policies. There have been advances in regards to the development of healthy procurement standards and policies in several institutions that procure, distribute, sell and serve food to individuals to design more nutritious food environments. For example, the American Heart Association (AHA) established the Alliance for a Healthier Generation in high schools, to address childhood obesity. This alliance contracted with the beverage industry to eliminate full-calorie beverages, and evaluation studies have shown that an 88% fewer beverage calories had been delivered to schools across the country (Gardner et al., 2014). Childcare programs present an opportunity for similar strides. While there are federal CACFP procurement standards that offer guidelines for procurement of goods and services, these standards are geared more towards efficiency and economic benefits. Future research should look specifically at how these procurement standards could be designed for child care programs and identify areas in which nutritional outcomes can be improved. Additionally, child care licensing departments could develop healthy procurement policy toolkits that are specific to child care programs. Examples of

general toolkits that are publically available include the ChangeLab Solutions and CDC toolkits, both of which tap on the government's purchasing power to increase access to healthy food.

This study has several limitations. First, this study is cross-sectional, limiting our ability to draw causal conclusions between procurement characteristics and the nutritional quality of foods served in ECE settings. Second, there is a possibility of selection bias, since respondents who chose to answer the survey may differ from those who did not. Third, response bias may have also occurred as survey respondents might have wanted to portray their childcare programs positively. Although survey respondents were guaranteed confidentiality, fear of losing child care licenses may have also resulted in response bias. Center surveys were also filled out by the directors or main providers who might not be the staff members responsible for implementing the nutrition and procurement practices within their childcare programs. Fourth, sample size may have affected statistical associations. Although the WA State Child Care Survey had a large sample size, there were some categories in which results for FHCCs reached statistical significance but not Centers, perhaps due to the bigger sample size of FHCCs. Fifth, we were unable to incorporate food cost into the analyses. This variable may have moderated our findings and would have added strength to our multivariate analysis, given that food expenditures are known to impact nutrition. Although both the Center and FHCCs surveys asked respondents to indicate how much money they spent on food in the previous month, the responses were not plausible for a vast majority. This could have been due to poor wording and/or understanding of the question. Future surveys should pre-test cost questions to obtain information about food costs accurately. Finally, our ability to generalize the results of this survey to other states may be

limited, given that we only studied child care programs in WA, and that ECE regulations and licensing vary from state to state.

SECTION FIVE: CONCLUSION

This study identifies food procurement practices by licensed ECE programs in WA state. It also explores the association between childcare procurement practices and the nutritional quality of foods served to children under their care. Specifically, we found that both licensed Centers and FHCCs use Megastores most, followed by Grocery Stores. This study also found that Centers and FHCCs prefer in-person shopping compared to phone and online shopping modes. In bivariate analyses, provider socio-demographics, including race/ethnicity, education, and years of employment in childcare are associated with the nutritional quality of foods in childcare programs. Enrollment in CACFP is also positively associated with better nutrition in child care. Finally, this study found that food procurement characteristics may not be associated with the nutritional quality of foods offered in childcare programs, after taking into account key socio-demographic variables and child care program characteristics. However, by identifying where and how meals are purchased for childcare programs in WA state, this manuscript helps to illuminate potential points of intervention to improve access to healthy and affordable foods for ECE settings.

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