

**EXAMINING THE SOCIOCULTURAL, PHYSICAL, AND  
POLITICAL/ECONOMIC FOOD ENVIRONMENTS OF FAMILY CHILD CARE  
HOMES**

by  
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## ABSTRACT

**Background:** Nearly 23% of US-based young children aged 2-5 are overweight or obese. Since young children spend a majority of their time in child care where they consume most of the day's meals, a better understanding of the child care food environment is warranted. Evidence shows that children placed especially in Family Child Care Homes (FCCHs) are at increased risk of becoming overweight and/or obese. Yet, there isn't much research on examining the obesity promoting attributes of the FCCH environment. There is also limited research on how effective the United States Department of Agriculture's program entitled the Child and Adult Care Food Program (CACFP) is in meeting its intended goal of ensuring healthy food environments in child care.

**Purpose:** The purpose of this dissertation is to describe and examine the association between the sociocultural, physical and political/economic food environment and quality and frequency of foods offered to 2-5-year-old children in FCCHs.

**Design and Methods:** A cross sectional design was employed. 91 licensed FCCHs (69 CACFP, 22 non-CACFP) were surveyed by phone using a proportionate random sampling technique to reflect the proportion of CACFP FCCHs in Baltimore City.

**Findings:** CACFP participation status of FCCHs was associated with the sociocultural food environment. Additionally, the sociocultural food environment was positively associated with the frequency and quality of foods offered to children. These

significant relationships persisted when adjusted for provider level characteristics. CACFP participation status of FCCHs was not associated with the quality and frequency of foods offered. Providers who reported not having had nutrition training within the past year had lower physical food environment mean scores, even when controlling for CACFP participation status. There were no significant associations between the food desert status of a FCCH and the CACFP status of FCCHs as well as the quality and frequency of foods offered. No significant associations were found between the micro physical food environment of the FCCH and the quality and frequency of foods offered to 2-5-year-old children.

**Conclusions:** Non-CACFP FCCH providers should be targeted for enhanced training in fostering a positive mealtime environment and help to enhance what's available in the FCCH.

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## CHAPTER ONE: INTRODUCTION

### Background

Nearly 23% of young children aged 2 to 5 years in the United States are overweight or obese.<sup>1</sup> Young children from low income and ethnic minority families are even more likely to be obese, exceeding the national average of 8.4% for obesity in 2-5 year olds in the US.<sup>1,2</sup> Early childhood overweight and obesity presents great risk for many chronic diseases including adolescent and adult obesity,<sup>3</sup> Type 2 diabetes,<sup>4,5</sup> hypertension,<sup>6</sup> and obstructive sleep apnea.<sup>7</sup> Additionally, the financial burden of early childhood overweight and obesity is immense due to higher hospital expenses related to complications of elevated body mass index (BMI) in young children.<sup>8</sup>

Since more than a third of 2-5-year-old children spend many hours in non-relative early child care settings, such as center-based child care and family child care homes (FCCHs) where they receive about 2-3 meals including snacks and beverages each day,<sup>9,10</sup> coupled with recent evidence linking care in early child care settings with an increased risk of becoming overweight or obese, compared to children cared for by their parents,<sup>11-20</sup> the early child care setting becomes an important venue to spearhead obesity prevention efforts.<sup>21</sup> Studies that have included FCCHs as type of child care setting have shown that children placed in FCCHs are especially at increased risk for overweight or obesity.<sup>11,14,17</sup> However, few studies have examined the obesity-promoting or obesogenic attributes of the food environment and feeding behaviors of providers in FCCHs. Since family child care providers are the second largest provider of non-relative early child care, providing care to nearly 2 million children less than 5 years of age in a home environment outside the child's home<sup>10,22</sup> it is important to understand its food

environment and the quality and frequency of foods offered in this setting.

In an effort to promote healthy feeding environments in early childcare, the United States Department of Agriculture (USDA) funds States to subsidize the Child and Adult Care Food Program (CACFP). The CACFP reimburses eligible child care providers for purchase of nutritious foods. The program's dietary guidelines are based on the Dietary Guidelines for Americans which provides a framework for the type of meals and snacks that are offered to children.<sup>23</sup> Participating child care providers are required to keep an audit trail of foods purchased, food preparation, and foods served. If funds are available, providers of the CACFP attend nutrition training offered by a sponsoring agency. Nearly 30% of children who are enrolled in CACFP funded childcare are cared for by family child care providers.<sup>22</sup> In the state of Maryland, 75% of registered family child care providers participate in the CACFP program. The results of recent studies assessing the impact of the CACFP subsidy on feeding practices in childcare are mixed. Results from a longitudinal cohort study found that 4 year olds from low income families enrolled in CACFP had better eating practices and healthier BMIs than nonparticipating children with similar demographics.<sup>24</sup> One study, however, reported cross-sectional data that showed non-CACFP participating Head Start programs faring better than non-Head Start centers, regardless of CACFP status on the food environment and on several healthy feeding behaviors.<sup>25</sup> Nonetheless, little is known about how the CACFP impacts FCCHs since these studies did not include FCCHs. After a convened expert panel, the IOM proposed recommendations for new nutrition guidelines for several nutrition assistance programs including for the CACFP.<sup>23</sup> The new recommendations will take effect on October 2017 and will encourage healthier feeding environments and practices within the

child care setting. Specifically, the recommendations call for an increase in fruits, vegetables, and whole grain consumption and less consumption of fats, sugar and salts.

The purpose of this dissertation is to describe and examine the association between the physical, sociocultural and political/economic food environment and the quality and frequency of foods offered to 2-5-year-old children in FCCHs, with the understanding that poor provider feeding behavior is a modifiable risk factor for childhood overweight and/or obesity. This dissertation research is the first step towards a long-term goal of partnering with early childcare providers in ensuring that early childcare settings, such as FCCHs provide optimal food environments for young children.

### **Conceptual Framework**

The dissertation is guided by the ANGELO framework an acronym for the Analysis Grid for Environments Linked to Obesity, which conceptualizes, identifies obesogenic environmental attributes within the physical, sociocultural, political and economic environment. The purpose of the framework is to prioritize intervention areas to increase policy and environmental change that would support healthy practices thereby reducing the risk for obesity. The ANGELO framework divides the obesogenic environment by level (micro and macro) and by type of environment (physical, sociocultural, political and economic).<sup>26</sup> The ANGELO framework has been used to guide obesity related studies both nationally and internationally. For example, the ANGELO framework has been used in several studies to help identify environmental factors that lead to obesity and chronic diseases in both the local community<sup>27,28</sup> and specialty settings such as psychiatric hospitals.<sup>29</sup> The ANGELO framework has also

been used to evaluate environmental action plans initiated by community boards to address obesity<sup>30</sup>, used to guide instrument development aimed at examining the obesogenicity of environments<sup>31</sup> and used to develop interview guides to elicit information on implementation of nutrition policy implementation in schools.<sup>32</sup> Finally, the ANGELO framework has been used as an organizing framework for systematic reviews that explore the environmental determinants of physical activity in adults and youth<sup>33-39</sup> and dietary behaviors in youth.<sup>40,41</sup> Figure 1 below is the adapted ANGELO framework for this study.

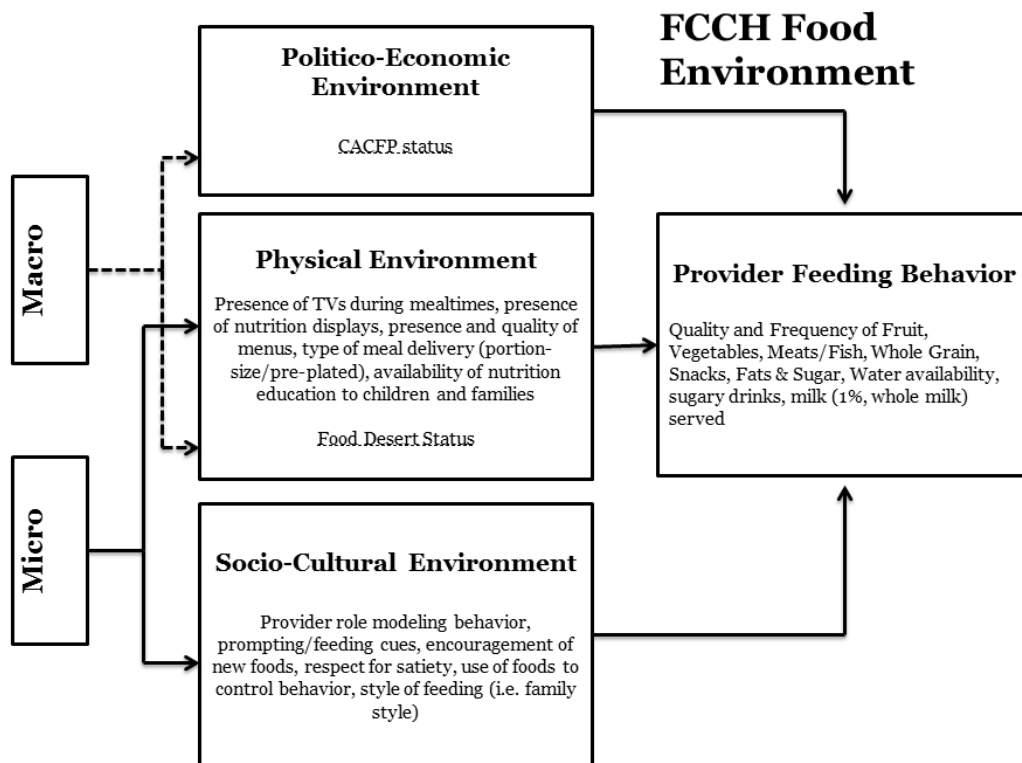


Figure 1. Adapted ANGELO framework for this study

The early childcare food environment is defined as the physical, sociocultural, political and economic environment. It is considered to be obesogenic when it promotes unhealthy behavior and increases risk for obesogenic behaviors, consequently increasing

the risk for overweight and/or obesity among young children. This definition was derived from Swinburn's definition, which conceptualizes the obesogenic environment as the "sum of influences that the surroundings, opportunities, or conditions of life have on promoting obesity in individuals or populations."<sup>26</sup>

Applying the ANGELO framework, the food environment of FCCHs was assessed along 3 domains of influence: the **sociocultural** (i.e. provider role modeling behavior, prompting/feeding cues, encouragement of new foods, respect for satiety, use of foods to control behavior, style of feeding (i.e. family style), the macro and micro **physical** (i.e. presence of TVs during mealtimes, presence of nutrition displays, presence and quality of menus, type of meal delivery (portion size/ pre-plated), availability of nutrition education to children and families and FCCH neighborhood food desert status), and **political/economic** (FCCH CACFP participation status) environments and the **family child care providers' feeding behavior**, namely the quality and frequency of foods offered to 2-5 year olds in the FCCH.

The childcare food environment literature suggests provider characteristics such as provider race/ethnicity, BMI, level of nutrition training, level of education and years of child care experience as a licensed family child care provider influence either provider's attitudes towards providing nutritious foods or providers' feeding practices within the child care setting.<sup>42,43-46</sup> For example, Hispanic child care providers were more likely to report forcing children to eat and to cook foods they knew children liked and were less likely to eat meals with the children.<sup>45</sup> Family child care providers with nutrition training within past year were more likely to disseminate healthy nutrition information to children and obesity prevention information to parents.<sup>44</sup> Providers with a higher level of

education were more likely not to pressure children to eat more food and were more likely to eat at the table with the children.<sup>42,45</sup> Child care providers who had more years of child care experience were more likely to report feeling responsible for communicating with parents concerning healthy eating.<sup>46</sup> Hence, in addition to food environment and feeding behaviors, measures of these provider level characteristics were also collected to assess for potential confounding.

### **Specific Aims**

The purpose of this dissertation is to describe and examine the association between the physical, sociocultural and political/economic food environment and the quality and frequency of foods offered to 2-5-year-old children in FCCHs. To this end, the specific aims were to:

**Specific Aim 1:** Describe the physical, sociocultural, political/economic food environment and the quality and frequency of foods offered to 2-5-year-old children in FCCHs.

**Specific Aim 2:** Compare the physical, sociocultural food environment and the quality and frequency of foods offered to 2-5-year-old children in non-CACFP and CACFP participating FCCHs

*Hypothesis 2.1:* CACFP funded FCCHs will have healthier food environments and feeding behaviors compared to non-CACFP FCCHs



**Specific Aim 3:** Evaluate the relationship between the food environment (physical and sociocultural food environment) and the quality and frequency of foods offered to 2-5-year-olds children, while adjusting for selected covariates

*Hypothesis 3.1:* An obesogenic physical food environment is positively associated with obesogenic feeding behaviors among family child care providers.

*Hypothesis 3.2:* An obesogenic sociocultural food environment is positively associated with obesogenic feeding behaviors among family child care providers

### **Significance**

This dissertation is one of the very few studies to provide information on the state of the food environment and feeding behaviors in FCCHs and is the first study to do so in Maryland. The high rate of obesity among young children throughout the country, including Maryland coupled with pending updated CACFP guidelines, are convincing evidence that there is an urgent need for a baseline data that will enable us to assess the impact of the new nutrition guidelines.

### **Dissertation Organization**

This dissertation is organized into 5 chapters. The first chapter provides an introduction to the study, informing with a background, detailing the purpose, specific aims, and significance of the dissertation. The second chapter is the first manuscript which is a

literature review that synthesizes the assessment of the obesogenic attributes of the FCCH environment. The third chapter is the second manuscript. This paper examines the sociocultural food environment of FCCHs and its relationship to the quality and frequency of foods offered to 2-5-year-old children. The fourth chapter is the third manuscript which examines the physical food environment inside and outside of FCCHs and its association with the quality and frequency of foods offered to 2-5-year-old children. Chapter 5 provides a summary of findings highlighting the dissertation's significance and implications for nursing research, practice and policy.

## References

1. Ogden, C. L., Carroll, M. D., Kit, B.K., & Flegal, K. M. (2014) Prevalence of childhood and adult obesity in the United States, 2011-2012. *Journal of the American Medical Association*, 311(8), 806-814.
2. Dalenius K, Borland E, Smith B, Polhamus B, Grummer-Strawn L. (2012) *Pediatric Nutrition Surveillance 2010 Report*. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention
3. Cunningham SA., Kramer MR. and Venkat KM. (2014) Incidence of childhood obesity in the United States. *NEJM*, 370(5), 403-411
4. Fagot-Campagna A, Pettitt DJ, Engelgau MM *et al.* (2000) Type 2 diabetes among North American children and adolescents: an epidemiologic review and a public health perspective. *J. Pediatr.* 136(5), 664–672
5. Ludwig DS, Ebbeling CB. (2001) Type 2 diabetes mellitus in children: primary care and public health considerations. *JAMA*, 286(12), 1427–1430
6. Din-Dzietham R, Liu Y, Bielo MV, Shamsa F. (2007) High blood pressure trends in children and adolescents in national surveys, 1963 to 2002. *Circulation* 116(13), 1488–1496
7. Redline S, Tishler PV, Schluchter M, Aylor J, Clark K, Graham G. (1999) Risk factors for sleep-disordered breathing in children. Associations with obesity, race, and respiratory problems. *Am. J. Respir. Crit. Care Med.* 159(5 Pt 1), 1527–1532

8. Leonardo Trasande, Brian Elbel (2012) The Economic Burden Placed on Healthcare Systems by Childhood Obesity. *Expert Rev Pharmacoeconomics Outcomes Res*, 12(1):39-45
9. US Census *Who's Minding the Kids? Child Care Arrangements: Spring 2011*
10. *Interagency Forum on Child and Family Statistics. America's children: key national indicators of well-being, 2013. Washington, DC: Interagency Forum on Child and Family Statistics*
11. Benjamin SE, Rifas-Shiman SL, Taveras EM, Haines J, Finkelstein J, Kleinman K, et al. (2009) Early childcare and adiposity at ages 1 and 3 years. *Pediatrics*, 124:555-62
12. Kim J, Peterson KE. (2008) Association of infant childcare with infant feeding practices and weight gain among US infants. *Arch Pediatr Adolesc Med*, 162:627-33
13. Lumeng JC, Gannon K, Appugliese D, Cabral HJ, Zuckerman B. (2005) Preschool childcare and risk of overweight in 6- to 12- year-old children. *Int J Obes Relat Metab Disord*, 29:60-6
14. Maher EJ, Li G, Carter L, Johnson DB. (2008) Preschool childcare participation and obesity at the start of kindergarten. *Pediatrics*, 122:322-30
15. McGrady M, Mitchell M, Theodore S, Sersion B, Holtzapple E. (2010) Pre-school participation and BMI at kindergarten entry: the case for early behavioral intervention. *J Obesity*, 2010:1-6

16. Geoffroy MC, Power C, Touchette E, Dubois L, Boivin M, Seguin JR, Tremblay RE et al. (2013) Childcare and Overweight or Obesity over 10 years of follow-up. *J Pediatr*, 162(4):753-758.e1
17. McLaren L, Zarrabi M, Dutton DJ, Auld MC, Emery JCH. (2012) Child care: implications for overweight/obesity in Canadian children? *Chronic Diseases and Injuries in Canada*, 33(1)
18. Lin SL, Leung GM, Hui LL, Lam TH, Schooling CM. (2011) Is informal child-care associated with childhood obesity? Evidence from Hong Kong's "Children of 1997" birth cohort. *Int J Epidemiol*, 40:1238-46
19. Gubbels JS, Kremers SPJ, Stafleu A, Dagnelie PC, de Vries NK, van Buuren S, et al. (2010) Childcare use and the association with body mass index and overweight in children from 7 months to 2 years of age. *Int J Obes*, 34:1480-6
20. Pearce A, Li L, Abbas J, Ferguson B, Graham H, Law C. (2010) Is childcare associated with the risk of overweight and obesity in the early years? Findings from the UK Millennium Cohort Study. *Int J Obes*, 34:1160-8
21. Kaphingst KM, Story M. (2009) Child care as an untapped setting for obesity prevention: state child care licensing regulations related to nutrition, physical activity, and media use for preschool-aged children in the United States. *Prev Chronic Dis*, 6(1). [http://www.cdc.gov/pcd/issues/2009/jan/07\\_0240.htm](http://www.cdc.gov/pcd/issues/2009/jan/07_0240.htm). Accessed [date].
22. <http://www.urban.org/UploadedPDF/412343-Child-Care-Choices.pdf>
23. Yaktine AL. and Murphy SP (2013) Aligning nutrition assistance programs with the Dietary Guidelines for Americans. *Nutrition Reviews*, 71(9):622-630

24. Korenman S, Abner KS, Kaestner R, Gordon RA (2013) The Child and Adult Care Food Program and Nutrition of Preschoolers. *Early Child Res Q.* 28(2):325-336
25. Dev DA., McBride BA., The Strong Kids Research Team (2013) Academy of Nutrition and Dietetics Benchmarks for Nutrition in Child Care 2011: Are Child-Care Providers across Contexts meeting recommendations?
26. Swinburn B, Egger G, Raza F. (1999) Dissecting Obesogenic Environments: The development and application of a framework for identifying and prioritizing environmental interventions for obesity. *Preventative Medicine*, 29, 563-570 (26)
27. Raine, KD, Plotnikoff, R., Nykiforuk C., Deegan H., Hemphill E., Storey K., Schopflocher D., Veugelers P., Cameron T., Ohinmaa A. (2010) Reflections on community-based population health intervention and evaluation for obesity and chronic disease prevention: the Healthy Alberta Communities project. *Int J Public Health*, 55:679-686
28. Simmons A., Mavoia HM., Bell AC., Courten M., Schaaf D., Schultz J., and Swinburn BA. (2009) Creating community action plans for obesity prevention using the ANGELO (Analysis Grid for Elements Linked to Obesity) Framework. *Health Promotion International*, 24(4)
29. Faulkner G., Gorczynski P., Cohn TA. (2009) Psychiatric Illness and Obesity: Recognizing the “Obesogenic” Nature of an Inpatient Psychiatric Setting. *PSYCHIATRIC SERVICES*, 60(4)

30. Porter CM. (2013) Community Action to Prevent Childhood Obesity: Lessons from Three US Case Studies. *Childhood Obesity*, 9(2)
31. Hales D., Vaughn AE., Mazzucca S., Bryant MJ., Tabak RG., McWilliams C., Stevens J., Ward DS. (2013) Development of HomeSTEAD's physical activity and screen time physical environment inventory. *International Journal of Behavioral Nutrition and Physical Activity*, 10(132)
32. Vine MM and Elliott SJ. (2013) Examining local-level factors shaping school nutrition policy implementation in Ontario, Canada. *Public Health Nutrition*: 17(6), 1290–1298
33. Wendel-Vos W., Droomers, M., Kremers S., Brug J., van Lenthe F. (2007) Potential environmental determinants of physical activity in adults: a systematic review. *Obesity reviews*, 8, 425-440
34. Ferreira I., van der Horst K., Wendel-Vos W., Kremers S., van Lenthe FJ., and Brug J. (2006) Environmental correlates of physical activity in youth- a review and update
35. Saimon R., Choo WY., Bulgiba A. (2013) "Feeling Unsafe": A Photovoice Analysis of Factors Influencing Physical Activity Behavior Among Malaysian Adolescents. *Asia Pac J Public Health* DOI: 10.1177/1010539513480229
36. Bosdriesz JR., Witvliet MI., Visscher T., Kunst AE. (2012) The influence of the macro-environment on physical activity: a multilevel analysis of 38 countries worldwide. *International Journal of Behavioral Nutrition and Physical Activity*, 9:110

37. De Meester, F., van Lenthe FJ., Spittaels H., Lien N., De Bourdeaudhuij I (2009) Interventions for promoting physical activity among European teenagers: a systematic review. *International Journal of Behavioral Nutrition and Physical Activity*, 6:82
38. Hennessy E., Kraak VI., Hyatt RR., Bloom J., Fenton M., Wagoner C., Economos CD. (2010) Active Living for Rural Children Community Perspectives using Photovoice. *American Journal of Preventive Medicine*, 39(6) 537–545
39. Belon AP., Nieuwendyk LM., Vallianatos H., Nykiforuk CJ. (2014) How community environment shapes physical activity: Perceptions revealed through the PhotoVoice method. *Social Science & Medicine*, 116 (2014) 10e21
40. Van der Horst K., Oenema A., Ferreira I., Wendel-Vos W., Giskes K., van Lenthe F., Brug J. (2007) A systematic review of environmental correlates of obesity-related dietary behaviors in youth. *Health Education Research*, 22 (2), 203-226
41. Lofink HE. (2012) ‘The worst of the Bangladeshi and the worst of the British’: exploring eating patterns and practices among British Bangladeshi adolescents in East London. *Ethnicity and Health*, 17(4)
42. Brann LS. (2010) Child-Feeding Practices and Child Overweight Perceptions of Family Day Care Providers Caring for Preschool-aged Children. *Journal of Pediatric Health Care*, 24:5
43. Lanigan JD (2012) The Relationship between Practices and Child Care Providers’ Beliefs Related to Child Feeding and Obesity Prevention. *J Nutr Educ Behav*, 44:521-529



44. Kim, J., Shim, E.J., Wiley, A.R., Kim, K., McBride, BA (2012) Is there a difference between center and home care providers' training, perceptions, and Practices Related to Obesity Prevention? *Matern Child Health J*, 16:1559-1566
45. Freedman, MR, Alvarez, KP (2010) Early Childhood Feeding: Assessing Knowledge, Attitude, and Practices of Multi-Ethnic Child-Care Providers. *J Am Diet Assoc*. 110:447-451
46. Chika S., Shultz AJ., Johnson SL., Branen LJ., Fletcher JW. (2011) Attitudes, Concerns, and Likelihood for Action Related to Young Children's Overweight Among Early Childhood Program Staff. *Fam Community Health*, 34:4, 291-300

## **CHAPTER TWO: Examining the Obesogenic Attributes of the Family Child Care Home Environment: A Literature Review (Manuscript One)**

**Working Title:** Examining the Obesogenic Attributes of the Family Child Care Home Environment: A Literature Review

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**Abstract:** The purpose of this review is to assess the obesogenic attributes of the family child care home (FCCH) environment. We conducted a search of the PubMed, Embase, CINHAL, and PsycINFO electronic databases. The search identified a total of 3,281 citations and 35 citations were eligible for full-text review. We included 21 articles from 20 studies in this review. The Environmental Research framework for weight gain prevention (EnRG) framework was used to classify the studies. This review demonstrates that there is a lack of nutrition, physical activity, and sleep- related child care regulations for FCCHs across all US states as well as a lack of comprehensive FCCH policies. Family child care home providers are not highly trained in nutrition and physical activity best practices and few FCCHs have adequate equipment and space for indoor and outdoor playtime activities. Interventions addressing authoritative and controlling feeding practices, improving communication between provider and families, and addressing poor nutrition related beliefs and perceptions are necessary.

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## **Introduction**

Although young children 2-5 years of age in the United States have experienced a decline in obesity, from 13.9% in 2004 to 8.4% in 2012, the prevalence of overweight or obesity continues to be alarmingly high with 22.8% of young children classified as overweight or obese.<sup>1</sup> Young children from low-income and ethnic minority families are even more likely to be obese.<sup>1,2</sup> A total of 16.7% Hispanics and 11.3% non-Hispanic Blacks are obese, compared to 3.5% non-Hispanic white and 3.4% Asian 2-5 year olds. In 2014, data from the Centers for Disease Control and Prevention show that 14.5% of low income 2 to 4 year olds who participated in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) were obese<sup>2</sup>.

Obesity among young children is problematic due to the greater likelihood of developing high blood pressure,<sup>3</sup> glucose intolerance<sup>4</sup> and poor sleep<sup>5</sup> all of which influence the risk for heart disease. Additionally, high hospital expenses related to complications of elevated body mass index in young children have contributed to increasing financial burdens.<sup>6</sup>

Much attention has been given to energy-balance related causes of obesity that are amenable to effective prevention interventions.<sup>7</sup> To effect change in reducing childhood obesity, a greater understanding of the environment in which children spend the majority of their time is imperative.

Parents of young children aged 2-5 years rely on early child care on a regular basis.<sup>8</sup> Although most children are placed in center-based child care or cared for by relatives, nearly 2 million young children in the US are placed in FCCHs which provide nonrelative care in a home setting outside the child's home.<sup>8</sup> Children placed in these settings eat 2-3 meals including beverages each day and have opportunities for physical

activity. Evidence suggests that children in FCCHs are at increased risk for becoming overweight or obese.<sup>9-11</sup> However, little is known about how the FCCH environment relates to childhood overweight or obesity. Although most research related to child care and obesity has concentrated on center-based childcare, research on the obesogenic attributes of the FCCH environment is emerging. There are no reviews to date that have synthesized the literature on the FCCH environment. The purpose of this review is to examine the attributes of the obesogenic environment of US-based FCCHs.

## **Methods**

### **Search Strategy & Eligibility Criteria**

We searched the following electronic databases for relevant articles published in English between 2006 and 2016: MEDLINE via PubMed, EMBASE via Elsevier, CINAHL via EBSCOhost, and PsycINFO via EBSCOhost. We used the keywords and controlled vocabulary terms in the following concept groups (child care OR family child care homes OR day care OR home-based day care OR child care centers) AND (obesity OR overweight) to identify candidate studies for review. We chose to review articles since 2006 coinciding with a landmark commentary on the role of child care settings in obesity prevention, highlighting the need to focus on FCCHs<sup>12</sup>. The final search for each database was conducted on August 8th, 2016. Studies were eligible for inclusion if they were US-based, child care studies in peer-reviewed journals that included an environmental assessment of FCCHs and focused on FCCHs that cared for children age 2-5 years. Non-pilot intervention studies that provided results for the assessment of the environment pre-intervention and studies that compared the environments of FCCHs and other types of nonrelative child care settings, including center based facilities, were also

included. We excluded studies that focused on parental home settings. All search terms regarding the type of child care were used because FCCHs are described in many different ways (i.e. child care homes, home-based daycare). We also aimed to resolve any confusion of child care terms such as preschools operating out of homes. Finally, we included studies that compared FCCHs to other types of nonrelative child care settings.

### **Screening Process**

The screening process occurred in two waves. In the first wave, titles, abstracts, and occasional full-text were screened to determine eligibility regarding US-based nonrelative child care studies in which the environment was assessed for children 2-5 years of age. In the second wave, titles and abstracts identified for inclusion from the first wave were further screened to identify studies that only included FCCHs and assessed the environment of the FCCH setting. This included non-pilot intervention studies that provided results for the assessment of the FCCH environment pre-intervention, and studies that compared the environments of FCCHs to other types of nonrelative child care settings. Any discordant reviews concerning eligibility were discussed and resolved. Articles identified from the second wave of screening were eligible for full-text review.

### **Data Abstraction**

Articles identified for full-text review were examined for eligibility for inclusion in this review. Data from full-text articles eligible for inclusion were abstracted and included

information on authorship, year of publication, the location of study, and provider level and child level demographic information (i.e. sample size, race/ethnicity, level of education, age, body mass index). Additionally, we abstracted information on the status of FCCHs based on their participation in the Child and Adult Care Food Program (CACFP), a subsidy program through the USDA which provides reimbursements to eligible providers for purchase of nutritious foods. Finally, assessment findings of the FCCH environment were recorded.

### **Classification of studies**

The articles included in the review were further classified using the Environmental Research framework for preventing weight gain (EnRG), an innovative framework grounded in behavior-change-ecological theory.<sup>14</sup> EnRG consists of 2 frameworks. The first is the ANGELO Framework which we used to classify the obesogenic attributes within the physical (what's available in and outside the FCCH, including education and training opportunities), socio-cultural (i.e. culture around feeding practices, mealtime environment), and policy/economic (child care regulations or policies to ensure best practices and to prevent obesity in the FCCH) environment.<sup>15</sup> The second is the Theory of Planned Behavior (TPB) which we used to classify articles that assessed the environment related to provider attitudes, beliefs and perceptions<sup>16</sup>. These articles were organized by matching the terms and definitions used to the TPB concepts; *Attitudes* (behavioral beliefs about consequences or expected outcomes), *Subjective Norm* (normative beliefs or perception of beliefs held by most FCCH providers), *Perceived*

*Behavioral Control* (perceived level of control to ensure best practices or perceived factors that may serve as enablers or barriers to engaging in best practices) and *Behavioral Intent* (strategies that are put in place to ensure that providers provide quality environments for the children in their care) regarding energy balance related behaviors (EBRBs). EBRBs refer to any activity that influences children’s weight in the FCCH setting. Provider and child level demographic information, including the CACFP status of the FCCHs were classified as potential demographic moderators.

## **Results**

### **Results of Search**

The summary of the search and screening results is shown in a flow diagram in **Figure 2**. A total of 3,281 records were identified from the 4 databases searched. A total of 687 duplicate records were removed, and the titles of the remaining 2,594 records were screened in wave 1 for eligibility. A total of 103 records identified through wave 1 were screened for further eligibility. Of 103 records, 35 studies were identified for full-text review. Fourteen articles were excluded and 21 articles were included in the review. The 21 articles eligible for inclusion reported results from 20 studies.

### **Study population**

The results abstracted from the studies are summarized in **Table 1** and **Table 2**. **Table 1** displays the physical, socio-cultural and policy/economic FCCH environment assessment results. **Table 2** displays the results from studies that assessed the FCCH environment related to providers’ attitudes, beliefs and perceptions. Per eligibility criteria, all articles



included in this review involved FCCHs and assessed the environment.<sup>17-37</sup> Eight studies focused solely on FCCHs or FCCH providers, meaning these studies did not include other types of child care facilities.<sup>18,23,26,29,32-35</sup>

Six studies examined both the nutrition and physical activity environment.<sup>17,24,25,31,34,35</sup>

Four studies focused only on the nutrition environment<sup>27,28,32,36</sup> while three focused only on the physical activity environment.<sup>20,26,30</sup> One study examined the sleep environment.

<sup>37</sup> Six studies examined TPB related beliefs.<sup>18,19,22,23,29,33</sup> Four of these studies used qualitative methods such as focus groups<sup>19,23,33</sup> and an in-depth interview.<sup>29</sup> Only five studies included FCCHs participating in the Child and Adult Care Food Program (CACFP),<sup>26-28,35,36</sup> with 3 studies having majority (~80%) CACFP FCCHs.<sup>26,35,36</sup> Of the studies that reported the race and/or ethnicity of the providers or the children they serve, 50% (4/8) reported having majority Hispanic providers and/or children.<sup>21,23,25,33</sup> Three studies had majority white providers<sup>18,26,29</sup> and only 1 study involved providers who were majority African-American.<sup>32</sup> Of the studies that reported level of education, all (7/7) reported the majority of providers to have a high school degree or GED and/or some college.<sup>18,23,26,30,31,35</sup> Two studies reported provider's weight status; most were overweight or obese.<sup>18,32</sup> Two studies reported children's weight status; most were of normal weight with 20-30% obese.<sup>26,32</sup>

## **Policy Environment**

Six studies examined the policy environment regarding FCCHs.<sup>17,20,24,34,35,37</sup> Three of these studies focused on reviewing US child care regulations that would influence energy balance behaviors.<sup>17,20,37</sup> These policy reviews showed that there is a lack of nutrition, physical activity and sleep regulations across all 50 states and territories for FCCHs. For example, in 2007, only 7 states had regulations regarding restricting sugar-sweetened beverages and restricting foods of low nutritional value in FCCHs.<sup>17</sup> Although most states had policies prohibiting forcing children to eat, only 10% of the states had policies prohibiting providers to use food as a reward.<sup>17</sup> Most states had at least 1 regulation related to physical activity; only 2 states however, did not require a policy for TV viewing and only 3 states required a specific amount of time dedicated to physical activity in FCCHs.<sup>17,20</sup> US child care regulations for physical activity do not align with the Institute of Medicine's (IOM) current child care recommendations.<sup>20</sup> Finally, a review of child care regulations compared to recommendations from the Institute of Medicine (IOM) related to sleep showed that out of the four IOM recommendations (create environments that ensure restful sleep, encourage sleep-promoting behaviors and practices, encourage practices that promote child self-regulation of sleep, and seek consultation yearly from an expert on healthy sleep durations and practices), no states had regulations for all 4 or 3 of the sleep recommendations. Ten states had regulations for 2 of the IOM recommendations. Thirty one states had regulations related to encouraging practices that promote self-regulation. Eleven states had recommendations related to providing restful sleep environments. Only one state, Virginia, had regulations regarding encouraging sleep promoting behaviors and practices<sup>37</sup>.

FCCH providers have the opportunity to have their own written nutrition, physical

activity, and sleep policies. Three studies showed that few FCCH providers have comprehensive written policies on nutrition and physical activity.<sup>24,34,35</sup> Few have written policies regarding best practices related to beverages, use of food as reward or punishment, encouragement for consumption of healthy foods and foods purchased for celebratory events.<sup>24,34</sup>

### **Physical Environment**

Seven studies assessed the physical environment in FCCHs.<sup>25,27,28,30,32,34,35</sup> Although more FCCH providers provided nutrition education to children, compared to center-based providers (44 vs. 27 %,  $p = 0.01$ ),<sup>24,25</sup> one study shows that few FCCH providers used books or games with nutrition themes in their delivery of nutrition education.<sup>34</sup> In one study, no FCCH providers used the services of a dietitian to plan their menus,<sup>27</sup> and 44.8% of FCCH providers made water readily accessible indoors and outdoors, compared to 73.1% of centers.<sup>28</sup> Less than half of FCCH providers received adequate nutrition and physical activity training one or more times a year.<sup>34</sup> Two studies showed that the FCCH's physical activity environment was not optimal and supportive for indoor and outdoor play time.<sup>30,34</sup> For example, in one study, 76% FCCHs had a variety of fixed play and 86% portable play equipment, when compared to center-based centers, 89% and 95%, respectively.<sup>30</sup> Additionally, in one study, 71% of FCCHs rely on television for part or most of the day.<sup>30</sup> Finally, one study showed that only about 22% of FCCH providers had physical activity displays such as posters, pictures or books about physical

activity.<sup>34</sup>

### **Sociocultural Environment**

Only three studies examined the socio-cultural environment in the FCCH setting.<sup>21,32,34</sup>

In one study, trained data collectors conducted observations of the FCCH nutrition environment. Analyses of the data showed that FCCH providers frequently praised the children for trying new foods and eating healthy foods. However, in response to children's mealtime behaviors, providers used both best practices and coercive controlling practices (i.e. insistence, pressuring, and threats) when responding to children's verbal and non-verbal refusals of food, and the verbal and non-verbal acceptance of food.<sup>32</sup> In 85 of the interactions observed related to the providers' response for seconds, providers responded with coercive controlling practices, especially during lunch times.<sup>32</sup> Providers also pressured their children to "clean their plates" before offering seconds of certain foods.<sup>32</sup> In one study, only 27percent of FCCH providers provided family style meals.<sup>34</sup> In terms of physical activity, 62.7percent of FCCH providers restricted play time for misbehavior.<sup>34</sup>

### **Theory of Planned Behavior**

There were six articles that addressed beliefs related to attitudes, subjective norm, perceived behavioral control and behavioral intent.<sup>18,19,22,23,29,33</sup> The beliefs described in

the articles were closely matched with the relevant TPB concepts. This was done by carefully reviewing the definitions of the concepts and how they were measured and matching the terms to the TPB related concept. Results are summarized in **Table 2**.

### ***I. Attitudes***

Overall, two studies show that there were poor attitudes among providers regarding parents and the parent's role in fostering a healthy environment in the FCCH setting.<sup>23,29</sup> For example, providers believe communication with parents is important to get a better understanding of the child's well-being at home, but were left frustrated and were reluctant to discuss a child's weight status with parents because of the fear of offending parents.<sup>23</sup> FCCH providers felt the nutrition-related CACFP policies were helpful and made a difference in the health of the children attending the FCCHs.<sup>23</sup>

### ***II. Subjective Norm***

There are three studies that address subjective norms.<sup>18,23,33</sup> In two studies, there were poor perceptions on what is considered normal weight.<sup>18,23</sup> In one study, for example, Hispanic providers reported having few children at risk for overweight or obesity or showed no concern about the weight status of the children under their care despite Hispanic children being disproportionately overweight or obese.<sup>23</sup> These beliefs, in turn, influenced their belief that portion sizes should be based on age and not weight.<sup>23</sup> In another study, providers, mostly white, who were presented with drawings of boys and girls of differing sizes, selected smaller sized drawings for girls as a measure for overweight.<sup>18</sup> These providers reported using more food restriction on the girls in the FCCH ( $U=257.5$ ,  $p=0.10$ ).<sup>18</sup> On the topic of physical activity, in one study, most providers believed in the importance of daily physical activity in FCCHs.<sup>23</sup> However,

the amount of time providers believed children should engage in physical activity varied.<sup>23</sup> Additionally, in one study, Hispanic providers believed 50 degrees Fahrenheit was too cold for children to go outside and play.<sup>33</sup> Although in one study, most providers perceived screen time should be limited, focus group discussions point to the poor belief among Hispanic FCCH providers that watching TV is not considered screen time.<sup>33</sup>

### ***III. Perceived Behavioral Control***

Perceived Behavioral control was assessed in all six articles. In one study, most providers were confident in their abilities to provide a nutritious environment for the children in their care.<sup>23</sup> Providers believe that they have a high level of responsibility to provide a healthy nutrition and physical activity environment and that their role is to nurture and educate the children.<sup>18,23,29</sup> Providers also perceived to have control on what and how much children eat.<sup>23</sup> In one study, providers felt that they had more influence than center-based providers on eating habits of children. However, FCCH providers also believed that both the center-based providers and FCCH providers have an equal share of influence on physical activity behavior<sup>22</sup>. Providers identified several enablers or barriers to engaging in nutrition and physical activity best practices. In one study, providers believe the high cost of food prevents the purchase of quality organic foods for the children.<sup>23</sup> In two studies, lack of space for play was identified as a major barrier to physical activity engagement.<sup>19,23</sup> Additionally, two studies identified that the varying needs for physical activities across ages can be challenging for providers.<sup>19,32</sup> Finally, providers perceive poor parental beliefs to be an obstacle in ensuring best nutrition and physical activity practices in the FCCH.<sup>23,32</sup>

#### ***IV. Behavioral Intent***

Three studies address providers' perceived strategies to improve the FCCH environment.<sup>23,29,33</sup> Strategies mentioned by providers include encouraging new foods, meal planning, and participating in workshops,<sup>23</sup> problem-based solutions-oriented trainings, programs and resources to address challenging feeding behaviors among children,<sup>32</sup> increased reimbursement from CACFP for purchase of nutritious foods,<sup>32</sup> improving communication with parents regarding proper nutrition and physical activity practices,<sup>29,32</sup> use of dramatic play during active play time,<sup>29</sup> and having written comprehensive rules inside the FCCH.<sup>29</sup>

#### **Knowledge**

Provider knowledge was addressed in three of the articles.<sup>29,32,36</sup> In one study, FCCH providers knew more of the rules on best nutrition practices than center-based providers in the state of Delaware (18 vs 14.7,  $p < 0.001$ ).<sup>36</sup> Providers also described using their own knowledge on child development to improve what is offered to children in the FCCH.<sup>29</sup> Finally, providers perceive that the CACFP improve their nutrition knowledge.<sup>32</sup> However, this improved knowledge did not help in engaging in best feeding practices due to cultural feeding practices.<sup>32</sup>

#### **Demographic Moderators**

### ***I.State-level***

This review suggests that provider, child, and facility related characteristics influence the FCCH environment. With respect to the policy environment, two reviews mention that the quantity and quality of child care regulations regarding nutrition and physical activity varied across states and may be due to the wide-ranging level of power within cities across the US to regulate child care policies in addition to the diverse level of frequency of assessing for compliance of regulations.<sup>17,20</sup> Additionally, in one study, although no correlation exists between the geographic region and the number of regulations for FCCHs, northern states had the greatest mean number of physical activity regulations compared to the Midwest, which had the fewest (4.6(1.1) vs. 3.4(1.2)).<sup>20</sup> Finally, in one study, southern states had fewer Institute of Medicine (IOM) recommended sleep regulations than other regions of the US. Although no significant association exists between the region and number of sleep regulations, a significant association exists between year of update of regulations and the number of regulations consistent with IOM recommendations (p=0.03).<sup>37</sup>

### ***II. Facility-Level***

When adjusting for income zone of the neighborhood in which centers and FCCHs are in, indoor and outdoor physical activity and television-use practices remained significantly different between FCCHs and centers, with fewer FCCHs providers providing best practices in these areas (p≤ 0.05)<sup>25</sup>. For nutritional practices, however, the differences seen between FCCHs and centers, nutritional practices were no longer significant when adjusting for the income zone of the neighborhood of the facilities (p=0.05).<sup>25</sup>



Four studies made note of the number of CACFP participating FCCHs included in the study sample.<sup>27,28,35,36</sup> Only one study examined the differences in environment between CACFP and non CACFP homes.<sup>27</sup> CACFP and non CACFP FCCHs were significantly more likely to serve whole milk than centers ( $p < 0.001$ ). More non-CACFP homes served candy and sweetened beverages compared to all other types of child care settings including CACFP homes (15.8% vs. 6.2 CACFP Home,  $p < 0.001$ ; 18.4% vs. 7.7%,  $p < 0.001$ , respectively).<sup>27</sup>

### ***III. Provider Level***

The review shows that Hispanics were more likely to engage in authoritative and controlling feeding practices. For example, in a study in which 76% of the FCCH providers were Hispanic, Hispanic providers were more likely to report forcing children to eat what they perceive to be good for them ( $\chi^2 7.25, p < 0.05$ ), insisted that the children clean their plates before leaving the table, did not allow children to eat less than they thought they should, and were least likely to sit at the table and eat meals with the children ( $\chi^2 3.04; p < 0.05$ ).<sup>21</sup> Hispanic providers were also 3 times more likely to cook foods they knew children liked compared to Asians and whites ( $\chi^2 1.96 p < 0.001$ ).<sup>21</sup> In another study where the study sample was 84% White, FCCH providers who selected smaller silhouettes for girls as overweight were more likely to have more concern about the child's weight ( $U=235, p < 0.04$ ).<sup>18</sup> Additionally, providers with a higher level of education were correlated with less pressuring of children to eat more food ( $r=-0.27$ ,

$p < 0.01$ )<sup>18</sup>. In one study, highly trained FCCH providers were more likely to disseminate healthy nutrition information to children and obesity prevention information to parents.<sup>22</sup>

Regarding physical activity, Hispanic providers who spent their formative years in warmer climates outside the US perceived winter as a barrier to physical activity engagement more than US-born Hispanic providers.<sup>23</sup>

#### ***IV. Child Level***

In one study, among 4 and 5-year-olds, overweight and obese children exhibited lower levels of moderate to vigorous physical activity and total physical activity than healthy 4 and 5 year olds ( $p < 0.5$ ). Relative to boys, girls exhibited lower levels of moderate to vigorous and total physical activity during the day ( $p < 0.5$ ).<sup>26</sup>

#### **Energy Balance Related Behaviors (EBRBs)**

Regarding foods served, in one study, FCCH providers reported offering more fresh fruit and vegetables than center-based child care (80.3% vs. 51.2%,  $p < 0.001$ ) and limiting rolls and bread compared to centers (28.1 vs. 18.6%,  $p = 0.001$ ).<sup>25</sup> However, in one study, only 41.7% of providers served lean meats more than 4 times per week, and less than half of the providers report serving healthy foods for celebratory events<sup>34</sup>. In one study, only fewer FCCH providers reported not offering fried foods compared to center-based providers (38% vs. 59%,  $p = 0.001$ ).<sup>24</sup>

Regarding beverages served, although FCCH providers report following best practice recommendations for serving water at least daily and limiting sweetened beverages, 55.8% of the providers offered 100% juice 3-4 times weekly in one study, and 66% of providers in another study.<sup>31,34</sup> One study shows that only 13.9% of FCCH providers offered 1% milk more than 1 time daily.<sup>34</sup> In another study, when compared to center-based child care, fewer FCCH providers provided 1% milk more than 1 time daily (45.2 vs. 55%,  $p=0.015$ ).<sup>25</sup>

Regarding physical activity, in one study, when compared to center-based child care, fewer FCCHs provided outside physical activity for 30 min or more 3 times a week (92.9% vs 96.5%,  $p=0.022$ ).<sup>25</sup> In another study, children in FCCHs spent on average of 5.8 min/ hour of moderate to vigorous physical activity and 10.4 min/ hours of total physical activity.<sup>26</sup> In one study, although a higher portion of FCCH providers reported preschoolers engaged in 60 min of adult led play time compared to center-based child care (33 vs. 18 %,  $p=0.02$ ), it's still only a third of providers engaging young children in an hour of playtime.<sup>24</sup> Seventy eight percent of providers report that they need training on how to help children be physically active.<sup>24</sup>

Regarding screen time, in one study, 64.6% of providers had the TV turned on every day for at least part of the day and 55.1% of providers allowed children to watch TV or video at least once a day.<sup>34</sup> In another study, when compared to centers, and more FCCH providers reported higher levels of limiting computer time (63.9 vs. 51.8%,  $p=0.003$ ). However, fewer FCCH providers rated excellent in limiting TV or video (39.2 %, 59.5

%,  $p < 0.001$ ).<sup>25</sup>

### **Environmental Research Framework for preventing weight gain**

**Figure 3** displays the obesogenic attributes of the FCCH environment within the Environmental Research framework for preventing weight gain. EnRG posits that EBRBs, behaviors that influence changes in weight, are both directly influenced by the environment characterized by the ANGELO framework and indirectly by the environment but mediated by cognitive factors, namely attitudes, beliefs and perceptions (concepts in the Theory of Planned Behavior) regarding EBRBs. Additionally, demographic factors may moderate the relationships between the environment, cognitive mediated environment and EBRBs.

### **Discussion**

This review examines the obesogenic attributes of the FCCH environment and highlights many priority needs for intervention in FCCHs. On the macro level, there is a lack of child care nutrition, physical activity, and sleep regulations across all 50 US states and territories. In order to ensure quality environments in FCCHs, improvement is needed in the quantity and quality of child care policies regarding the food served, how food is served, the level of physical activity, the quality of space available, and sleep practices. Additionally, states need to create better opportunities for FCCH providers to be adequately trained in childhood obesity prevention and in best practices in nutrition and physical activity.

On a micro level, providers can be proactive in providing written nutrition, physical activity and sleep-related policies. FCCH providers also need to provide optimal space for quality physical activity and minimize the use of TV.

Since uninvolved, indulgent feeding styles are associated with overeating in young children,<sup>38</sup> interventions aimed at reducing these obesogenic interactions are warranted.

Additionally, child care providers' attitudes, normative beliefs and control beliefs influence the providers feeding and physical activity practices as well as family communication practices. Further understanding of these concepts as they relate to the FCCH environment is instrumental in developing training strategies that can eliminate misconceptions and inappropriate beliefs about nutrition and physical activity practices and enhance self-efficacy, which would help with better communication with families concerning children's eating behaviors. Partnering with families is most effective since families engage with childcare settings more than they interact with their child's primary care provider. Finally, since thirty percent of US children are enrolled in the CACFP-participating FCCHs,<sup>36</sup> more research needs to be conducted to examine the impact CACFP is making on feeding practices in the FCCH. Only one study examined the differences in the food environment by CACFP status. The results show that more non-CACFP homes served candy and sweetened beverages. This finding is consistent with a study that showed that compared to non-CACFP providers, more CACFP providers engaged in best nutrition practices.<sup>39</sup>

There are limitations to this review that can affect the generalizability of the findings. First, there were few studies that examined the FCCH environment and these

studies were limited to FCCHs from a limited number of states. Half of the studies that reported race or ethnicity involved majority Hispanic providers and only one study had majority African-American providers. Expanding the child care research network to include FCCHs across all US states would improve generalizability in our process of defining the FCCH environment in the US while striving for equal representation in races and/or ethnicities of FCCH providers and children in their care.

Of the studies that examined the physical, socio-cultural, and policy/economic environment, only one study relied on observations to assess the environment.<sup>32</sup> The majority of the studies relied on self-report cross-sectional data. Relying on this type of data introduces bias that can be minimized by objectively observing the FCCH environment. Finally, none of the studies examined the food environment outside of the FCCH.

Despite the limitations, the review of the literature shows that FCCHs are prime territory for childhood prevention efforts to take place. Making changes in the political, sociocultural, and physical environment of FCCHs can provide optimal environments for young children. Increasing nutrition and physical activity regulations for child care, enhancing nutrition training for providers, and promoting healthy mealtime interactions can help improve the quality of the foods children eat.

## References

1. Ogden CL, Carroll MD, Kit BK, Flegal KM. Prevalence of childhood and adult obesity in the United States, 2011-2012. *Jama*. 2014;311(8):806-814. doi:10.1001/jama.2014.732.
2. Pan L, Freedman DS, Sharma AJ, et al. Trends in Obesity Among Participants Aged 2-4 Years in the Special Supplemental Nutrition Program for Women, Infants, and Children - United States, 2000-2014. *MMWR Morb Mortal Wkly Rep*. 2016;65(45):1256-1260. doi:10.15585/mmwr.mm6545a2.
3. Din-Dzietham R, Liu Y, Bielo MV, Shamsa F. High blood pressure trends in children and adolescents in national surveys, 1963 to 2002. *Circulation*. 2007;116(13):1488-1496. doi:10.1161/CIRCULATIONAHA.106.683243.
4. Ludwig DS, C.B. Ebbeling. Type 2 diabetes mellitus in children: primary care and public health considerations. *Jama*. 2001;286(12):1427-30.
5. REDLINE S, TISHLER PV, SCHLUCHTER M, AYLOR J, CLARK K, GRAHAM G. Risk Factors for Sleep-disordered Breathing in Children. *Am J Respir Crit Care Med*. 1999;159(5):1527-1532. doi:10.1164/ajrccm.159.5.9809079.
6. Trasande L, Elbel B. The economic burden placed on healthcare systems by childhood obesity. *Expert Rev Pharmacoecon Outcomes Res*. 2012;12(1):39-45. doi:10.1586/erp.11.93.
7. Romieu I, Dossus L, Barquera S, et al. Energy balance and obesity: what are the main drivers? *Cancer Causes Control*. 2017;28(3):247-258. doi:10.1007/s10552-017-0869-z.

8. Laughlin L. Who's Minding the Kids ? Child Care Arrangements : Spring 2011. *Househ Econ Stud.* 2013;2009(April):70-135.
9. Benjamin SE, Rifas-Shiman SL, Taveras EM, et al. Early child care and adiposity at ages 1 and 3 years. *Pediatrics.* 2009;124(2):555-562. doi:10.1542/peds.2008-2857.
10. EJ M, Li G, Carter L, DB J. Preschool child care participation and obesity at the start of kindergarten. *Pediatrics.* 2008;122(2):322-330.  
<http://search.ebscohost.com/login.aspx?direct=true&db=rzh&AN=105809094&site=ehost-live&scope=site>.
11. McLaren L, Zarrabi M, Dutton DJ, Auld MC, Emery JC. Child care: implications for overweight / obesity in Canadian children? *Chronic Dis Inj Can.* 2012;33(1):1-11.
12. Story M, Kaphingst K, French S. The role of child care settings in obesity prevention. *Futur Child.* 2006;16(1):143-168.
13. USDA. child-and-adult-care-food-program @ [www.fns.usda.gov](http://www.fns.usda.gov).  
<https://www.fns.usda.gov/cacfp/child-and-adult-care-food-program>.
14. Kremers SPJ, de Bruijn G-J, Visscher TLS, van Mechelen W, de Vries NK, Brug J. Environmental influences on energy balance-related behaviors: a dual-process view. *Int J Behav Nutr Phys Act.* 2006;3(1):9. doi:10.1186/1479-5868-3-9.
15. Swinburn B, Egger G, Raza F. Dissecting obesogenic environments: the development and application of a framework for identifying and prioritizing environmental interventions for obesity. *Prev Med (Baltim).* 1999;29(6 Pt 1):563-570. doi:10.1006/pmed.1999.0585.



16. Ajzen I. The theory of planned behaviour is alive and well, and not ready to retire: a commentary on Sniehotta, Pesseau, and Araújo-Soares. *Health Psychol Rev.* 2014;7199(May):1-7. doi:10.1080/17437199.2014.883474.
17. Benjamin SE, Craddock A, Walker EM, Slining M, Gillman MW. Obesity prevention in child care: a review of U.S. state regulations. *BMC Public Health.* 2008;8:188. doi:10.1186/1471-2458-8-188.
18. Brann LS. Child-feeding practices and child overweight perceptions of family day care providers caring for preschool-aged children. *J Pediatr Heal Care.* 2010;24(5):312-317. doi:10.1016/j.pedhc.2009.09.001.
19. Vinci DM, Whitt-Glover MC, Wirth CK, Kraus C, Venezia AP. Let's Wiggle with 5-2-1-0: Curriculum Development for Training Childcare Providers to Promote Activity in Childcare Settings. *J Obes.* 2016;2016.  
<http://www.embase.com/search/results?subaction=viewrecord&from=export&id=L611280663> <http://dx.doi.org/10.1155/2016/8967092>  
<http://findit.library.jhu.edu/resolve?sid=EMBASE&issn=20900716&id=doi:10.1155%2F2016%2F8967092&atitle=Let%27s+Wiggle+with+5-2-1-0%3A>.
20. Duffey KJ, Slining MM, Benjamin Neelon SE. States lack physical activity policies in child care that are consistent with national recommendations. *Child Obes.* 2014;10(6):491-500. doi:10.1089/chi.2014.0096.
21. Freedman MR, Alvarez KP. Early childhood feeding: assessing knowledge, attitude, and practices of multi-ethnic child-care providers. *J Am Diet Assoc.* 2010;110(3):447-451. doi:10.1016/j.jada.2009.11.018.
22. Kim J, Shim JE, Wiley AR, Kim K, McBride BA. Is there a difference between

- center and home care providers' training, perceptions, and practices related to obesity prevention? *Matern Child Heal J.* 2012;16(8):1559-1566.  
doi:10.1007/s10995-011-0874-x.
23. Lindsay AC, Salkeld JA, Greaney ML, Sands FD. Latino Family Childcare Providers' Beliefs, Attitudes, and Practices Related to Promotion of Healthy Behaviors among Preschool Children: A Qualitative Study. *J Obes.* 2015;2015:1-9. doi:2015/409742.
24. Liu ST, Graffagino CL, Leser KA, Trombetta AL, Pirie PL. Obesity Prevention Practices and Policies in Child Care Settings Enrolled and Not Enrolled in the Child and Adult Care Food Program. *Matern Child Heal J.* 2016.  
doi:10.1007/s10995-016-2007-z.
25. Natale R, Page M, Sanders L. Nutrition and physical activity practices in childcare centers versus family childcare homes. *Early Child Educ J.* 2014;42(5):327-334.  
doi:10.1007/s10643-013-0607-4.
26. Rice KR, Trost SG. Physical Activity Levels Among Children Attending Family Day Care. *J Nutr Educ Behav.* 2014;46(3):197-202.  
doi:10.1016/j.jneb.2013.09.001.
27. Ritchie LD, Boyle M, Chandran K, et al. Participation in the child and adult care food program is associated with more nutritious foods and beverages in child care. *Child Obes.* 2012;8(3):224-229. doi:10.1089/chi.2011.0061.
28. Ritchie LD, Yoshida S, Sharma S, Patel A, Vitale EH, Hecht K. Drinking water in California child care sites before and after 2011-2012 beverage policy. *Prev Chronic Dis.* 2015;12:E89. doi:10.5888/pcd12.140548.

29. Rosenthal MS, Crowley AA, Curry L. Family Child Care Providers' Self-perceived Role in Obesity Prevention: Working With Children, Parents, and External Influences. *J Nutr Educ Behav*. 2013;45(6):595-601. doi:10.1016/j.jneb.2013.03.016.
30. Tandon PS, Zhou C, Christakis DA. The Frequency of Outdoor Play for Preschool Age Children Cared for at Home-Based Child Care Settings. *Acad Pediatr*. 2012;12(6):475-480. <http://search.ebscohost.com/login.aspx?direct=true&db=rzh&AN=108084718&site=ehost-live&scope=site>.
31. Tandon PS, Garrison MM, Christakis DA. Physical Activity and Beverages in Home- and Center-based Child Care Programs. *J Nutr Educ Behav*. 2012;44(4):355-359. doi:10.1016/j.jneb.2011.10.009.
32. Tovar A, Vaughn AE, Fallon M, et al. Providers' response to child eating behaviors: A direct observation study. *Appetite*. 2016;105:534-541. doi:10.1016/j.appet.2016.06.020.
33. Tovar A, Mena NZ, Risica P, Gorham G, Gans KM. Nutrition and Physical Activity Environments of Home-Based Child Care: What Hispanic Providers Have to Say. *Child Obes*. 2015;11(5):521-529. doi:10.1089/chi.2015.0040.
34. Trost SG, Messner L, Fitzgerald K, Roths B. Nutrition and Physical Activity Policies and Practices in Family Child Care Homes. *Am J Prev Med*. 2009;37(6):537-540. doi:10.1016/j.amepre.2009.09.020.
35. Trost SG, Messner L, Fitzgerald K, Roths B. A nutrition and physical activity intervention for family child care homes. *Am J Prev Med*. 2011;41(4):392-398.

- doi:10.1016/j.amepre.2011.06.030.
36. Van Stan S, Lessard L, Dupont Phillips K. The impact of a statewide training to increase child care providers' knowledge of nutrition and physical activity rules in Delaware. *Child Obes.* 2013;9(1):43-50. doi:10.1089/chi.2012.0057.
  37. Benjamin Neelon SE, Duffey K, Slining MM. Regulations to promote healthy sleep practices in child care. *Pediatrics.* 2014;134(6):1167-1174. doi:10.1542/peds.2014-0578.
  38. Shloim N, Edelson LR, Martin N, Hetherington MM. Parenting styles, feeding styles, feeding practices, and weight status in 4-12 year-old children: A systematic review of the literature. *Front Psychol.* 2015;6(DEC). doi:10.3389/fpsyg.2015.01849.
  39. Korenman S. The Child and Adult Care Food Program and the Nutrition of Preschoolers. *Early Child Res Q.* 2013;28(2). doi:10.1016/j.cardfail.2013.04.005.Sleep.

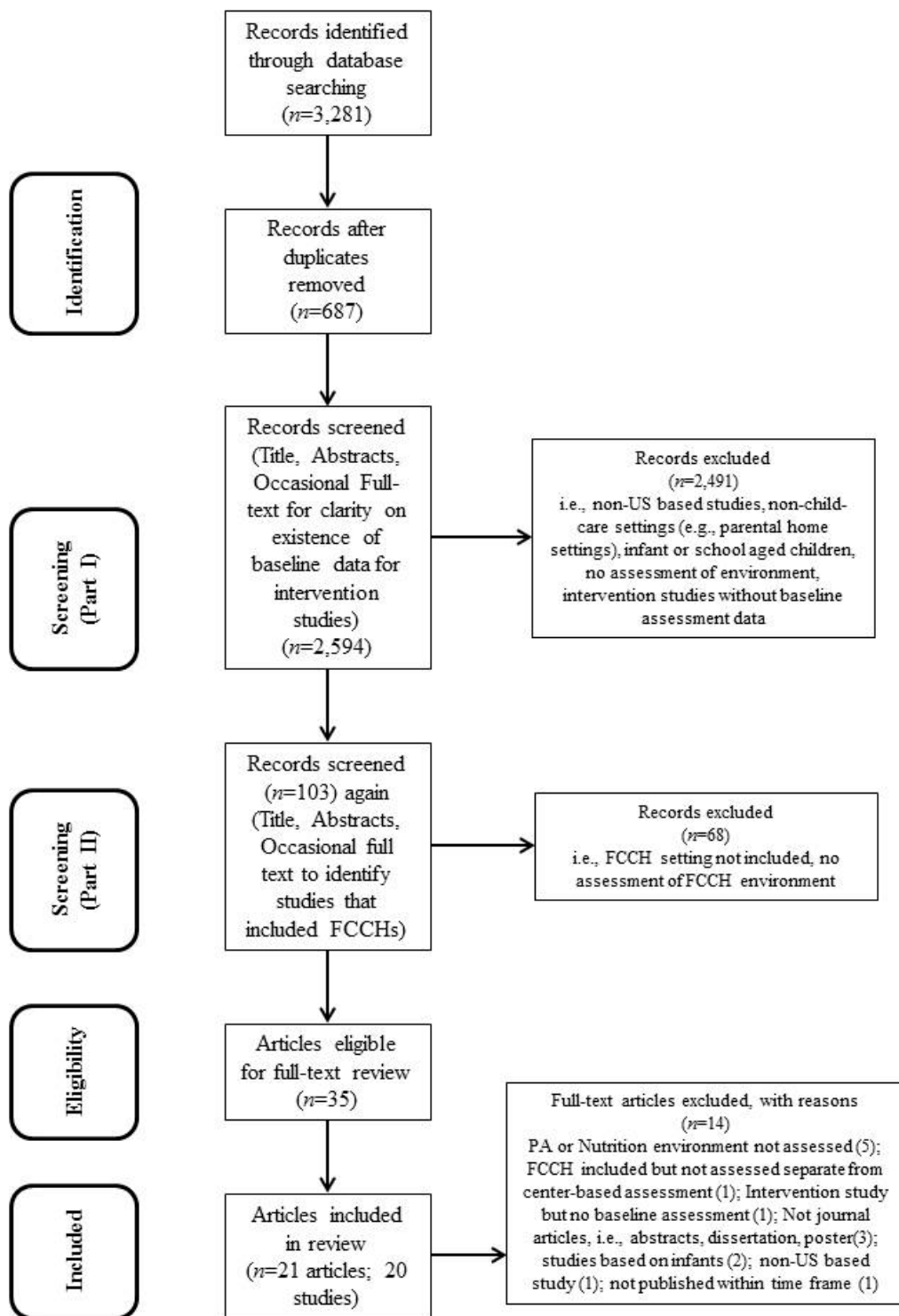


Figure 2. Preferred reporting items for systematic reviews and meta-analyses diagram depicting the flow of records

Table 1. The Physical, Socio-cultural, and Policy/Economic Environment of Family Child Care Homes

Citation/Year/State/ Method	Sample Size & FCCH Provider level, Child level Demographics (i.e. age, race/ethnicity & education)	Data source/Measures	Physical Environm ent	Socio- cultural Environm ent	Policy/economic environment	EBRBs	Demographic Moderators Mentioned or Analyzed
<b>Nutrition</b>							

<p>Benjamin SE et al., <i>BMC Public Health</i>/ 2008/ Multistate/policy review of nutrition and PA regulations for child care facilities, including FCCHs, between January and August of 2007, across all 50 states and the District of Columbia</p>	<p>N=50 US States and the District of Columbia</p>	<p>Data on state licensing regulations for child care facilities collected from the National Resource Center for Health and Safety in Child Care (<a href="http://nrc.uchsc.edu">http://nrc.uchsc.edu</a>)</p>	<p>NA</p>	<p>NA</p>	<p><b><u>Water availability</u></b> --34 (67%) states required water to be freely available to all children at all times. -4 states specify water availability outdoors or in warm weather -7 states required staff to offer water between meals and snacks or at frequent intervals</p> <p><b><u>Sugar Sweetened Beverages</u></b> -7 (14%) states restricted sugar sweetened beverages -5 states specify sugar sweetened beverages cannot replace healthier options -2 states specify that sugar sweetened beverages can only be provided on special occasions</p> <p><b><u>Foods of low nutritional value</u></b> 7(14%) restricted foods of low nutritional value -Arizona and Vermont had specific regulations for only Family Child Care Homes related to limiting high-fat, high sugar foods and</p>	<p>NA</p>	<p>-Varied level of Power within cities across states in varied geographic areas to regulate FCCHs</p> <p>-Varied level of frequency of assessing for compliance of regulations across states</p>
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					<p>encouraging low salt and unprocessed foods</p> <p><b><u>Forced to eat</u></b> 32 (63%) states prohibits providers to force children to eat -Forced to eat mostly under discipline regulations and not regulations related to nutrition</p> <p><b><u>Food as a reward</u></b> 5 (10%) states prohibits use of food as a reward</p>	
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<p>Freedman et al., <i>J Am Diet Assoc</i>/2010/CA/Pre-post test</p>	<p>N=54% (39) FCCHs; 46% center-based</p> <p><u>Provider</u> <b>Race/Ethnicity:</b> 76% of FCCHs were Hispanic</p> <p>*included results regarding ethnicity since a great percentage of homes were Hispanic</p> <p><b>Age:</b> 18 years+</p>	<p>Questionnaire modified from the Stanford Child Feeding Questionnaire and the Hughes Caregiver Feeding Styles Questionnaire</p>		<p>Compared to center-based</p> <p>- more FCCH providers reported only cooking foods they knew children liked. (63 vs. 39%, not significant )</p> <p>-FCCH providers more likely to allow children to eat less than they think they should, (47 vs. 29%, not significant )</p> <p>-FCCH providers rarely or never allowed children</p>			<p><b><u>Ethnicity</u></b></p> <p>-Hispanics (24%) less likely to eat meals with children [<math>\chi^2</math> 3.04; <math>p &lt; 0.05</math>]; more likely to report forcing children to eat what's good for them [<math>\chi^2</math> 7.25, <math>p &lt; 0.05</math>].</p> <p>Hispanic 3x more likely to cook foods they knew children liked [<math>\chi^2</math> 1.96 <math>p &lt; 0.001</math>]</p> <p>50% Hispanics insisted children finish food before leaving the table</p>
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				to eat more than they thought they should (55 vs 27%, not significant).			
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<p>Liu ST., <i>Matern Child Health J</i>/2016/OH/cross-sectional survey</p>	<p>N= 185 child care settings; 44% Family child care homes; 56% centers</p>	<p>Survey questions were modified from The Nutrition and Physical Activity Self-Assessment for Child Care (NAPSACC), and the Environment and Policy Assessment and Observation instrument</p>	<p>Compared to centers,</p> <p>Higher proportion of FCCH providers reported teaching children about the food groups at least once a month (44 vs. 27 %, p = 0.01)</p>		<p>Compared to centers, fewer FCCHs had policies relevant to</p> <p><b>Beverages</b>          -only milk, water, and 100 % fruit juice are served to the children (47 vs. 77 %, p&lt;0.001);          -&lt;6 oz of 100 % fruit juice per day are served to children 12 months of age and older (22 vs. 43 %, p = 0.003);          -skim, 1 or 2 % milk are served to children older than 2 years of age (28 vs. 50 %, p = 0.003);          -providers cannot eat or drink food from outside in front of the children (12 vs. 31 %, p = 0.003);</p> <p><b>Use of Food as punishment/reward</b>          -providers cannot withhold/delay food or drinks as a punishment (44 vs. 83 %, p&lt;0.001);          -providers cannot give food or drinks as a reward or an incentive (30 vs. 48 %, p = 0.01);</p>	<p>Compared to centers,</p> <p>Fewer FCCH providers reported not offering fried foods (38% vs. 59%, p=0.001)</p> <p>-</p>	
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					<p><b>Authoritarian/Controlling Feeding Interactions</b></p> <ul style="list-style-type: none"><li>-providers cannot force children to eat certain foods or certain amounts of food (33 vs. 55 %, <math>p = 0.004</math>);</li><li>-providers allow children to decide how much to eat (25 vs. 38 %, <math>p = 0.05</math>);</li><li>-and each child is to be encouraged but not forced to eat or taste his or her food (30 vs. 45 %, <math>p = 0.03</math>).</li></ul>		
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<p>Natale R et al., <i>Early Childhood Educ J</i>/2014/FL/cross-sectional survey of baseline data</p>	<p>N= 298FCCHs; 842 center-based</p> <p><u>Provider/Home</u></p> <p><b>SES:</b> Facilities' Zip code=18.1% has more than 40% of household income less than 25K*significantly different from center based *FCCHs more likely to care for children enrolled in federal subsidy programs.</p> <p><u>Children</u></p> <p><b>Race/Ethnicity:</b> Homes reporting predominantly black enrollment=8.3% Homes reporting predominantly</p>	<p>Food Frequency Questionnaire was developed based on a modified version of the Harvard Service Food Frequency Questionnaire (HSFFQ)</p>	<p>Compared to centers, FCCHs provided more lessons with a basis in health and nutrition each week, (p = .036)</p>			<p>Compared to centers, Fewer FCCH providers provided 1% milk more than 1 time daily (45.2 vs. 55%, p=0.015)</p> <p>More FCCH providers reported providing more fresh fruit (p = 0.001),</p> <p>More FCCHs reported limiting servings of rolls and bread (28.1 vs. 18.6%, p=.001)</p>	<p><b><u>Income Zone of Facility</u></b></p> <p>Associations between facility type and all other nutritional/dietary outcomes (e.g., fresh fruit and vegetable consumption, 1 % milk consumption) were no longer significant (p&gt;0.05), after adjusting for income zone.</p>
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	Hispanic enrollment=45 .8%						
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<p>Ritchie et al., <i>Childhood Obesity</i>/2012/Multi-state/cross-sectional survey</p>	<p>N= 65 Head Start Centers; 68 preschools; 104 CACFP centers; 88 non-CACFP centers; 65 CACFP FCCHs; 38 non-CACFP FCCHs</p>	<p>Adapted NAPSACC Survey</p>	<p>FCCHs were least likely to use a dietitian in menu planning (0%) compared to state preschools (19.1%), and other centers (4.2%) (p &lt; 0.001).</p>				<p><b><u>CACFP status</u></b></p> <p>CACFP and non CACFP homes more likely to serve whole milk than centers (p &lt; 0.001).</p> <p>More non-CACFP homes served candy than all other types of child care settings including CACFP homes day before survey (15.8% vs. 6.2 CACFP Home, p &lt; 0.001 )</p> <p>More non-CACFP homes served sweetened drinks day before the survey (18.4% vs. 7.7%, p&lt; 0.001)</p>
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<p>Ritchie et al., <i>Preventing Chronic Disease</i>/2015/CA/cross-sectional survey in 2008 and 2012</p>	<p>N= 429 child care sites (2008); 435 child care sites (2012); 65 CACFP homes; 38 non-CACFP homes</p>	<p>Adapted NAPSACC Survey</p>	<p>Compared to centers,</p> <p>Less than half of homes made water easily available to children to serve themselves indoors and outside (44.8%) reported doing so (44.8% vs. 73.1%, <math>p &lt; .001</math>).</p> <p>More centers than FCCHs provided tap water (<math>p = .01</math>)</p>				
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<p>Tandon PS et al., <i>Journal of Nutrition Education and Behavior</i>/2012/FL, MA, MI, WA/cross-sectional surveys</p>	<p>N= 94 FCCHs; 74 center-based</p> <p><u>Provider</u> <b>Level of Education:</b> 28% HS grad, 21% Some college, 51% 2 or 4 year college</p>	<p>NAP SACC survey</p>				<p>Both FCCHs and centers follow best practice recommendations for serving water at least daily and rarely serving sugar sweetened beverages</p> <p>66% FCCHs and centers offered 100% juice 3-4 times weekly</p>	
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<p>Tovar A et al., <i>Appetite</i>/2016/RI/Observational study</p>	<p>N= 48 FCCHs; 214 observed meals and snack times; 227 child- provider interactions captured</p> <p><u>Provider</u> <b>Race/Ethnicity:</b> 75% African- American 19% White <b>Gender:</b> 100% female <b>Level of Education:</b> 57% HS or Associates 40% Bachelors <b>BMI:</b> 77% obese 18% overweight</p> <p><u>Children</u> <b>BMI:</b> 67% normal weight 13% overweight 20% obese</p>	<p>Modified Environmental Policy Assessment and Observation (EPAO) tool</p>		<p>Only plated meals served</p> <p><b>Response to verbal refuses of food</b> -55% provider interactions used best feeding practices in response to verbal refuses -45% provider interactions used coercive controlling practices</p> <p><b>Response to non- verbal refuses of food</b> -Providers use both best practices and coercive</p>			
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				<p>controlling practices equally</p> <p><b>Response to verbal and non-verbal acceptance of food</b>  -Providers reacted to food acceptance with autonomy supportive practices much more often than coercive controlling practices (43 vs. 5 interactions)</p> <p><b>Response for seconds</b>  -85% provider interactions responded with coercive</p>			
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				<p>controlling practices, especially during lunch</p> <ul style="list-style-type: none"> <li>-Providers pressured children to clean their plates first to get seconds of certain foods</li> <li>-Some simply complied or offered bribes</li> </ul> <p><b>Being “all done”</b></p> <ul style="list-style-type: none"> <li>-Providers responded equally with coercive and best practices</li> <li>- Pressuring children to eat more was frequently observed</li> </ul>			
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				<b>Attempts for praise or attention</b> -Providers frequently praised for trying new foods and eating certain foods			
Trost SG et al., <i>Am J Prev Med</i> /2011/Kansas/cross-sectional survey	N= 297 FCCHs; 85.3% CACFP	NAPSACC survey  *Scoring guide: 1 =marginally	-Menus and variety		-Nutrition policy 2.41(+/-0.5)	<b>Foods Served</b>  -Fruits and vegetables	

	<p>participation</p> <p><i>Provider</i></p> <p><b>Level of Education:</b> 40.8% HS diploma or GED, 42.9% Some college or Associate's, 14.3% Bachelor degree</p>	<p>meeting child care standards; 2 = meeting child care standards; 3 =exceeding child care standards; and 4 =far exceeding child care standards and using best practice.</p>	<p>2.50 (+/- 0.6)</p> <p>-Nutrition education 2.60(+/- 0.7)</p>			<p>3.20 (+/-0.4)</p> <p>-Fried foods and high-fat meats 3.10(+/-0.3)</p> <p>-Beverages 2.90 (+/-0.5)</p> <p>-Meals and snacks 3.70(+/-0.3)</p> <p>-Foods outside of regular meals and snacks 2.00(0.7)</p> <p>-Supporting healthy eating 3.00(+/-0.5)</p>	
<p>Trost et al., <i>American Journal of Preventive Medicine</i>/2009/Kansas/cross-sectional survey</p>	<p>N= 297 FCCHs</p>	<p>NAPSACC survey</p>	<p>47.5% (95% CI: 41.2, 53.8) providers received nutrition training 1 or more times per year</p> <p>46.9% (95% CI: 40.6, 53.2) providers offer nutrition education for</p>	<p>23% (95% CI: 17.7, 28.4) providers provided family style meals</p>	<p>18.6% (95% CI: 13.7,23.4) providers had written guidelines concerning type of foods brought for celebrations</p> <p>53.7% (95% CI: 47.6,59.7) providers had a comprehensive written policy on nutrition and food service</p>	<p>41.7% (95% CI: 35.4,48) providers served lean meats more than 4 times per week</p> <p>55.8% (95% CI: 49.6, 62) providers served 100% fruit juice more than 1 times per day</p> <p>Infrequent servings of low-fat milk; only 13.9% (95% CI 9.7,</p>	

			children 45.3% (95% CI: 39.1, 51.5) providers offer nutrition education to parents			18.1) served 1% milk  Infrequent use of healthy foods for celebrations 43.9% (95% CI: 37.6,50.2)	
<b>Physical Activity</b>							
Benjamin SE et al., <i>BMC Public Health</i> / 2008/ Multistate/policy review of nutrition and PA regulations for child care facilities, including FCCHs, between January and August of 2007, across all 50 states and the District of Columbia	N= 50 US States and the District of Columbia	Data on state licensing regulations for child care facilities collected from the National Resource Center for Health and Safety in Child Care ( <a href="http://nrc.uchsc.edu">http://nrc.uchsc.edu</a> )	NA	NA	<b>Screen Time</b> -15 (29%) states regulated screen time - 6 states set daily limit time (ie. Mississippi limits screen time to 1 hour, Alaska 1.5 hrs, Delaware, Georgia and Oregon up to 2 hours per day) -2 states did not require no TV viewing (SC, WI)  <b>Physical Activity</b> -only 3 states required specific number of min. of PA each day -1 (MA) requires 30 min of daily PA in	NA	-Varied level of Power within cities across states in varied geographic areas to regulate FCCHs  -Varied level of frequency of assessing for compliance of regulations across states

					homes -2 (Alaska & Delaware) mandates 20 min of PA for every 3 hours in homes	
Duffey KJ et al., <i>Childhood Obesity</i> /2014/Multi-state and US territories/policy review of existing PA regulations of child care including FCCHs	N= 50 US States and the District of Columbia	Policy review of state licensing and administrative regulations (National Resource Center for Health and Safety in Child Care <a href="http://www.nrckids.org">www.nrckids.org</a> & commercial legal research database WestlawNextTM) and compared to IOM's 15 policy-based recommendations related to physical activity			-49 states had at least 1 regulation related to PA (Louisiana did not have any PA regulations) -Average of 3.8 PA regulations across states and territories with PA regulations -Virginia had most PA regulations (7) -Eight states had at least 6 of IOM's 15 recommendations (AL, AK, DW, MA, NY, TN, TX, VA) -Ten states had regulations for 5 of IOM's 15 recommendations -Fewer than 10% of states had 9 of 15 IOM recommendations  <u>Total PA</u> Only 9% of states had regulations consistent with the IOM recommendation that homes provide opportunities for light, moderate, and vigorous physical	<b><u>Geographic Differences</u></b>  <i>Mean number of regulations</i>  Northern states greatest mean number of regulations for homes compared to the Midwest  4.6(1.1) vs. 3.4(1.2)  No correlation between geographic region and number of regulations (Spearman's rho=0.123; p=0.372)



					<p>activity at least 15 minutes per hour while children are in care</p> <p><u>Outdoor Time</u> 78% of states had Regulations regarding Daily outdoor time provided</p> <p><u>Type of PA</u> Only 7% had a regulation consistent with offering developmentally appropriate structured and unstructured physical activity experiences.</p> <p><u>Staff Join Kids in PA</u> No states had regulations regarding staff joining kids in PA</p> <p><u>Integrate PA into cognitive and social activities</u> No States had regulations regarding integrating PA into activities designed to promote children's cognitive and social</p>	
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					<p>development</p> <p><u>Outdoor &amp; Indoor Environment</u> More than 90% of states had Regulations for homes to Provide an outdoor and indoor environment with a variety of portable play equipment and adequate space per child</p> <p><u>Disabilities</u> 32.7% had regulations regarding appropriate PA opportunities and space for those who are disabled</p> <p><u>No Punishment</u> Only 3.6% had regulations for avoiding the use of punishment for engaging in PA</p> <p><u>No withholding</u> Only 1 state had regulation regarding withholding PA as form of punishment</p> <p><u>Limit Sitting/Standing</u> (10) 18.2% had regulations for limiting sitting or</p>	
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					<p>standing to no more than 30 min at a time  <u>Limit stroller use</u>  No states had regulations regarding limiting stroller use</p> <p><u>Seek yearly Consultation from early childhood PA expert</u>  No states had regulations regarding seeking yearly consultations from an early childhood PA expert</p> <p><u>Train educators</u>  No states had regulations regarding training for early child care educators on PA and sedentary behaviors</p> <p><u>Screen time</u>  42% of states had regulations regarding Screen time to be limited to less than 30 min or 1 hr per day</p>	
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Liu ST., <i>Matern Child Health J</i> /2016/OH/cross-sectional survey	N= 44% Family child care homes; 56% centers	Modified NAPSACC survey and the Environment and Policy Assessment and Observation instrument				Compared to centers, more FCCHs reported that preschoolers engage in 60 min of adult-led physical activity each day (33 vs. 18 %, p = 0.02)  More FCCHs require training on how to help children be physically active (78 vs. 56 %, p = 0.002).	
Natale R et al., <i>Early Childhood Educ J</i> /2014/FL/cross-sectional survey of baseline data	N= 298 FCCHs; 842 Center-based childcare  <u>Provider/Home</u>	Physical Activity Frequency Questionnaire developed based on physical activity standards from Caring for Our Children				Compared to centers, Fewer FCCHs provided outside PA for 30 min or more 3 times	<b><u>Income Zone of Facility</u></b>  Indoor physical activity, outdoor physical

	<p><b>SES:</b> Facilities' Zip code=18.1% has more than 40% of household income less than 25K*significantly different from center based which has 26.7%</p> <p><u>Children</u> <b>Race/Ethnicity:</b> Homes reporting predominantly black enrollment=8.3% Homes reporting predominantly Hispanic enrollment=45.8%</p>	National Health and Safety Performance Standards				<p>a week (92.9% vs 96.5%, p=0.022)</p> <p>Fewer FCCHs rated excellent in amount of limiting television/video than out of-home facilities (39.2 %, 59.5 %, p&lt;0.001)</p> <p>More FCCHs reported higher levels of limiting computer time than out of home facilities (63.9 vs. 51.8%, p=0.003)</p>	<p>activity, and television-use practices remained significantly different (p &lt;= 0.05) between in home and centers when adjusting for income zone</p>
Rice KR et al., <i>Journal of Nutrition Education and Behavior</i> /2014/OR/accelerometer readings	<p>N=47 FCCHs, 114 children (60 boys, 54 girls), 70% CACFP</p> <p><u>Provider</u> <b>Age:</b> 2% less than 30, 44% 30-</p>	ActiGraph GT1M accelerometer				<p>Avg participation in MVPA and total PA was 5.8 +/-3.2 and 10.4 +/- 4.4 min/h, respectively</p>	<p><b>BMI</b> overweight and obese 4 to 5 yr olds exhibited lower levels of MVPA and TPA than healthy</p>

	<p>39, 54% greater than 40</p> <p><b>Provider race</b> 90% white,</p> <p><b>Mean yrs of operation:</b> 10(IQR 5-15)</p> <p><b>Level of Education</b> 66% HS diploma or GED, 20% Some college or associate degree, 15% Bachelor's degree</p> <p><u>Children</u></p> <p><b>Avg BMI:</b> 16.8 +/-202</p> <p><b>Percent overweight or obese:</b> 29%</p>						<p>4 to 5 yr olds (p&lt;0.5)</p> <p><b>Gender</b> girls exhibited lower levels of MVPA and TPA compared to boys (p&lt;0.5) *no test statistic reported</p>
<p>Tandon PS et al., <i>Journal of Nutrition Education and Behavior</i>/2012/FL, MA, MI, WA/cross-sectional surveys</p>	<p>N= 94 FCCHs; 74 center-based</p> <p><i>Provider</i></p> <p><b>Level of Education:</b> 28% HS grad, 21% Some college, 51% 2 or 4 year college</p>	<p>NAP SACC survey</p>	<p>Compared to center-based,</p> <p>Fewer FCCHs had more variety of fixed-play equipment (76 vs. 89%,</p>			<p>50% percent of preschoolers in FCCHs less than 1 hour per day of outdoor play time</p>	

			<p><math>\chi^2=5.3</math>, df=1; p=0.02)</p> <p>Fewer FCCHs had more variety of portable play equipment (86 vs. 95%, <math>\chi^2=4.4</math>, df=1, p=0.04)</p> <p>Fewer FCCHs reported rarely or never showing TV (29 vs. 68% <math>\chi^2=25</math>, df=1; p less than 0.001)</p>				
Tandon PS et al., <i>Academic Pediatrics</i> /2012/cross-sectional analyses on longitudinal data	<p>N=Overall (1900); Non relative in Child's home (n=150); Nonrelative in Another Home (n=550)</p> <p>Provider (<i>nonrelative in</i></p>	Data from Early Childhood Longitudinal Study-Birth Cohort (ECLS-B)				<p>50% of home-based providers take the child outside to walk or play at least once a day</p> <p>Increased odds of going</p>	

	<p><i>child's home, nonrelative in another home)</i></p> <p><b>Race:</b> 85%, 82% White, 6%, 13% Black, 26%,14% Hispanic</p> <p><b>Level of Education:</b> 34,37% HS or less 35,45% Some college 26,14% College graduate 6,4% Graduate degree</p>					<p>outside daily for children cared for by non-relatives in home-based than relatives in homes (OR 1.5, 95% CI 1.36-1.64).</p> <p>Odds of outdoor play did not differ between nonrelative care in another home and relative care</p>	
Trost SG et al., <i>Am J Prev Med</i> /2011/Kansas/cross-sectional survey	<p>N= 297 FCCHs;: 85.3% CACFP participation</p> <p><i>Provider</i></p> <p><b>Level of Education:</b> 40.8% HS diploma or GED, 42.9% Some college or Associate's, 14.3% Bachelor degree</p>	<p>NAPSACC survey</p> <p>1 =marginally meeting child care standards 2 = meeting child care standards; 3 =exceeding child care standards; and 4 =far exceeding child care standards and using best practice.</p>	<p>Play environment 3.10(+/- 0.6)</p> <p>Physical activity education 2.2(+/- 0.9)</p>	<p>Supportin g physical activity 2.40(+/- 0.7)</p>	<p>PA policy 1.6(+/-1.2)</p>	<p>-Active play and inactive time 3.20(+/- 0.4) -TV use and TV viewing 2.90(+/-0.8)</p>	



<p>Trost et al., <i>American Journal of Preventive Medicine</i>/2009/Kansas/cross-sectional survey</p>	<p>N= 297 FCCH providers</p>	<p>NAPSACC survey</p>	<p>17.6% (95% CI: 12.8,22.3) providers have suitable space indoors when the weather is bad</p> <p>21.9% (95% CI: 16.5,27.2) providers display posters, pictures, or books about PA</p> <p>46.1% (95% CI: 39.8, 52.3) providers received training on PA 1 or more times per year</p> <p>30.2% (95% CI: 24.3,36) providers</p>	<p>62.7% (95% CI: 56.6, 68.7) providers restrict active play time for misbehavior</p>	<p>24.9% (95% CI: 19.5, 30.3) providers had a comprehensive written policy on PA</p>	<p>64.6% (95% CI: 58.7, 70.5) providers had the TV turned on every day for at least part of the day</p> <p>55.1% (95% CI: 48.7,61.4) providers allowed children to watch TV or videos at least once a day</p>	
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			provided PA education to parents				
<b>Sleep</b>							
Benjamin SE et al., <i>Pediatrics</i> / 2014/ Multistate/policy review of sleep regulations for child care facilities, including FCCHs, between August and December of 2013, across all 50 states and the District of Columbia	N= 50 US States, the District of Columbia, and US territories	Data on state licensing regulations for child care facilities collected from the National Resource Center for Health and Safety in Child Care ( <a href="http://nrc.uchsc.edu">http://nrc.uchsc.edu</a> )& commercial legal research database WestlawNextTM) and compared to IOM's 4 policy-based sleep recommendations related to obesity prevention			-0 states had regulations for all 4 or 3 of the sleep recommendations. -10 states had regulations for 2 of the IOM recommendations. -31 states had regulations related to encouraging practices that promote self-regulation. -11 states had recommendations related to providing restful sleep environments. -1 state, Virginia, had regulations regarding encouraging sleep promoting behaviors and practices -19 states updated regulations after release of IOM recommendations		<b><u>Geographic Differences</u></b>  -Southern states had fewer regulations  - Year of update (before vs. after release of IOM recommendations associated with number of regulations consistent with IOM (p=0.03) for FCCHs but not for centers

FCCH= Family Child Care Homes; BMI= body mass index; PA=physical activity, MVPA= moderate to vigorous physical activity, TPA= total physical activity

Table 2. Cognitive Mediators\_ Attitudes, Subjective Norm, Perceived Behavioral Control, Intent & Practices + Knowledge

Citation/Year/State/Method	Sample Size & Provider level, Child level Demographics (race/ethnicity, age, education, BMI, & SES)	Study Concepts ( <i>related TPB concepts</i> ) and Definitions	Results on TPB related concepts	Association between TPB concepts and child care practices	Demographic Moderators Mentioned or Analyzed
<p>Brann L.S., <i>J Pediatr Health Care</i>/ 2010/Onondaga County, central NY/ Cross-sectional survey</p>	<p>N= 123 FCCH providers</p> <p><i>Provider</i></p> <p><b>Race:</b> 84% White, 11% Black, 2% Hispanic, 0.8% Native American * 5 providers missing data</p> <p><b>Age:</b> 45% 20-40, 50% 41-60, 5% greater than 60 years</p> <p><b>Education level:</b> 30% college graduate or above, 66% HS graduate or some college, 4% some HS</p> <p><b>Avg BMI:</b> 27(+/-7.7)</p> <p><i>Children</i></p> <p><b>Avg age:</b> 4.5 years(+/-1.5)</p> <p><b>Avg household Income:</b> 42% &lt;40K, 52% 40-80K, 6% &gt;80K</p>	<p><b>Perceptions of childhood overweight</b> (<i>subjective norm</i>): perception of what is considered overweight by identifying drawings of boys and girls ranging from very thin to very heavy that lie in a gradient from thin to heavy</p> <p><b>Perceived Responsibility in Child Feeding</b> (<i>perceived behavioral control</i>)</p>	<p><b>Perception of childhood overweight</b> (<i>subjective norm</i>) Most providers chose a figure representing an above average-sized boy and girl as a cut off point for overweight</p> <p><b>Perceived Responsibility in child feeding</b> (<i>perceived behavioral control</i>) High level of responsibility for feeding and monitoring</p>	<p><b>Perception of childhood overweight</b> (<i>subjective norm</i>) Providers who selected smaller silhouettes for girls as a measure for overweight reported using more food restriction on girls (U=257.5, p=0.10).</p>	<p><b>Level of Education</b> Providers with a higher level of education were correlated with less pressuring of children to eat more food (r=-0.27, p&lt;0.01)</p> <p><b>Concerned about child weight</b> -relationship exist between concern about weight and restriction of unhealthy foods (r=0.27, p&lt;0.01)</p> <p>-providers who selected smaller silhouettes for girls were more likely to have more concern about the child's weight (U=235, p&lt;0.04)</p>

<p>Kim, J et al., <i>Matern Child Health J</i>/2012/ East Central Illinois/Cross-sectional analysis</p>	<p>N= 88 FCCH providers; 94 center-based providers</p>	<p><b>Perceptions</b> (<i>perceived behavioral control</i>)- providers' perceptions of the level of influence on children's healthy behaviors and weight status</p>	<p><b>Providers' perceptions of the level of influence on children's healthy behaviors and weight status</b> (<i>perceived behavioral control</i>)</p> <p>-Both the family and center-based providers felt that the home environment had more influence on healthy eating /pa habits and weight status of the children [paired t tests, all significant p values]</p> <p>-Family home child care providers ranked their influence higher than center based providers on health behaviors and weight status with the exception of physical activity.</p> <p>-Family home providers felt that home and center-based facilities shared similar influence</p>		<p><b>Level of Training</b></p> <p><u>Results</u></p> <p>-More than 55% of family child care providers received obesity prevention training within the past year, which is a marked difference 30% of center-based providers [*chi square, p=0.0005].</p> <p>-Highly trained family child care providers are also more likely to receive nutrition and physical activity training [*chi square ,p=0.0009, 0.0024 respectively]</p> <p>-Highly trained family child care providers are also more likely to disseminate healthy nutrition and physical activity information to children and physical activity and obesity prevention information to parents [all significant p values]</p> <p>*statistic not reported</p>
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			on physical activity of the children.		
Lindsay AC et al., <i>Journal of Obesity</i> /2015/MA/Focus Groups	<p>N=44 Latino FCCH providers; 4 Focus Groups</p> <p><i>Provider</i>  <b>Ethnicity:</b>  100% Latino  <b>Education Level</b>  -1/3 HS graduate or GED,  40% Some college  <b>Years of Experience</b>  93% up to 25 years of child care experience</p>	<p><b>Provider's perceptions, attitudes and practices related to nutrition and physical activity</b></p> <p><i>(attitudes):</i> perceptions of the Child and Adult Care Food Program and EEC:</p> <p><i>(attitudes):</i> attitudes related to communication with parents</p> <p><i>(subjective norm):</i> perception of child</p>	<p><b>Attitudes towards CACFP and EEC</b> <i>(attitudes):</i> providers felt CACFP policies were helpful and made a difference in the health of children attending FCCHs.</p> <p><b>Attitudes related to communication with parents</b> <i>(attitudes):</i> - Providers deemed</p>	<p><b>Attitudes related to communication with parents and communicating weight concerns to parents</b> <i>(attitudes):</i> Providers who reported being uncomfortable and reluctant to discuss child's weight felt that parents can be very sensitive to other people's perceptions of their children, and because of that they preferred not to talk about it with parents.</p> <p><b>Foods Served &amp; Portion sizes</b> <i>(subjective norm)</i>  -Providers report serving</p>	<p><b>Providers' place of birth</b>  -Providers who had formative years outside of US, in warmer climates, perceived winter as a barrier to PA more than US born providers</p>

		<p>weight status of kids in care of providers</p> <p><i>(subjective norm)</i>: beliefs about physical activity and sedentary behaviors</p> <p><i>(perceived behavioral control)</i>: provider control on what and how much children eat</p> <p><i>(perceived behavioral control)</i>: perceived barriers to PA &amp; healthy eating</p> <p><i>(perceived behavioral control)</i>: provider's belief related to their role</p> <p><i>(perceived behavioral control)</i></p> <p>Perceived Barriers to provision of healthy foods</p> <p>Strategies to Incorporate Nutritious Foods</p> <p><i>(Behavioral Intent)</i></p>	<p>communication with parents important and critical in understanding child's well-being at home</p> <p>-A few providers stated that they did not feel comfortable discussing children's weight status with parents.</p> <p><b>Perceptions of Child Weight Status</b> <i>(subjective norm)</i></p> <p>-few providers reported having some children at risk for overweight or obesity</p> <p>-majority of providers reported that they did not have major concerns about weight status of children currently under their care.</p> <p><b>Beliefs about PA and Sedentary Behavior</b> <i>(subjective norm)</i></p> <p>-Most providers believed that it is important for</p>	<p>foods aligned with recommendations from USDA</p> <p>-Many providers base portion sizes on age of child</p> <p><b>Perceptions of Child Weight Status and determining Portion sizes</b> <i>(subjective norm)</i></p> <p>-few providers reported having some children at risk for overweight or obesity and that this influenced their feeding practices, especially in determining portion sizes</p>	
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			<p>children to engage in PA throughout the day. However, the amount of time providers believed children should engage in PA varied (from 30 minutes to 2 hours)</p> <p><b>Foods Served &amp; Portion sizes</b>  <i>(perceived behavioral control)</i>          -providers perceive parents to be a barrier to healthy eating in FCCH</p> <p><b>Beliefs related to child feeding</b>  <i>(perceived behavioral control)</i>          -Perceived role is to nurture and educate children          -Most providers feel that they are confident in the abilities to serve healthy foods</p> <p><b>Perception on need to control feeding</b>  <i>(perceived behavioral control)</i></p>		
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			<p>-providers felt the need to control what and how much children eat</p> <p><b>Perceived Barriers to PA</b>  <i>(perceived behavioral control)</i>: Most providers believed lack of space and cold weather to be major obstacles for PA opportunities</p> <p><b>Perceived Barriers to provision of healthy foods</b>  <i>(perceived behavioral control)</i>:          -providers perceived that the high cost of organic and fresh fruits and vegetables does not enable them to purchase and provide these foods.          -providers perceive that the CACFP does not pay enough for purchase of organic and fresh fruits and vegetables</p>		
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			<p><b>Strategies to incorporate nutrition foods</b> <i>(behavioral intent)</i></p> <ul style="list-style-type: none"><li>-encouraging new foods</li><li>-meal planning</li><li>-participating in workshops</li></ul>		
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<p>Rosenthal et al., <i>J Nutr Educ Behav</i>/2013/CT/in-depth interviews</p>	<p>N=17 FCCH providers</p> <p><i>Provider</i></p> <p><b>Race/Ethnicity:</b> 29% African American, 53% White, 24% Latina</p> <p><b>Mean age:</b> 43 yrs(31-54)</p> <p><b>Mean yrs working in child care:</b> 13(5-32)</p> <p><b>Household income:</b> less than 50K (47%), 50-75K (29%), 75-100K (18%), more than 100K (6%)</p>	<p><b>Attitudes towards parents</b> (<i>attitudes</i>)</p> <p><b>Perceived Role in Obesity Prevention</b></p> <p>(<i>perceived behavioral control</i>)</p> <p><b>Strategies used to implement best practices in nutrition and PA</b></p> <p>(<i>behavioral intent</i>)</p>	<p><b>Attitudes towards parents</b> (<i>attitudes</i>)</p> <p>Providers expressed both empathy and frustration with parents.</p> <p><b>Perceived Role in Obesity Prevention</b> (<i>perceived behavioral control</i>)</p> <p>Family child care providers perceived that they had a personal responsibility in obesity prevention.</p> <p>Family child care providers discussed the importance of their role in sharing healthy foods with parents.</p> <p>Family child care providers acknowledged the supportive role of food guidelines, unannounced inspections from the government sponsored food</p>	<p><b>Strategies used to implement best practices in nutrition and PA</b> (<i>behavioral intent</i>)</p> <p>-Providers described how, at the first meeting with parents, they try to be clear with parents about food guidelines.</p> <p>-Some providers have written rules about food guidelines, and all described having a conversation with families about food guidelines.</p> <p>-Providers described using their own knowledge of child development to improve nutritional intake and incorporating dramatic play to facilitate times of high physical activity</p> <p>-Providers described how they incorporate another aspect of child development, socialization, to improve a child's nutrition.</p> <p>-Providers described how they use dramatic play to facilitate physical activity</p> <p>-Providers described sharing with parents both the actual food and the techniques they use</p>	
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			program, and the peer group.	to encourage children to eat nutritiously  -providers did not pressure kids to eat but were still concerned so helped the child to eat	
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<p>Tovar et al., <i>Childhood Obesity</i>/2015/RI/Focus groups</p>	<p>N= 30 FCCH providers; 4 Focus groups</p> <p><i>Provider</i></p> <p><b>Race/Ethnicity:</b> 100% female, Hispanic (predominantly Dominican, 77%), and Spanish speaking</p> <p><b>Level of Education:</b> 50% = some college education or a college degree or higher.</p> <p><b>Mean age:</b> 50 years</p>	<p><b>Perceptions on use of TV</b> (<i>subjective norm</i>)</p> <p><b>Perceptions and beliefs</b> regarding which factors influence children's PA, Screen time and dietary behaviors</p> <p>(<i>perceived behavioral control</i>)</p> <p><b>Perceived strategies to improve the Nutrition and PA environment of FCCHs</b></p> <p>(<i>behavioral intention</i>)</p>	<p><b>Provider Perceptions on Screen Time Behaviors</b> (<i>subjective norm</i>)</p> <p>-Most providers felt that screen time should be limited and rules should be in place to stop parents from leaving children at FCCH with ipad or a tablet</p> <p>-Providers perceived watching educational programs such as Dora the Explorer was not considered screen time and should not be limited since it's a form of learning</p> <p>-Providers use TV for food prep</p> <p>-Others felt that watching TV did not benefit child</p> <p><b>Provider's perceptions on How preschool-aged children can be physically active</b> (<i>perceived behavioral</i>)</p>	<p><b>Training and Feeding Practices</b></p> <p>--Often disconnect between providers belief on the importance of healthy foods and what they actually serve</p> <p>-providers perceive the CACFP program to help enhance knowledge on nutrition foods, yet some still do not follow nutrition guidelines of the food program due to cultural feeding practices</p> <p>-providers rely on child's age and physical stature to determine portion size instead of relying on age-appropriate guidelines for portion sizes</p> <p>-Due to training, providers appreciate the importance of not force feeding and being a role model during feeding mealtimes</p>	
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			<p><i>control)</i></p> <p>-Providers perceive that children have many opportunities to engage in physical activity in the home</p> <p>-Providers perceive that children are more active when outside</p> <p>-Providers perceive that there are opportunities indoor but needs to be scheduled into the provider's' day</p> <p><b>Influences on What and How Providers feed or offer PA opportunities for preschool-aged children</b> <i>(perceived behavioral control)</i></p> <p>-Perceived responsibility to provide children with nutritious foods</p> <p>-Perceived need to abide by program</p>	
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			<p>regulations, though some deem regulations as contributing to added stress</p> <ul style="list-style-type: none"> <li>-Culture influenced foods served</li> <li>-poor parental behavior influences the childcare environment</li> <li>-providers perceive parents' poor beliefs regarding PA to be a major barrier to PA in the FCCH.</li> <li>-providers perceive children's varying preferences to be a barrier to group PA</li> <li>-Fear of children getting hurt in home limits PA in home</li> <li>-winter weather</li> <li>-provider perceived 50F to be too cold to take children outside</li> </ul> <p><b>Perceived strategies to improve the Nutrition and PA environment of FCCHs</b> <i>(behavioral)</i></p>	
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			<i>intent</i> ) -More problem-based solutions oriented trainings, Programs and resources -Increased reimbursement for purchase of fruits and vegetables -improve communication with parents regarding proper nutrition and PA practices		
Vinci et al., <i>Journal of Obesity</i> /2016/Florida/Focus Groups	N= 27 FCCHs (75.9% of sample of child care providers)	<b>Subjective Beliefs of what is needed to ensure PA in Homes</b> <i>(perceived behavioral control)</i>	<b>Subjective Beliefs of what is needed to ensure PA in Homes</b> <i>(perceived behavioral control)</i>  FCCHs identified additional specific factors that were not raised by center staff including the need for activities that can be adapted for a wide range of ages.  Home providers also cautioned against providing physical		



			activities that required extensive space or equipment, since space is limited in FCCHs.		
Van Stan et al., <i>Childhood Obesity/2013/Delaware/survey</i>	N= 62% FCCHs; 5% Center owner; 84% CACFP	Survey modeled after Nemours' Delaware Child Care Provider Survey		Center staff scored significantly lower than family child care providers (14.7 versus 18 out of 26, $p < 0.001$ ) in Delaware's nutrition and physical activity rules	

FCCH= Family Child Care Homes; BMI= body mass index; PA=physical activity, MVPA= moderate to vigorous physical activity, TPA= total physical activity, U= Mann-Whitney test

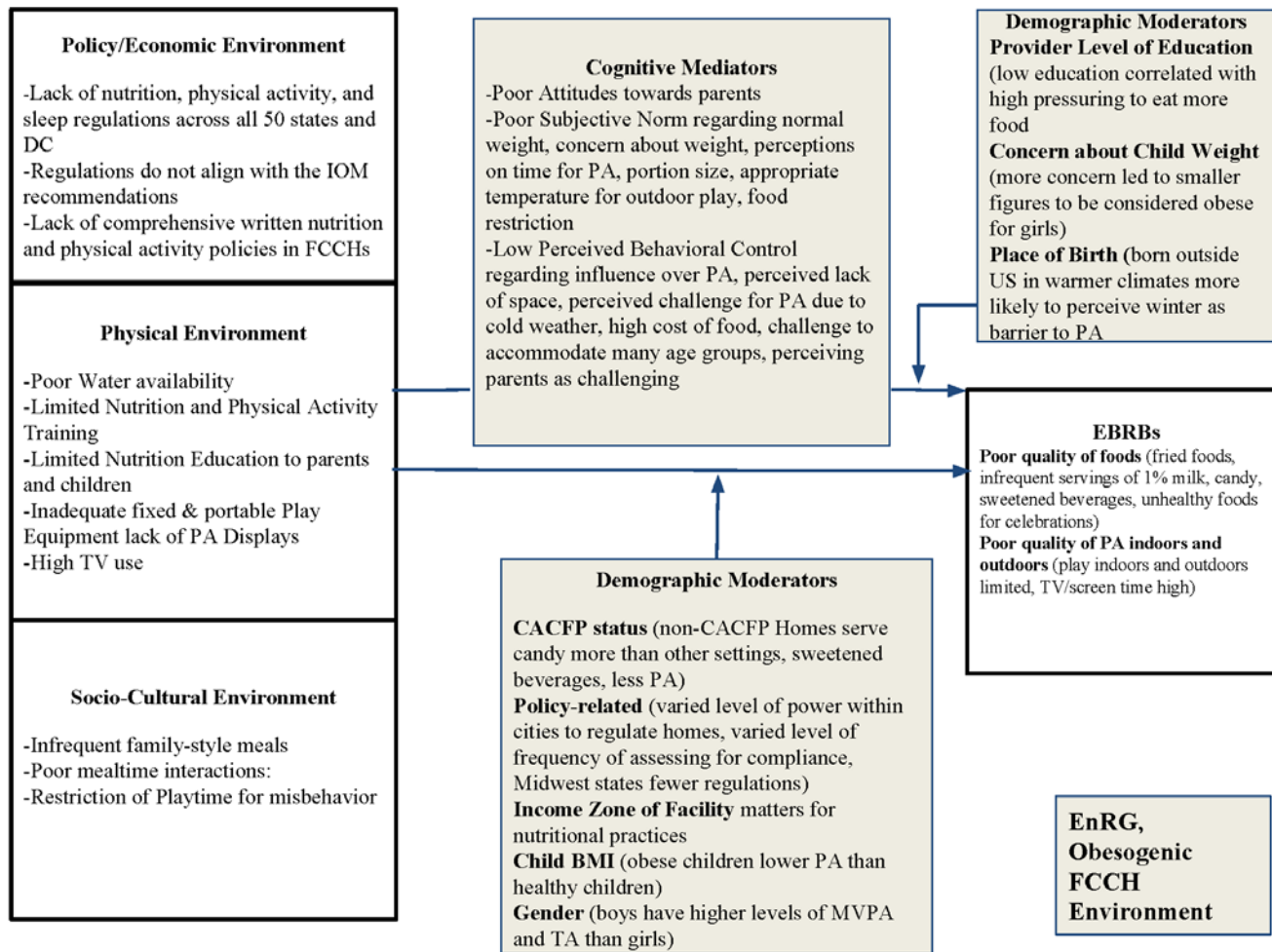


Figure 3. Map of the obesogenic FCCH environmental attributes

## **CHAPTER THREE: Mealtime Environment Matters: Examining the Sociocultural Food Environment of Baltimore’s Family Child Care Homes (Manuscript Two)**

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## **Abstract**

**Background:** Child care workers play an integral role in shaping early eating habits in young children. Parents consider family child care homes (FCCHs) as an attractive child care option because children are cared for by providers in an intimate home setting. Greater understanding is needed on the mealtime or sociocultural food environment in FCCHs and its relationship to the quality of foods offered by FCCH providers. The purpose of this study is to describe and examine the association between the sociocultural food environment and the quality and frequency of foods offered to 2-5-year-old children in FCCHs.

**Methods:** A proportionate stratified random sample of providers by the Child and Adult Care Food Program (CACFP) participation status (a federal subsidy program that provides monetary support for food) was recruited and a cross-sectional telephone survey was conducted using the Nutrition and Physical Activity Self-Assessment for Child Care (NAPSACC).

**Results:** A total of 91 providers (69 CACFP and 22 non-CACFP) participated in the survey. Fewer non-CACFP FCCHs exceeded child care nutrition standards in meal style delivery, encouragement of new foods, quality of vegetables served, and quality and frequency of whole grains served. In regression analyses, non-CACFP participating FCCHs were associated with lower sociocultural food environment mean scores ( $\beta=-0.18$ ,  $p=0.041$ ). The sociocultural food environment was positively associated with the frequency and quality of foods offered to children ( $\beta=0.26$ ,  $p=0.008$ ). These significant relationships persisted when adjusted for provider level characteristics.

CACFP participation status of FCCHs was not associated with the quality and frequency of foods offered.

**Conclusions:** Participating in the Child and Adult Care Food Program is associated with positive mealtime interactions in FCCHs. Although CACFP status is not associated with the quality and frequency of foods offered, the mealtime environment is positively associated with the quality and frequency of foods offered to 2-5-year-olds in FCCHs.

## **Introduction**

Nearly 2 million children less than five years of age are in the care of family child care providers, a labor force who provides care for children in a home setting outside the child's home.<sup>1</sup> Since young children spend the majority of the working day in early child care settings where they consume most of the day's meals, child care providers play a pivotal role in shaping children's preferences and habits surrounding food.<sup>2</sup> Hence, offering high quality foods in appropriate amounts and engendering positive mealtime interactions is necessary for children's adoption of healthy eating habits. Studies have shown that the quality of the sociocultural food or mealtime environment affects children's consumption of healthy foods.<sup>3-10</sup> For example, several studies have shown positive associations between parental or caregiver role modeling and encouragement with children's fruit and vegetable intake.<sup>3,4</sup> In one study maternal presence during meal times was associated with lower child BMI z scores.<sup>5</sup> In the child care arena, there are few studies that examine the sociocultural food or mealtime environment of FCCHs. One observational study reports that FCCH providers frequently praised the children for trying new foods and eating healthy foods. However, in response to children's mealtime behaviors, providers used both best practices and coercive controlling practices (i.e. insistence, pressuring, and threats) when responding to children's verbal and non-verbal refusals and acceptance of food.<sup>6</sup> In another study, only 27% of FCCH providers provided meals family style.<sup>11</sup> Few studies have examined the association between the sociocultural food environment and the quality of foods children consume in child care settings, and none that we found from FCCH.<sup>8-10</sup> Evidence from center-based child care facilities

shows that provider encouragement was associated with children eating more vegetables. Children's involvement in food prep was associated with less intake of sweet snacks<sup>8</sup> and greater new food acceptance in the absence of peer pressure.<sup>9</sup> Providers sitting with children and eating the same foods as children were associated with higher vegetable intake.<sup>10</sup>

The purpose of this study is to describe and examine the association between the sociocultural food environment and the quality and frequency of foods offered to 2-5-year-old children in FCCHs. An additional aim is to test whether participation in the Child and Adult Care Food Program (CACFP), a subsidy program instituted by the United States Department of Agriculture (USDA) that provides cash reimbursements to eligible providers for purchase of healthy foods,<sup>12</sup> is associated with the sociocultural food environment and with the quality and frequency of foods offered. A previous study that compares the quality of foods offered at CACFP and non-CACFP FCCHs shows that CACFP and non-CACFP FCCHs were significantly more likely to serve whole milk than centers ( $p < 0.001$ ) and more non-CACFP homes served candy and sweetened beverages compared to all other types of child care settings including CACFP homes (15.8% vs. 6.2% CACFP Home,  $p < 0.001$ ; 18.4% vs. 7.7%,  $p < 0.001$ , respectively).<sup>13</sup> However, few studies exist that compares the mealtime or sociocultural food environment of FCCHs by CACFP status.

This study is guided by the ANGELO framework, an acronym for the Analysis Grid for Environments Linked to Obesity, which identifies obesogenic or obesity promoting environmental attributes.<sup>14</sup> Applying the ANGELO framework, the sociocultural food environment refers to norms, values, and culture surrounding feeding interactions between caregivers and children. In this study, the sociocultural food



environment includes concepts such as provider role modeling behavior, presence during mealtimes, prompting and feeding cues, encouragement of new foods, respect for satiety, controlling and restrictive mealtime behavior, and feeding style (i.e. family style, pre-plated, pre-portioned).

## **Methods**

### **Study Sample and Participant Recruitment**

We requested and received a list of all licensed FCCH providers from the Maryland State Department of Education (MSDE), including mailing addresses, license numbers, phone numbers, and the CACFP participation status of Baltimore City's FCCHs. A proportionate stratified random sample of FCCHs was generated to reflect 75% CACFP and 25% non CACFP participating FCCHs. An effect size of 0.1 was used to determine sample size, primarily for detecting the association between the sociocultural food environment and the quality and frequency of foods offered in the FCCH. Based on the power analyses; a conservative target for enrollment was 92 FCCHs (69 CACFP homes and 23 non-CACFP homes). Recruitment letters were mailed to randomly selected providers in batches of 10-20 per week. Each recruitment letter was accompanied with a pre-stamped return postcard for the providers to specify disinterest in receiving a recruiting telephone call. After two weeks, providers who did not return the postcards were assumed to be interested and therefore contacted. Providers who were licensed at the time of the study, operated in Baltimore City, had at least one child aged 2-5 years old full time or half time, and were able to conduct the phone survey in English were eligible for this study. Providers who did not

provide lunch and snacks to the children were excluded from the study. Verbal consent was obtained from providers who participated in the 45-minute phone survey. Interviews were conducted between August 2015 and April 2017. This study was approved by the Johns Hopkins Institutional Review Board.

### **Survey & Content Validity**

Provider and child-level demographic questions regarding provider race, height and weight, the status of nutrition training within the past year, the level of education, years of child care experience, and number of children in care by age and racial groups were obtained. We used the NAP SACC (Nutrition and Physical Activity Self-Assessment for Child Care) Family Child Care Edition tool to assess the sociocultural food environment and the quality and frequency of foods offered.<sup>15,16</sup> The tool consists of a 4-point Likert scale; the range signifies whether child care nutrition standards have been adequately met (1 = barely met, 2 = met, 3 = exceeded, 4 = far exceeded child care standards). The lower the score on the subscale, the higher the level of obesogenicity of the provider feeding behaviors. There are 13 questions on the NAPSACC tool that measure the sociocultural food environment (i.e. provider role modeling behavior, prompting/feeding cues, encouragement of new foods, respect for satiety, use of foods to control behavior, and style of feeding (i.e. family style)). There are 15 questions that measure the quality and frequency of foods offered (i.e. fruit, vegetables, meats/fish, whole grain, snacks, fats and sugar, water, sugary drinks, and milk served by providers). The ranges of scores for the sociocultural food environment and the quality and quantity of foods offered are 13-52 and 15-60, respectively.

Application of the ANGELO framework guided the regrouping of the questions from the NAPSACC tool. A panel of 3 experts (expertise in instrument development, child care food environment research and obesity intervention research) were given definitions of each concept, a list of NAPSACC questions expected to measure each concept, and specific guidelines for judging the concordance between the questions and its assigned concept, either the sociocultural food environment or the quality and frequency of foods offered. Each reviewer rated each question using a 4 point rating scale (1=not relevant, 2= unable to assess relevance without item revision or item is in need of such revision that it would no longer be relevant, 3=relevant but needs minor alteration and 4=very relevant and succinct).<sup>17</sup> After reviewing and addressing each reviewer's comments, 100% agreement was achieved to establish content validity for each item. After data were obtained, we analyzed the scales for internal consistency reliability. Cronbach's alphas for the 13 sociocultural food environment and 15 quality and frequency of foods offered items were 0.60 and 0.58, respectively.

### **Statistical Analyses**

Normality, skewness, kurtosis, box plots, and histograms were all assessed. The prevalence or means and standard deviations for each demographic variable were calculated. Two-sample z-tests for proportions or independent sample t-tests were conducted to detect significant differences in proportions or means, respectively with 95% confidence intervals by CACFP participation status. Simple linear regressions were used to assess the association between CACFP participation status and the sociocultural environment mean score, as well as the association between the sociocultural food environment, mean score and the quality and frequency of foods

offered mean score. Multiple regressions were performed to analyze these relations while adjusting for provider characteristics. Pearson's chi square tests were used to examine the relations between categorical variables. We conducted all statistical analyses using STATA version 14, using  $p \leq 0.05$  as significant.<sup>18</sup>

## Results

A total of 91 FCCH providers (69 CACFP and 22 non-CACFP) were consented and interviewed. **Figure 4** provides a summary of the recruitment efforts. The majority of the FCCH providers (90.11%) were Black or African American, the mean (sd) years of experience was 18 years (9.5 years), 18% had a college degree or higher.

The only CACFP vs. non-CACFP provider difference is that 37% more CACFP providers reported having nutrition training within the past year (87% vs. 50%  $p=0.0003$ ). Pearson's chi square test show that the status of nutrition training within the past year is associated with the CACFP participation status of the FCCH ( $\chi^2(1)=13.3$ ,  $p=0.000$ ). There was no difference in the mean (sd) number of 2-5-year-old children ( $3.14 \pm 1.56$ ). A complete description of the study sample is found in **Table 3**.

**Table 4** provides the prevalence and 95% CI for percent of FCCHs who exceed (score of 3) or far exceed (score of 4) child care nutrition standards. Overall, irrespective of CACFP participation status, a high percentage of FCCHs exceed or far exceed child care nutrition standards as described in the NAPSACC tool. However, fewer than 50% of FCCHs serve meals family style most or all of the time. Significantly more CACFP than non-CACFP FCCHs serve meals family style, praised children for trying new or less-preferred food, reasoned with a child to eat healthy

foods, served high-quality vegetables at least three times per week, and provided high fat, high sugar foods once or fewer than once a day. Most providers do not provide sugary drinks such as sweet tea and soda, but more than 50% of CACFP and non-CACFP homes provide 100% juice more than once a day. Finally, significantly more non-CACFP homes serve mostly 1% or skim milk compared to CACFP homes.

The mean score (sd) for the sociocultural food environment was 3.15 (0.35); range 1 (barely met) to 4 (far exceeds) child care nutrition standards. There was not a significant difference in the mean scores for the sociocultural food environment for CACFP homes (M=3.19, SD=0.32) and non-CACFP homes (M=3.01, SD=0.42);  $t(29.5) = 1.82, p=0.08$ . The mean score (sd) for the frequency and quality of foods offered was 3.16 (0.33). There was not a significant difference in the mean score for frequency and quality of foods offered for CACFP homes (M=3.19, SD=0.31) and non-CACFP homes (M=3.08, SD=0.38);  $t(31) = 1.19, p=0.24$ .

A simple linear regression used to examine the association between CACFP participation status and the sociocultural food environment mean score shows a positive association. Non-CACFP homes are associated with lower sociocultural food environment scores ( $\beta = -0.18, p=0.041$ ). Since nutrition training status is associated with the CACFP status of FCCHs, when adjusting for nutrition training status, the significance is attenuated. Results are summarized in Table 5.

We examined the association between the sociocultural food environment and the quality and frequency of foods offered mean scores. The regression results are summarized in Table 6. In the regression results, we find that the sociocultural food environment is associated with the frequency and quality of foods offered to children ( $\beta=0.26, p=0.008$ ). Multiple linear regressions show that the relationship between

the sociocultural food environment and the quality and frequency of foods offered continues to be significant when adjusting for CACFP status and the nutrition training status of FCCH providers.

## **Discussion**

In this study, we examined the sociocultural food environment of FCCHs in Baltimore City. We also tested whether there was an association between the sociocultural food environment and the quality and frequency of foods offered to 2-5-year-old children in FCCHs. We found that FCCH providers report exercising best practices regarding the mealtime environment and the quality and frequency of the foods offered to 2-5-year-old children. Still, there are some areas researchers and child care practitioners can consider. Fewer than 50% of the FCCHs in this study reported serving meals family style. This percentage is comparable to what has been reported in the literature. In one study, only 27% of FCCH providers provided meals family style<sup>11</sup>. Family style dining is supported by many health and child care organizations because it provides social benefits to children and gives providers the opportunity to role model healthy eating. Recent evidence shows that delivering meals family style, instead of pre-plating or pre-portioning foods, was associated with lower levels of food restriction<sup>19</sup> and may prevent children from overeating.<sup>20</sup> Fewer non-CACFP FCCH providers reported having exceeded or far exceeded child care standards in the areas of encouragement of new foods, quality of vegetables served and the quality and frequency of whole grains served. Although CACFP status did not predict the quality and frequency of foods offered, regression results show that non-CACFP participating FCCHs were significantly associated with lower sociocultural food environment mean scores. This finding suggests

that the financial support and nutrition training provided to FCCHs by CACFP is associated with best nutrition child care practices. Additionally, CACFP providers are routinely audited to ensure that they are subscribing to best practices within the FCCH.<sup>12</sup>

Regarding beverages, most providers did not provide sugary drinks such as sweet tea and soda, but more than 50% of CACFP and non-CACFP homes provided 100% juice more than once a day. This is consistent with other findings that showed that more than half of the FCCH providers offered 100% fruit juice 3-4 times weekly.<sup>21</sup> The new CACFP nutrition guidelines that will go into effect in October 2017 require child care facilities, including FCCH, to serve no more than one serving of 100% fruit juice per day.<sup>11,22</sup> Significantly more non-CACFP homes served mostly 1% or skim milk compared to CACFP homes. This finding contradicts one study that showed that both CACFP and non-CACFP FCCHs were significantly more likely to serve whole milk than centers.<sup>13</sup>

Our results show that the sociocultural food environment was associated with the frequency and quality of foods offered to children, even when adjusting for CACFP status and the nutrition training status of the FCCH. This finding supports previous research in that the mealtime environment can affect the dietary intake of children.<sup>3-10</sup>

This study provides unique contributions to the body of child care nutrition research. This study examines the food environment of FCCHs in a major urban city with a majority of the providers and children being black or African-American. Furthermore, this study shows that the Child and Adult Care Food Program can be instrumental in fostering a positive mealtime environment in FCCHs.

Like most studies, there were several limitations to this study. First, because this was a cross-sectional survey, we were unable to determine causality. Second, although FCCHs were selected randomly, there may be bias inherent to recruiting willing participants. Also, the use of a self-report and the potential apprehension of reporting poor practices to the Maryland State Department of Education make this study susceptible to social desirability bias. To minimize this possibility, we emphasized that all data would be de-identified and reported in aggregate. Providers were also assured that the MSDE was not a part of the study team. All FCCHs were located within Baltimore City, Maryland, limiting the generalizability of our results. Finally, Cronbach alphas for the sociocultural environment and quality and frequency of foods offered subscales were about 0.6 which is close to the acceptable minimum of 0.7. An alpha of 0.7 provides an acceptable measure of the reliability of scales.

## **Conclusion**

This study shows that a high proportion of FCCH providers engage in best nutrition child care practices, with several areas for improvement, namely the meal style delivery, encouragement of new foods, quality of vegetables served and quality and frequency of whole grains served. In our findings, we find that the sociocultural food environment, specifically the mealtime environment, is positively associated with the quality and frequency of foods served to 2-5-year-old children in FCCHs. Additionally, non-CACFP participating FCCHs were associated with lower sociocultural food environment mean scores. Recruiting more FCCH providers to the CACFP may improve mealtime interactions between providers and children, and the quality and frequency of foods.



## References

1. Laughlin L. Who's Minding the Kids ? Child Care Arrangements : Spring 2011. *Househ Econ Stud.* 2013;2009(April):70-135.
2. Story M, Kaphingst K, French S. The role of child care settings in obesity prevention. *Futur Child.* 2006;16(1):143-168.
3. Pearson N, Biddle SJ, Gorely T. Family correlates of fruit and vegetable consumption in children and adolescents: a systematic review. *Public Health Nutr.* 2009;12(2):267. doi:10.1017/S1368980008002589.
4. McGowan L, Croker H, Wardle J, Cooke LJ. Environmental and individual determinants of core and non-core food and drink intake in preschool-aged children in the United Kingdom. *Eur J Clin Nutr.* 2012;66(3):322-328. doi:10.1038/ejcn.2011.224.
5. McCurdy K, Gorman KS, Kislner T, Metallinos-Katsaras E. Associations between family food behaviors, maternal depression, and child weight among low-income children. *Appetite.* 2014;79:97-105. doi:10.1016/j.appet.2014.04.015.
6. Tovar A, Vaughn AE, Fallon M, et al. Providers' response to child eating behaviors: A direct observation study. *Appetite.* 2016;105:534-541. doi:10.1016/j.appet.2016.06.020.
7. Trost SG, Messner L, Fitzgerald K, Roths B. Nutrition and Physical Activity Policies and Practices in Family Child Care Homes. *Am J Prev Med.* 2009;37(6):537-540. doi:10.1016/j.amepre.2009.09.020.
8. Gubbels JS, Gerards SMPL, Kremers SPJ. Use of Food Practices by Childcare Staff and the Association with Dietary Intake of Children at Childcare. *Nutrients.*

- 2015;7(4):2161-2175. doi:10.3390/nu7042161.
9. Hendy HM. Effectiveness of trained peer models to encourage food acceptance in preschool children. *Appetite*. 2002;39:217-225. doi:10.1006.
  10. Kharofa RY, Kalkwarf HJ, Khoury JC, Copeland KA. Are Mealtime Best Practice Guidelines for Child Care Centers Associated with Energy, Vegetable, and Fruit Intake? *Child Obes*. 2016;12(1):52-58. doi:10.1089/chi.2015.0109.
  11. Trost SG, Messner L, Fitzgerald K, Roths B. Nutrition and Physical Activity Policies and Practices in Family Child Care Homes. *Am J Prev Med*. 2009;37(6):537-540. doi:10.1016/j.amepre.2009.09.020.
  12. USDA. [www.fns.usda.gov](http://www.fns.usda.gov). <https://www.fns.usda.gov/cacfp/child-and-adult-care-food-program>.
  13. Ritchie LD, Boyle M, Chandran K, et al. Participation in the child and adult care food program is associated with more nutritious foods and beverages in child care. *Child Obes*. 2012;8(3):224-229. doi:10.1089/chi.2011.0061.
  14. Swinburn B, Egger G, Raza F. Dissecting obesogenic environments: the development and application of a framework for identifying and prioritizing environmental interventions for obesity. *Prev Med (Baltim)*. 1999;29(6 Pt 1):563-570. doi:10.1006/pmed.1999.0585.
  15. Ward D, Hales D, Haverly K, et al. An Instrument to Assess the Obesogenic Environment of Child Care Centers. *Am J Heal Behav*. 2008;32(4):380-386.
  16. Ammerman AS, Ward DS, Benjamin SE, et al. An intervention to promote healthy weight: Nutrition and Physical Activity Self-Assessment for Child Care (NAP SACC) theory and design. *Prev Chronic Dis*. 2007;4(3): A67.

17. LYNN MR. Determination and Quantification Of Content Validity. *Nurs Res.* 1986;35(6):382-386. doi:10.1097/00006199-198611000-00017.
18. StataCorp. Stata Statistical Software: Release 14. 2015.
19. Loth KA, Horning M, Friend S, Neumark-Sztainer D, Fulkerson J. An Exploration of How Family Dinners Are Served and How Service Style Is Associated With Dietary and Weight Outcomes in Children. *J Nutr Educ Behav.* 2017;49(6):513-518.e1. doi:10.1016/j.jneb.2017.03.003.
20. Fisher JO, Rolls BJ, Birch LL. Children's bite size and intake of an entrée are greater with large portions than with age-appropriate or self-selected portions. *Am J Clin Nutr.* 2003;77(5):1164-1170. doi:10.1016/j.surg.2006.10.010.
21. Tandon PS, Garrison MM, Christakis DA. Physical Activity and Beverages in Home- and Center-based Child Care Programs. *J Nutr Educ Behav.* 2012;44(4):355-359. doi:10.1016/j.jneb.2011.10.009.
22. United States Department of Agriculture. *Child and Adult Care Food Program: Meal Pattern Revisions Related to the Healthy, Hunger-Free Kids Act of 2010; Final Rule.* Washington (DC); 2016. <https://www.gpo.gov/fdsys/pkg/FR-2016-04-25/pdf/2016-09412.pdf>.

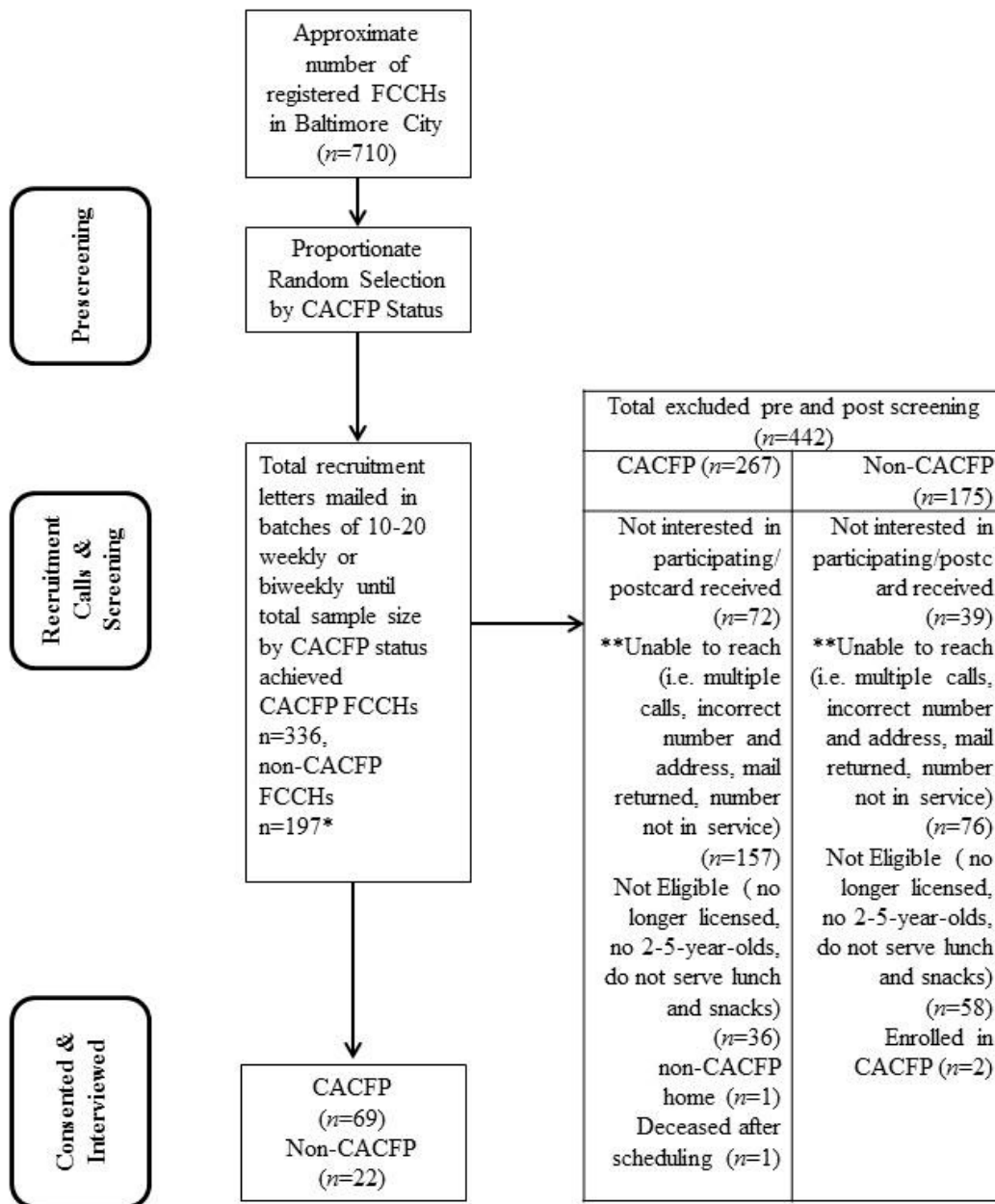


Figure 4. Flowchart describing recruitment efforts. \* An updated list was requested to obtain newly registered non-CACFP homes to attempt to meet sample size. \*\* contact information verified through online White and Yellow Pages as well as updated lists by MSDE

Table 3. Characteristics of Participants by CACFP status

Characteristics	Total Sample	CACFP status		Difference in proportion or means by CACFP status,
	N=91	CACFP (n=69)	Non-CACFP (n=22)	Difference, [95% CI], p value
	n (%) / Mean (SD)	n (%) / Mean (SD)	n (%) / Mean (SD)	
<b>Provider-level</b>				
<b>Race/Ethnicity</b>	Black/AA: 82 (90.11%) White/Caucasian: 6 (6.59%) Mixed Race: 2 (2.2%) Hispanic: 1 (1.1%) Jewish (White): 2 (2.2%) No reply: 1	Black/AA: 63 (91.3%) White/Caucasian: 4 (5.80%) Mixed Race: 1 (1.45%) Hispanic: 1 (1.45%) Jewish (White): 1 (1.45%) No reply: 1 (1.45%)	Black/AA: 19 (86.36%) White/Caucasian: 2 (9.09%) Mixed Race: 1 (4.55%) Jewish (White): 1 (4.55%)	Black/AA: 4.94%, [-11.99, 21.9%] White/Caucasian: 3.29%, [-42.7%, 49.2%] Mixed Race: Jewish (White):
<b>Level of Experience (yrs.)</b>	18.04 years ± 9.46 years	18.64 years ± 8.82 years	16.14 years ± 11.24 years	2.5 years ± 2.62 p=0.35
<b>Highest Level of Education completed</b>	Some HS: 1 (1.10%) Completed HS or GED: 32 (35.16%) Some College: 41 (45.05%) College graduate & above: 16 (17.58%) NR: 1 (1.10%)	Some HS: 1 (1.45%) Completed HS or GED: 26 (37.68%) Some College: 31 (44.93%) College graduate & above: 10 (14.49%) NR: 1 (1.45%)	Completed HS or GED: 6 (27.27%) Some College: 10 (45.45%) College graduate & above: 6 (27.27%)	Completed HS or GED: 10.4%, p=0.374 Some College: 0.52%, p=0.97 College graduate & above: 12.8%, p=0.17
<b>Level of Education (yrs.)</b>	14.51 years ± 1.70 years	14.41 years ± 1.75 years	14.82 years ± 1.56 years	0.41 ± 0.39 p=0.30
<b>Nutrition Education within past year</b>	Yes: 71 (78.02%) No: 20 (21.98%)	Yes: 60 (86.96%) No: 9 (13.04%)	Yes: 11 (50%) No: 11 (50%)	37% [14.6%, 59.3%] p=0.0003
<b>Provider Body Mass Index (BMI) kg/m<sup>2</sup></b>	29.67 kg/m <sup>2</sup> ± 4.69 kg/m <sup>2</sup>	29.39 kg/m <sup>2</sup> ± 4.70 kg/m <sup>2</sup>	30.62 kg/m <sup>2</sup> ± 4.65 kg/m <sup>2</sup>	1.23 ± 1.19 kg/m <sup>2</sup> p=0.308
<b>Accepts Childcare subsidy vouchers</b>	77 (84.62%)	61 (88.41%)	16 (72.73%)	15.7% [-4.4%, 3.6%] p=0.08
<b>Monthly Food Costs</b>	\$639.38 ± 383.12	\$671.51 ± 381.34	\$526.94 ± 378.40	\$144.57 ± 101.31 p=0.165
<b>% Reimbursement by CACFP (only among CACFP homes)</b>		<50%: 9 (13.04%) 50-74%: 14 (20.29%) 75-99%: 28 (40.58%) 100%: 14 (20.29%) No Reply: 4 (5.80%)		
<b>Food Source</b>	Supermarkets: 78 (85.71%)	Supermarkets: 62 (89.86%)	Supermarkets: 16 (72.73%)	Supermarkets: 17.13%, p=0.05 (72.73%)

	Corner Convenience Stores: 2 (2.2%) Grocery Stores: 9 (9.89%) Wholesale Warehouses: 53 (58.24%) Farmer's Market: 15 (16.48%)	Corner Convenience Stores: 1 (1.45%) Grocery Stores: 7 (10.14%) Wholesale Warehouses: 44 (63.77%) Farmer's Market: 11 (15.94%)	Corner Convenience Stores: 1 (4.55%) Grocery Stores: 2 (9.09%) Wholesale Warehouses: 9 (40.91%) Farmer's Market: 4 (18.18%)	Corner Convenience Stores: 3.1%, p=0.39 Grocery Stores: 1.1%, p=0.89 Wholesale Warehouses: 22.9%, p=0.06 Farmer's Market: 2.24%, p=0.81
<b><u>Child-level</u></b>				
<b>Total children</b>	525 (5.769 ± 2.371)	412 (5.97 ± 2.03)	113 (5.136 ± 3.196)	0.83 [-0.31, 1.98] p=0.15
<b>0-23 month old</b>	112 (1.230 ± 0.932)	92 (1.333 ± 0.886)	20 (0.091 ± 1.019)	1.242±0.24 [0.75, 1.74] p<0.0001
<b>2-5 year old</b>	286 (3.14 ± 1.560)	227 (3.2898 ± 1.5058)	59 (2.6818 ± 1.6729)	0.61 [-0.21, 1.42] p=0.14
<b>Above 5 years old</b>	127 (1.3956 ± 1.632)	93(1.3478 ± 1.5980)	34 (1.5454±1.76547)	0.198 [-0.66, 1.06] p=0.64
<b>Race/Ethnicity</b>	Black/AA: 444 (93.33%) White/Caucasian: 47 (17.98%) Mixed Race: 20(10.11%) Hispanic: 11 (6.66%)	Black/AA: 351 (94.12%) White/Caucasian: 35 (17.91%) Mixed Race: 17(11.94%) Hispanic: 5 (4.41%)	Black/AA: 93 (90.91%) White/Caucasian: 12 (18.18%) Mixed Race: 3(4.55%) Hispanic: 6 (13.65%)	Black/AA: 3.21%, p=0.60 White/Caucasian:0.27%, p= 0.98 Mixed Race:7.39%, p=0.32 Hispanic: 9.24%, p=0.13

Table 4. Prevalence and 95% CI's for high-quality nutritional environment ((3) exceeding & (4) far exceeding child care standards) of Baltimore's Family Child Care Homes by CACFP status

NAPSACC Items	Total Percentage [95% CI]	CACFP Percentage [95% CI]	Non-CACFP Percentage [95% CI]	Difference in proportions by CACFP status [95% CI] p value
<b>Sociocultural Environment</b>				
Mealtime				
Meals are served family style most or all of the time	27.5% [18.6%, 37.8%]	33.3% [22.4%, 45.7%]	9.1% [1.1%, 29.2%]	24.2% [7.9%, 40.6%] P=0.027
Provider consumes the same food and drinks as the children often or always	61.5% [50.8%, 71.6%]	65.2% [52.8%, 76.3%]	50% [28.2%, 71.8%]	15.2% [8.51, 38.9%] P= 0.202
Provider eats or drinks less-healthy foods (ie soda, chips, cookies, fried foods) in front of the children sometimes or rarely or never.	95.6% [89.1%, 98.8%]	94.2% [85.8%, 98.4%]	100% [84.6%, 100%*]	5.8% [0.28%, 11.3%] p=0.248
Providers role model healthy eating often or at every meal and snack time	82.4% [73.0%, 89.6%]	85.5% [75%, 92.8%]	72.7% [49.8%, 89.3%]	12.8% [-7.59%, 33.2%] p=0.170
Providers praise children for trying new or less-preferred foods often or always	95.6% [89.1%, 98.8%]	98.6% [92.2%, 100%]	86.4% [65.1%, 97.1%]	12.2% [-2.4%, 26.8%] p=0.015
Providers ask children if they are full before removing their plates often or always when children eat less than half of a meal or snack	75.3% [65.0%, 83.8%]	79.4% [67.9%, 88.3%]	61.9% 38.4%, 81.9%	17.5% [-5.38%, 40.4%] p=0.104
When children request seconds, providers ask if they are still hungry before serving more food most or all of the time.	55% [44.2%, 65.4%]	55.1% [42.6%, 67.1%]	54.6% [32.2%, 75.6%]	0.52% [-23.4%, 24.4%] p=0.966
Children are required to finish everything on their plate before leaving the meal table sometimes or rarely or never.	72.5% [62.2%, 81.4%]	68.1% [55.8%, 78.8%]	86.4% [65.1%, 97.1%]	18.3% [0.24%, 36.4%] p=0.094
Reason with a child	49.4%	56.7%	27.3%	29.5%

to eat healthy foods	[38.7%, 60.2%]	[44.04%, 68.8%]	[10.7%, 50.2%]	[7.38%, 51.5%] p=0.017
Use of children's preferred foods to encourage them to eat vegetables or less-preferred foods	83.52% [74.3%, 90.5%]	84.1% [73.3%, 91.8%]	81.8% [59.7%, 94.8%]	2.24% [-16.04, 20.5%] p=0.805
Providers use food to calm upset children sometimes or rarely or never	94.5% [87.6%, 98.2%]	95.7% [87.8%, 99.1%]	90.9% [70.8%, 98.9%]	4.74% [-8.20%, 17.7%] p= 0.396
Hands on help	86.7% [77.9%, 92.9%]	89.9% [80.2%, 95.8%]	76.2% [52.8%, 91.8%]	13.7% -5.90%, 33.2% p=0.107
Providers remind children to drink water during indoor and outdoor playtime often or all of the time	85.7% [76.8%, 92.2%]	88.4% [78.4%, 94.9%]	77.3% [54.6%, 92.2%]	11.12% [-7.95%, 30.2%] P=0.194
<b>Frequency and Quality of Foods Served</b>				
<b>Fruits and vegetables</b>				
Fruit (not juice) is served >=1 times per day	97.8% [92.3%, 99.7%]	97.1% [89.9%, 99.6%]	100% [84.6%, 100%*]	2.9% [-1.06%, 6.86%] p=0.419
Fruit is served fresh, frozen, or canned in its own juice often or every time fruit is served	90.1% [82.1%, 95.4%]	88.4% [78.4%, 94.9%]	95.5% [77.2%, 99.9%]	7.04% [-4.39%, 18.6%] p=0.331
Vegetables (not including French fries or fried potatoes) are served >=1 times per day	91.2% [83.4%, 96.1%]	94.2% [85.8%, 98.4%]	81.8% [59.7%, 94.8%]	12.4% [-4.65%, 29.41%] p= 0.074
Vegetables that are dark green, red, orange, or yellow in color are served at least 3 times per week.	92.3% [84.8%, 96.9%]	95.7% [87.8%, 99.1%]	81.8% [59.7%, 94.8%]	13.8% [-2.99%, 30.65%] p=0.034
Cooked vegetables are rarely or sometimes served with added meat fat, margarine, or butter.	81.3% [71.8%, 88.7%]	81.2% [69.9%, 89.6%]	81.8% [59.7%, 94.8%]	0.6% [-17.9%, 19.2%] p= 0.945
Fried or prefried potatoes (french fries, tater tots, hash browns) are served <2 times per week.	64.8% [54.1%, 74.6%]	68.1% [55.8%, 78.8%]	54.5% [32.2%, 75.6%]	13.6% [-9.95%, 37.1%] p=0.245
<b>Meats</b>				
Fried or prefried meats (chicken nuggets) or fish (fish sticks) are served <2 times per week.	56.2% [45.3%, 66.7%]	52.9% [40.4%, 65.2%]	66.7% [43.0%, 85.4%]	13.7% [-9.7%, 37.1%] p=0.268



High-fat meats (sausage, bacon, hot dogs, bologna, ground beef) are served <2 times per week.	69.3% [58.6%, 78.7%]	70.2% [57.7%, 80.7%]	66.7% [43.0%, 85.4%]	3.48% [-19.5%, 26.4%] P=0.763
Lean meats (baked or broiled chicken, turkey, or fish) are served >= 3 times per week.	56.2% [45.3%, 66.7%]	56.7% [44.0%, 68.8%]	54.6% [32.2%, 75.6%]	2.17% [-21.8, 26.1%] p=0.859
<b>Whole Grains</b>				
whole grain foods including whole wheat bread, whole-wheat crackers, oatmeal, brown rice offered >= 1 time per day.	65.9% [55.3%, 75.5%]	72.5% [60.4%, 82.5%]	45.5% [24.4%, 67.8%]	27.0% [3.69%, 50.3%] p=0.020
High fat, high sugar foods (cookies, cakes, doughnuts, pudding, muffins) offered </ = 1 time per week	92.1% [84.3%, 96.7%]	97.0% [89.6%, 99.6%]	76.2% [52.8%, 91.8%]	20.8% [2.15%, 39.5%] p=0.002
<b>Beverages</b>				
100% fruit juice is served <1 times per day.	31.9% [22.5%, 42.5%]	30.4% [19.9%, 42.7%]	36.4% [17.2%, 59.3%]	5.93% [-16.9, 28.8%] P=0.603
Sugary drinks (Kool-aid™, sports drinks, sweet tea, punches, soda) other than 100% juice are served only a few times a year or never	86.8% [78.1%, 93%]	87% [76.7%, 93.9%]	90.9% [70.8%, 98.9%]	3.95% [-10.5%, 18.4%] p=0.621
Milk served to children aged >=2 years is mostly 1% or skim.	55% [44.2%, 65.4%]	62.3% [49.8%, 73.7%]	86.4% [65.1%, 97.1%]	24.1% [5.7%, 42.4%] p= 0.035*
Flavored milk served </= 1 time per week	91.1% [83.2%, 96.1%]	91.2% [81.8%, 96.7%]	90.9% [70.8%, 98.9%]	.27% [-13.50%, 14%] p=0.970

Table 5. Multiple regression models predicting the sociocultural food and environment and the quality and frequency of foods offered

Predictor Variables	Outcome Variable: Sociocultural Food Environment Mean Score (SFE)					Outcome Variable: Quality and Frequency of Foods Offered Mean Score (FO)				
	$\beta$ coefficient	Std. Error	t	p-value	R <sup>2</sup>	$\beta$ coefficient	Std. Error	t	p-value	R <sup>2</sup>
Analysis 1: $\beta_0 + \beta_1$ CACFP Status										
CACFP status (Yes or No)	-0.18	0.085	-2.08	0.041	0.046	-0.1	0.081	-1.28	0.202	0.02
Analysis 2: $\beta_0 + \beta_1$ CACFP Status+ $\beta_2$ nutrition training										
CACFP status (Yes or No)	-0.18	0.092	-1.94	0.056	0.046	-0.077	0.087	-0.88	0.383	0.025
Nutrition Training within the past year in which certificate was provided (Yes or No)	0.008	0.095	0.09	0.931		-0.073	0.09	-0.81	0.422	

Table 6. Multiple regression models predicting the quality and frequency of foods offered mean score using sociocultural food environment, CACFP participation status, nutrition training

Predictor Variables	$\beta$ coefficient t	Std. Error	t	p- value	R <sup>2</sup>
Analysis One: FO= $\beta_0$ + $\beta_1$ SFE					
Sociocultural Food Environment Mean Score	0.26	0.095	2.72	0.008	0.077
Analysis Two: FO= $\beta_0$ + $\beta_1$ SFE+ $\beta_2$ CACFP status					
Sociocultural Food Environment Mean Score	0.244	0.098	2.49	0.015	0.083
CACFP Status (Yes or No)	-0.06	0.08	-0.76	0.452	
Analysis Three: FO= $\beta_0$ + $\beta_1$ SFE+ $\beta_2$ nutrition training					
Sociocultural Food Environment Mean Score	0.025	0.096	2.64	0.01	0.089
Nutrition Training within past year in which certificate was provided (Yes or No)	-0.087	0.081	-1.08	0.283	
Analysis Four: FO= $\beta_0$ + $\beta_1$ SFE+ $\beta_2$ nutrition training+ $\beta_3$ CACFP status					
Sociocultural Food Environment Mean Score	0.244	0.098	2.49	0.015	0.09
CACFP Status (Yes or No)	-0.033	0.087	-0.38	0.706	
Nutrition Training within past year in which certificate was provided (Yes or No)	-0.075	0.087	-0.85	0.396	

## **CHAPTER FOUR: Examining the macro and micro physical food environment of Family Child Care Homes (Manuscript 3)**

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## **Abstract**

**Background:** Family Child Care Homes (FCCHs) are a popular child care choice for parents of 2-5-year-old children. However, little is known about its food environment. Given the current obesity rates in young children, it is essential for FCCH providers to promote a food environment that is supportive of a healthy intake of nutritious foods among young children. The purpose of this study is to describe and examine the association between the macro and micro physical food environment of FCCHs and the quality and frequency of foods offered to 2-5-year-old children by FCCH providers.

**Methods:** A proportionate stratified random sample of 91 FCCH providers by Child and Adult Care Food Program (CACFP) participation status (a federal subsidy program that provides monetary support for food) were surveyed over the phone using the Nutrition and Physical Activity Self-Assessment for Child Care (NAPSACC) tool. The NAPSACC tool was used to assess the micro physical food environment and the quality and frequency of foods offered. Participants' addresses were spatially joined with a food desert map to assess the macro physical food environment of the FCCH. Pearson's chi square tests of independence were conducted to examine the associations between the food desert status and the CACFP participation status of FCCHs. Multiple linear regressions were conducted to examine the association between the micro and macro physical food environment and the quality and frequency of foods offered to 2-5-year-old children while adjusting for provider level characteristics.

**Results:** Nutrition training within the past year in which a certificate of completion was provided was associated with the micro physical food environment mean score,

even when adjusting for CACFP participation status ( $\beta=-0.242$ ,  $p=0.011$ ). No significant associations were found between the mean scores of the micro physical food environment and the quality and frequency of foods offered to 2-5-year-old children. No significant associations were found between the food desert status of a FCCH and the CACFP status of FCCHs or the quality and frequency of foods offered mean score.

**Conclusions:** Providing quality nutrition training for providers may be useful to improving the physical food environment inside FCCHs.

## **Introduction**

Family Child Care Homes (FCCHs) provides child care to approximately 2 million children under five years of age in a home environment outside the child's home.<sup>1</sup> Young children consume more than half of their Recommended Dietary Allowances in child care and have a high prevalence of overweight and obesity.<sup>1,2</sup> FCCH providers have an opportunity to impact children's food choices. Despite the growing body of nutrition related child care research, little attention has been paid to assessing the food environment of FCCHs.

Evidence shows that the macro and micro physical food environment of homes is related to the quality of nutrition intake of children.<sup>3-8</sup> For example, on a micro level, a population based survey shows that the use of TV or electronic devices during meal times was associated with lower odds of parents serving nutritious foods such as greens, fruit, vegetables at meals and increased odds of serving sugar sweetened beverages.<sup>3</sup> Other studies show that family style meals,<sup>4</sup> presence of quality menus planned,<sup>5</sup> and nutrition education to children and families<sup>6,7</sup> are related to positive feeding practices among caregivers and families. On a macro level, food desert studies have shown that children and caregivers who live in neighborhoods with poor access to quality supermarkets are more likely to engage in obesogenic behaviors<sup>8</sup> and make poor decisions when purchasing foods.<sup>9</sup> Too few studies, however, have examined the relationship between the macro and micro physical food environment and the quality and frequency of foods offered to young children in the context of FCCHs.

To enhance access to healthy foods in child care, the United States Department of Agriculture (USDA) provides funds to states to institute the Child and

Adult Care Food Program (CACFP), a subsidy program that provides monetary support to eligible child care providers for the purchase of nutrient-dense foods.<sup>10</sup> The program's dietary guidelines are based on the Dietary Guidelines for Americans which provides a framework for the type of meals and snacks that are offered to children.<sup>11</sup> Participating child care providers are required to keep an audit trail of foods purchased, food preparation, and foods served. If funds are available, providers of the CACFP attend nutrition training offered by a sponsoring agency. Nearly 30% of children who are enrolled in CACFP funded child care are cared for by family child care providers.<sup>12</sup> There are insufficient studies that have examined the impact of the CACFP on the physical food environment of the FCCH.

The purpose of this study is to describe and examine the association between the macro and micro physical food environment of FCCHs and the quality and frequency of foods offered to 2-5-year-old children by FCCH providers. An additional aim is to test whether participation in the Child and Adult Care Food Program (CACFP) is associated with the physical food environment and with the quality and frequency of foods offered.

This study is guided by the ANGELO framework, an acronym for the Analysis Grid for Environments Linked to Obesity. It is a prioritizing framework which identifies obesogenic or obesity promoting environmental attributes within the physical, socio-cultural, political and economic environment at both the macro and micro level.<sup>13</sup> The ANGELO framework has been used to guide obesity related studies both nationally and internationally. For example, the ANGELO framework has been used in several studies to help identify environmental factors that lead to obesity and chronic diseases in both the local community<sup>14,15</sup> and specialty settings such as psychiatric



hospitals.<sup>16</sup> The ANGELO framework has also been used to evaluate environmental action plans initiated by community boards to address obesity<sup>17</sup>, used to guide instrument development aimed at examining the obesogenicity of environments<sup>18</sup> and used to develop interview guides to elicit information on the implementation of nutrition policy implementation in schools.<sup>19</sup>

Applying the ANGELO framework in this study, the macro physical food environment refers to what is available outside the FCCH. The food desert status of a FCCH was used to assess the macro physical food environment. The micro physical food environment refers to what is available inside the house. It includes the less tangible items such as availability of nutrition education for the children and parents in the FCCH. The NAPSACC tool was used to assess the micro physical food environment (i.e. presence of TVs during mealtimes, the presence of nutrition displays, presence and quality of menus, type of meal delivery, and availability of nutrition education to children and families).

## **Methods**

This study was approved by the Institutional Review Board of Johns Hopkins University. All subjects provided verbal consent over the phone before participating in the study. Data were collected between August 2015 and April 2017.

### **Study Sample and Recruitment**

There are approximately 710 registered FCCHs in Baltimore City. Among children who attend child care, about 12% of children in the 2-4 age group are placed in Baltimore's FCCHs. In Maryland, registered FCCHs can provide care to a maximum

of 8 children with no more than two under the age of 2 years. To maintain licensure, the family child care provider must meet child health and safety requirements outlined in the Code of Maryland Regulations (COMAR 13A.15).

We obtained the list of all licensed family child care providers with their contact information from the Maryland State Department of Education (MSDE), the licensing agency that provides regulatory oversight to child care facilities in the state of Maryland. The list included license numbers, license expiration date, legal names, business addresses, telephone numbers, and the CACFP status of the FCCHs. A proportionate stratified random sample of FCCHs was generated to reflect 75% CACFP and 25% non CACFP homes in Baltimore City. An effect size of 0.1 was used to determine sample size. Based on the power analyses; a conservative target for enrollment was 92 FCCHs (69 CACFP homes and 23 non-CACFP homes).

Recruitment letters were mailed to the randomly selected providers in batches of 10-20 mailings per week. Each recruitment letter was accompanied with a pre-stamped return postcard for the providers to indicate their disinterest in receiving a telephone call. After two weeks, providers who did not return the postcard by mail were contacted by phone. Providers who were licensed at the time of the call, operated in Baltimore City, had at least one child aged 2-5 years old full time or part time, and were able to conduct the phone survey in English were eligible for the study.

Providers who did not provide at least lunch and snacks were unable to participate. Verbal consent was obtained, and interviews were either scheduled or conducted in the same recruiting phone call. Each interview lasted approximately 45 minutes.

### **Survey Data Collection (Micro Physical Food Environment)**

Data regarding provider race/ethnicity, height and weight, the status of nutrition training within the past year in which a certificate was provided, the level of education, years of child care experience, and number of children in care by age and racial and ethnic groups were obtained. In this study, the NAPSACC Family Child Care Edition tool was used to examine the micro physical food environment within the FCCH and the quality and frequency of foods offered. The tool was created to measure the obesogenic nutrition environment of Family Child Care Homes.<sup>20</sup> It consists of a 4-point Likert scale where the range in numbers signify whether child care nutrition standards have been adequately met (1 = barely met, 2 = met, 3 = exceeded, 4 = far exceeded child care standards). The ranges of scores for the micro physical food environment and the quality and quantity of foods offered are 13-52 and 15-60, respectively. The range of scores represents a continuum of obesogenicity of the environment. The lower the score, the higher the level of obesogenicity of the nutrition environment or quality and frequency of foods offered. Thirteen items in the survey cover topics related to the micro physical food environment (presence of TVs during mealtimes, nutrition displays, availability and quality of menus, type of meal delivery and availability and quality of nutrition education for providers and parents) and 15 questions cover topics related to the quality and frequency of foods offered (fruit, vegetables, meats/fish, whole grain, snacks, fats & sugar, water, sugary drinks, and milk).

### **Establishing Content Validity & Internal Consistency Reliability**

A thorough literature review, as well as strong conceptual guidance by the ANGELO framework, informed us on how to group the questions to create the micro

physical food environment and quality and frequency of foods offered subscales. A panel of 3 experts (expertise in instrument development, child care nutrition research, and obesity intervention research) were given conceptual definitions of each concept, a list of questions expected to measure each concept, and specific guidelines for judging the concordance between the question and its assigned concept (micro physical food environment and quality and frequency of foods offered). Each reviewer rated each question using a 4 point rating scale (1=not relevant, 2= unable to assess relevance without item revision or item is in need of such revision that it would no longer be relevant, 3=relevant but needs minor alteration and 4=very relevant and succinct).<sup>21</sup> After reviewing and addressing each reviewer's comments, 100% agreement was achieved to establish content validity for each item. Once data were obtained, we analyzed the micro physical food environment and quality and frequency of foods offered subscales for internal consistency reliability. The Cronbach's alpha coefficients were 0.57 for the 13 items in the micro physical food environment subscale and 0.58 for the 15 items in the quality and frequency of foods offered subscale.

### **Food Desert (Macro Physical Food Environment)**

To examine the macro physical food environment of the FCCH, we examined the food desert status of the FCCHs. A food desert is determined by meeting 4 criteria: 1) the distance to a supermarket is more than ¼ mile, 2) the median household income is at or below 185% of the Federal Poverty Level, 3) over 40% of households have no vehicle available, and 4) the average Healthy Food Availability Index score for supermarkets and corner stores is low (0-9.5 out of 27) measured using the Nutrition Environment Measurement Survey.<sup>22,23</sup>

We obtained the geographic information systems (GIS) shapefiles for the 2015 Food Desert Map of Baltimore City from the Center for a Livable Future at Johns Hopkins University School of Public Health. ArcGIS Desktop version 10.4.1 was used to handle all spatial data, conduct descriptive analyses, and create maps.<sup>24</sup> Addresses of the interviewed participants were converted to locations on the food desert map through geocoding.<sup>25</sup> A geographic mask was applied to the maps to heighten the level of difficulty for reverse, the process of determining the street address of the home on the map, and to ensure confidentiality.<sup>25</sup> The locations of the FCCHs in the study were spatially joined to the food desert shapefile to determine the percent of FCCHs located in food deserts. Radius buffers were created around FCCHs not in a food desert to determine which FCCHs were within 0.5 and 1-mile radius of a food desert. The locations of the FCCHs were also spatially joined to each criterion of the food desert to determine which FCCHs fulfilled each criterion of a food desert. Information gathered from the spatial join was used to describe the food desert status of FCCHs, and to examine the association between the food desert status of FCCHs and CACFP status of a home as well as the association between the food desert status of FCCHs and the quality and frequency of foods offered mean score.

### **Statistical Analyses**

We conducted all statistical analyses using STATA version 14.<sup>26</sup> We examined the normality of all the relevant variables including the physical food environment mean score and quality and frequency of foods offered mean score, reviewing skewness, kurtosis, box plots, and histograms. Descriptive statistics were

used to summarize study sample characteristics. For each demographic variable, we conducted two-sample z-tests for proportions or independent sample t-tests to identify significant differences in proportions or means with 95% Confidence Intervals by CACFP status.

Simple linear regressions were used to examine the association between the micro physical food environment mean score and CACFP status of homes, as well as the micro physical food environment, mean score and the quality and frequency of foods offered mean score. Multiple linear regressions were performed to analyze these relationships, while including provider demographic variables in the models.

Pearson's chi square tests of independence were used to examine how CACFP status relates to the food desert status of FCCHs. Regressions were used to test how the food desert status of FCCHs relate to the quality and frequency of foods offered, adjusting for provider level characteristics. All significance tests were two-sided with a significant level at 0.05.

## **Results**

### **Demographic Data**

A total of 91 FCCH providers, a proportionate sample of 69 CACFP and 22 non-CACFP providers, participated in the study. **Figure 4** provides a summary of the recruitment efforts. The majority of the FCCH providers were Black or African American (90.11%) while 6.6% and 1.1% were White and Hispanic, respectively. The mean (sd) years of child care experience among providers were 18 years (9.5).

The educational background of the providers varied from not completing high school (1/91, 1%), high school or GED with no further education (32/91, 35%), some advanced training beyond high school (41/91, 45%), and college degree (16/91, 18%). Seventy-eight percent of providers (71/91) had nutrition training within the past year in which a certificate of completion was provided. CACFP providers had higher rates of having had nutrition training within the past year than non-CACFP providers (87% vs. 50%, ( $\chi^2$  (1) =13.3,  $p<0.0001$ ). The entire sample description is in **Table 7**.

### **Micro Physical Food Environment (NAPSACC Survey)**

Based on the NAPSACC, the mean physical food environment score was higher for providers with nutrition training with certificates of completion within the past year (M=3.42, SD=0.33) compared to providers with no nutrition training (M=3.17, SD=0.37);  $t$  (28.1) = 2.73,  $p=0.01$ . There was not a significant difference in the mean score for the quality and frequency of foods offered score by nutrition training status (Yes: M=3.16, SD=0.33; No: M=3.18, SD=0.32).

CACFP status was not associated with the micro physical food environment (**Table 8**). When nutrition training with certificates of completion within the past year was included in the model, nutrition training was significantly associated with the micro physical food environment ( $\beta=-0.242$ ,  $p=0.011$ ). When CACFP was removed from the model, nutrition training status was associated with the micro physical food environment at a  $p$  level of 0.01 ( $\beta=-0.256$ ,  $p=0.01$ ).

The micro physical food environment was not related to the quality and frequency of foods offered (**Table 9**). Adding nutrition training status to the model did not alter the results.

### **Macro Physical Food Environment (Food Desert Data Analyses)**

One fifth (19/91, 20.9%) of the FCCHs were located in a food desert, with the majority (72/91, 79%) not located in a food desert. **Figure 5** provides a map of this study's FCCHs joined with Baltimore's food desert areas. Of the 72 FCCHs not located in a food desert, 65.3% and 84.7% are located within half a mile or a mile, respectively, of a food desert. Of the 19 homes located in a food desert, 13 (68.4%) are CACFP FCCHs. Thirty-seven (78.7%) of CACFP homes and forty-nine (80.3%) are within half a mile and 1 mile of a food desert, respectively. For each food desert criterion, 75.8% of the FCCHs are located more than ¼ radius mile from a supermarket, and 47.3% are located in a neighborhood where the local supermarket has a low average HFAI index score. Forty-five percent of homes live in a neighborhood where over 40% of household children have no vehicle, and about 55% of FCCHs live in a neighborhood where the median household income is at or below 185% of the Federal Poverty level. There are not any significant differences in proportions by CACFP status for each food desert criterion.

Although 68.4% of FCCHs in a Food Desert are CACFP homes compared to 31.6% non-CACFP homes, CACFP status is not associated with the food desert status of the FCCHs [ $\chi^2$  (1, N=91) = 0.7180; p=0.397]. We also find no associations between 0.5 mile and 1 mile food desert buffers and the CACFP status of FCCHs ( $\chi^2$  (1, N=72) = 0.07; p=0.791;  $\chi^2$  (1, N=72) = 1.5022; p=0.220, respectively). Finally, no associations exist between each food desert criterion and CACFP status of the FCCHs (Distance to Supermarket: [ $\chi^2$  (1, N=91) = 1.5532; p=0.213]; HFAI Score [ $\chi^2$  (1, N=91) = 2.4242;



p=0.119]; Vehicle Availability [ $\chi^2$  (1, N=91) = 0.2015; p=0.654], Income [ $\chi^2$  (1, N=91) = 0.2015; p=0.654].

Neither food desert status nor food desert buffers are associated with the quality nor frequency of foods offered mean score in the FCCH (p=0.64) (Table 10). Adding the nutrition training status and CACFP status did not alter the findings.

## **Discussion**

The majority of FCCH providers purchase, prepare and offer foods to young children in their homes. Understanding the physical food environment inside and outside of the FCCH and determining its role in the quality of foods being offered is essential. In this study, we found that providers who had nutrition training with a certificate of completion within the past year had a higher micro physical food environment mean score than those who have not had training within the past year. Although there were no significant findings on the association between the macro physical food environment (food desert status) and the quality and frequency of foods offered, we obtained useful information on the proportion of FCCHs located in or near food deserts in Baltimore city. In most nutrition related FCCH studies, Black or African-American providers and children are underrepresented.<sup>27-34</sup> A majority of the providers and the children cared for by FCCH providers in this study are Black or African-American. Regarding nutrition training, evidence shows that enhanced nutrition training improves the nutrition environment of child care facilities<sup>35,36</sup> and children's body mass index.<sup>37</sup> In this study, a greater percentage of CACFP providers compared to non-CACFP providers reported having had nutrition training within the past year in which a certificate of completion was provided. This is likely due to the educational and resource support CACFP providers

receive from the MSDE and the CACFP sponsoring agencies. Although CACFP status did not predict the micro physical food environment mean score, providers who have not had nutrition training in the past year had lower micro physical food environment mean scores than those who have had nutrition training, even when adjusting for CACFP participation status of a FCCH.

We also examined the physical food environment outside of the FCCH. Twenty percent of the FCCHs were located in food deserts. Even more FCCHs were located within a 0.5 or 1-mile radius of a food desert. Previous research shows that areas with poor access to quality supermarkets are typically associated with poor diet intake and risk for overweight or obesity.<sup>8,38</sup>

Several limitations are present in this study. The findings may not apply to all FCCHs. First, although FCCHs were selected randomly, there may be bias inherent to recruiting willing participants. Also, the use of a self-report and the potential apprehension of reporting poor practices to the MSDE make this study susceptible to social desirability bias. To minimize this, it was emphasized over the phone that all data will be de-identified and reported in aggregate. Providers were also assured that the MSDE was not a part of the study team. Lastly, the subscales created had Cronbach alpha scores at approximately 0.6 which is close to the acceptable minimum of 0.7. An alpha of 0.7 provides an acceptable measure of the internal consistency of the scales.

Despite the limitations, our findings indicate that supporting providers with quality nutrition training and advocating on their behalf for better neighborhood food environments may help to provide optimal physical food environments for the children they serve.

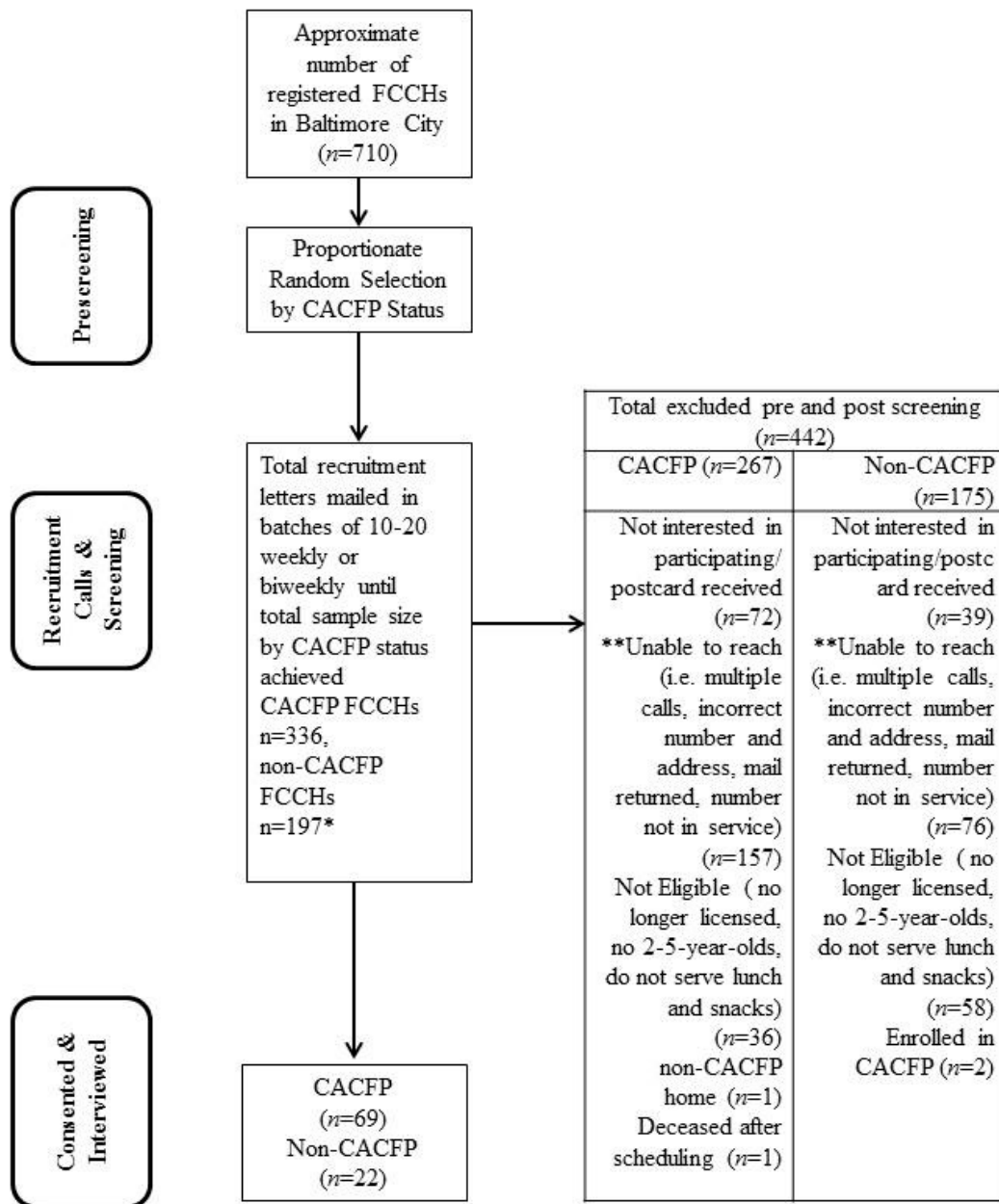


Figure 5. Flowchart describing recruitment efforts. \* An updated list was requested to obtain newly registered non-CACFP homes to attempt to meet sample size. \*\* contact information verified through online White and Yellow Pages as well as updated lists by MSDE

Table 7. Characteristics of Participants by CACFP status

Characteristics	Total Sample	CACFP status		Difference in proportion or means by CACFP status
	N=91	CACFP (n=69)	Non-CACFP (n=22)	
	n (%) / Mean (SD)	n (%) / Mean (SD)	n (%) / Mean (SD)	Difference, [95% CI], p value
<b>Provider-level</b>				
<b>Race/Ethnicity</b>	Black/AA: 82 (90.11%) White/Caucasian: 6 (6.59%) Mixed Race: 2 (2.2%) Hispanic: 1 (1.1%) Jewish (White): 2 (2.2%) NR: 1	Black/AA: 63 (91.3%) White/Caucasian: 4 (5.80%) Mixed Race: 1 (1.45%) Hispanic: 1 (1.45%) Jewish (White): 1 (1.45%) NR: 1 (1.45%)	Black/AA: 19 (86.36%) White/Caucasian: 2 (9.09%) Mixed Race: 1 (4.55%) Jewish (White): 1 (4.55%)	Black/AA: 4.94%, [-11.99, 21.9%] White/Caucasian: 3.29%, [-42.7%, 49.2%] Mixed Race: Jewish (White):
<b>Level of Experience (yrs.)</b>	18.04 years ± 9.46 years	18.64 years ± 8.82 years	16.14 years ± 11.24 years	2.5 years ± 2.62 p= 0.35
<b>Highest Level of Education completed</b>	Some HS: 1 (1.10%) Completed HS or GED: 32 (35.16%) Some College: 41 (45.05%) College graduate & above: 16 (17.58%) NR: 1 (1.10%)	Some HS: 1 (1.45%) Completed HS or GED: 26 (37.68%) Some College: 31 (44.93%) College graduate & above: 10 (14.49%) NR: 1 (1.45%)	Completed HS or GED: 6 (27.27%) Some College: 10 (45.45%) College graduate & above: 6 (27.27%)	Completed HS or GED: 10.4%, p=0.374 Some College: 0.52%, p=0.97 College graduate & above: 12.8%, p=0.17
<b>Level of Education (yrs.)</b>	14.51 years ± 1.70 years	14.41 years ± 1.75 years	14.82 years ± 1.56 years	0.41 ± 0.39 p=0.30
<b>Nutrition Education within past year</b>	Yes: 71 (78.02%) No: 20 (21.98%)	Yes: 60 (86.96%) No: 9 (13.04%)	Yes: 11 (50%) No: 11 (50%)	37% [14.6%, 59.3%] p=0.0003
<b>Provider Body Mass Index (BMI) kg/m<sup>2</sup></b>	29.67 kg/m <sup>2</sup> ± 4.69 kg/m <sup>2</sup>	29.39 kg/m <sup>2</sup> ± 4.70 kg/m <sup>2</sup>	30.62 kg/m <sup>2</sup> ± 4.65 kg/m <sup>2</sup>	1.23 ± 1.19 kg/m <sup>2</sup> p=0.308
<b>Accepts Childcare subsidy vouchers</b>	77 (84.62%)	61 (88.41%)	16 (72.73%)	15.7% [-4.4%, 3.6%] p=0.08
<b>Monthly Food Costs</b>	\$639.38 ± 383.12	\$671.51 ± 381.34	\$526.94 ± 378.40	\$144.57 ± 101.31 p=0.165
<b>% Reimbursement by CACFP (only among CACFP homes)</b>		<50%: 9 (13.04%) 50-74%: 14 (20.29%) 75-99%: 28 (40.58%) 100%: 14 (20.29%) No Reply: 4 (5.80%)		
<b>Food Source</b>	Supermarkets: 78 (85.71%)	Supermarkets: 62 (89.86%)	Supermarkets: 16 (72.73%)	Supermarkets: 17.13%, p=0.05 (72.73%)

	Corner Convenience Stores: 2 (2.2%) Grocery Stores: 9 (9.89%) Wholesale Warehouses: 53 (58.24%) Farmer's Market: 15 (16.48%)	Corner Convenience Stores: 1 (1.45%) Grocery Stores: 7 (10.14%) Wholesale Warehouses: 44 (63.77%) Farmer's Market: 11 (15.94%)	Corner Convenience Stores: 1 (4.55%) Grocery Stores: 2 (9.09%) Wholesale Warehouses: 9 (40.91%) Farmer's Market: 4 (18.18%)	Corner Convenience Stores: 3.1%, p=0.39 Grocery Stores: 1.1%, p=0.89 Wholesale Warehouses: 22.9%, p=0.06 Farmer's Market: 2.24%, p=0.81
<b><u>Child-level</u></b>				
<b>Total children</b>	525 (5.769 ± 2.371)	412 (5.97 ± 2.03)	113 (5.136 ± 3.196)	0.83 [-0.31, 1.98] p=0.15
<b>0-23-month-old children</b>	112 (1.230 ± 0.932)	92 (1.333 ± 0.886)	20 (0.091 ± 1.019)	1.242±0.24 [0.75, 1.74] p<0.0001
<b>2-5-year-old children</b>	286 (3.14 ± 1.560)	227 (3.2898 ± 1.5058)	59 (2.6818 ± 1.6729)	0.61 [-0.21, 1.42] p=0.14
<b>Children above 5 years old</b>	127 (1.3956 ± 1.632)	93(1.3478 ± 1.5980)	34 (1.5454±1.76547)	0.198 [-0.66, 1.06] p=0.64
<b>Race/Ethnicity</b>	Black/AA: 444 (93.33%) White/Caucasian: 47 (17.98%) Mixed Race: 20(10.11%) Hispanic: 11 (6.66%)	Black/AA: 351 (94.12%) White/Caucasian: 35 (17.91%) Mixed Race: 17(11.94%) Hispanic: 5 (4.41%)	Black/AA: 93 (90.91%) White/Caucasian: 12 (18.18%) Mixed Race: 3(4.55%) Hispanic: 6 (13.65%)	Black/AA: 3.21%, p=0.60 White/Caucasian:0.27%, p=0.98 Mixed Race:7.39%, p=0.32 Hispanic: 9.24%, p=0.13

NR= No reply

Table 8. Multiple regression models predicting the micro physical food environment mean score (PFE) using CACFP participation status and Nutrition training status as predictor variables

Predictor Variables	$\beta$ coefficient t	Std. Error	t	p- value	R <sup>2</sup>
Analysis One: PFE= $\beta_0 + \beta_1$ CACFP Status					
CACFP Status (Yes or No)	-0.125	0.086	-1.46	0.148	0.02
Analysis Two: PFE= $\beta_0 + \beta_1$ CACFP Status + $\beta_2$ nutrition training					
CACFP Status (Yes or No)	-0.036	0.09	-0.4	0.693	0.09
Nutrition Training within past year in which certificate was provided (Yes or No)	-0.242	0.093	-2.61	0.011	
Analysis Three: PFE= $\beta_0 + \beta_1$ Nutrition Training					
Nutrition Training within past year in which certificate was provided (Yes or No)	-0.256	0.085	-3	0.004	0.092

Table 9. Multiple regression models predicting the quality and frequency of foods offered (FO) mean score using the micro physical food environment mean score and nutrition training status as predictor variables

<b>Predictor Variables</b>	<b><math>\beta</math> coefficient t</b>	<b>Std. Error</b>	<b>t</b>	<b>p- value</b>	<b>R<sup>2</sup></b>
<b>Analysis One: FO=<math>\beta_0</math>+<math>\beta_1</math> Physical Food Environment Mean Score (PFE)</b>					
Micro Physical Food Environment Mean Score (PFE)	0.157	0.1	1.61	0.112	0.03
<b>Analysis Two:FO=<math>\beta_0</math>+<math>\beta_1</math>PFE+<math>\beta_2</math> Nutrition Training</b>					
Micro Physical Food Environment Mean Score (PFE)	0.13	0.1	1.29	0.202	0.04
Nutrition Training within past year in which certificate of completion was provided (Yes or No)	0.07	0.09	0.79	0.43	

# Baltimore City's Family Child Care Homes & Food Deserts

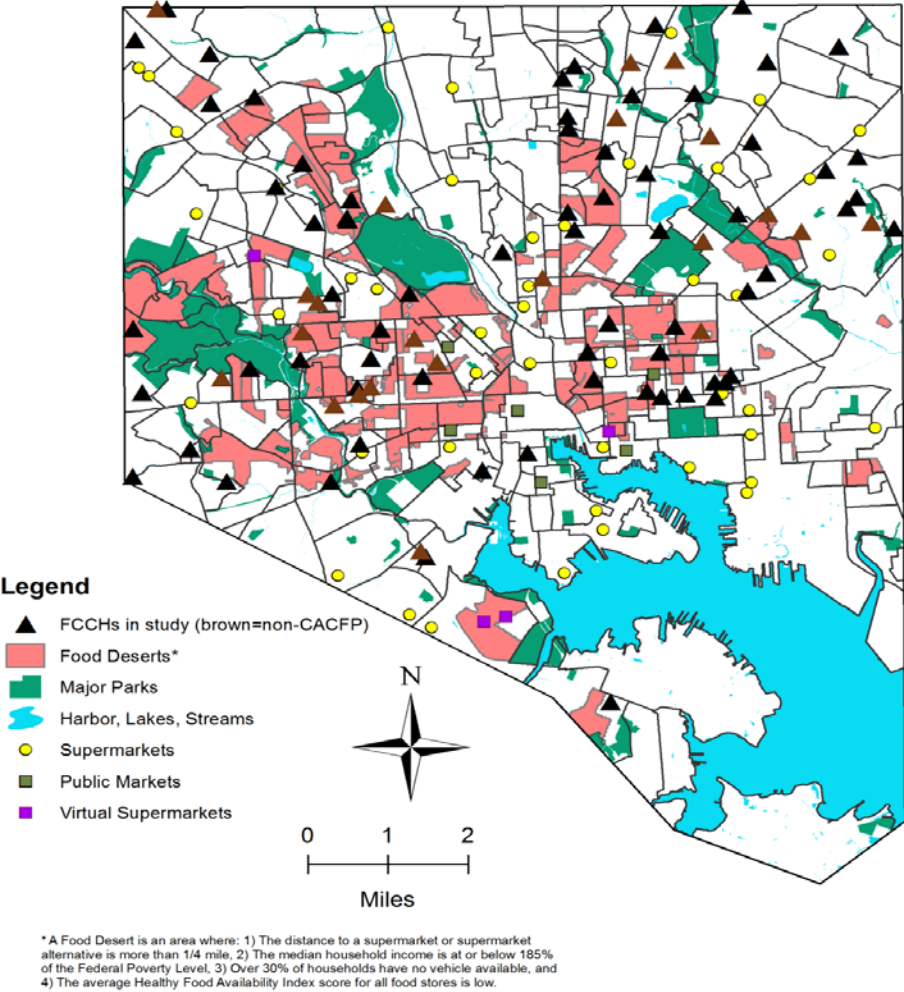


Figure 6. Baltimore City's FCCHs geocoded onto Baltimore's 2015 Food Desert Map



Table 10. Multiple regression models predicting the quality and frequency of foods offered mean score using food desert status and nutrition status among FCCH providers as predictor variables

Predictor Variables	$\beta$ coefficient	Standard Error	t	p-value	R <sup>2</sup>
Analysis One: FO= $\beta_0$ + $\beta_1$ Food Desert Status					
Food Desert Status (Yes or No)	-0.04	0.086	-0.47	0.641	0.003
Analysis Two: FO= $\beta_0$ + $\beta_1$ Food Desert Status (0.5 mile buffer)					
0.5 mile buffer of a Food Desert (Yes or No)	-0.15	0.075	-1.94	0.056	0.05
Analysis Three: FO= $\beta_0$ + $\beta_1$ Food Desert Status (0.5 mile buffer)+ $\beta_2$ CACFP status					
0.5 mile buffer of a Food Desert (Yes or No)	-0.15	0.075	-1.93	0.058	0.05
CACFP status	0.002	0.086	0.03	0.98	
Analysis Four: FO= $\beta_0$ + $\beta_1$ Food Desert Status (1 mile buffer)					
1 mile buffer of a Food Desert (Yes or No)	-0.057	0.101	-0.56	0.578	0.004
Analysis Five: FO= $\beta_0$ + $\beta_1$ Food Desert Status (1 mile buffer) + $\beta_2$ CACFP status					
1 mile buffer of a Food Desert (Yes or No)	-0.06	0.103	-0.55	0.59	0.0044
CACFP Status	0.0003	0.089	0	0.997	
Analysis six: FO= $\beta_0$ + $\beta_1$ Food Desert Status+ $\beta_2$ Nutrition Training					
Food Desert Status (Yes or No)	-0.028	0.086	-0.33	0.75	0.02
Nutrition Training within past year in which certificate was provided (Yes or No)	0.1	0.84	1.18	0.24	

## References

1. Laughlin L. Who's Minding the Kids ? Child Care Arrangements : Spring 2011. *Househ Econ Stud.* 2013;2009(April):70-135.
2. Ogden CL, Carroll MD, Kit BK, Flegal KM. Prevalence of childhood and adult obesity in the United States, 2011-2012. *Jama.* 2014;311(8):806-814. doi:10.1001/jama.2014.732.
3. Fulkerson JA, Loth K, Bruening M, Berge J, Eisenberg ME, Neumark-Sztainer D. Time 2 tlk 2nite: Use of electronic media by adolescents during family meals and associations with demographic characteristics, family characteristics, and foods served. *J Acad Nutr Diet.* 2014;114(7):1053-1058. doi:10.1016/j.jand.2013.10.015.
4. Loth KA, Horning M, Friend S, Neumark-Sztainer D, Fulkerson J. An Exploration of How Family Dinners Are Served and How Service Style Is Associated With Dietary and Weight Outcomes in Children. *J Nutr Educ Behav.* 2017;49(6):513-518.e1. doi:10.1016/j.jneb.2017.03.003.
5. Breck A, Dixon LB, Kettel Khan L. Comparison of planned menus and centre characteristics with foods and beverages served in New York City child-care centres. *Public Heal Nutr.* 2016:1-8. doi:10.1017/s1368980016000720.
6. Natale RA, Lopez-Mitnik G, Uhlhorn SB, Asfour L, Messiah SE. Effect of a Child Care Center-Based Obesity Prevention Program on Body Mass Index and Nutrition Practices Among Preschool-Aged Children. *Health Promot Pract.* 2014;15(5):695-705. doi:10.1177/1524839914523429.
7. Fitzgibbon ML, Stolley MR, Schiffer L, Van Horn L, KauferChristoffel K, Dyer A. a Randomized Controlled Trial for Overweight Prevention. *J Pediatr.* 2005;146(5):618-625. doi:10.1016/j.jpeds.2004.12.019.

8. Caspi CE, Sorensen G, Subramanian SV, Kawachi I. The local food environment and diet: A systematic review. *Health Place*. 2012;18(5):1172-1187. doi:10.1016/j.healthplace.2012.05.006.
9. Caspi CE, Lenk K, Pelletier JE, et al. Food and beverage purchases in corner stores, gas-marts, pharmacies and dollar stores. *Public Health Nutr*. 2016:1-11. doi:10.1017/S1368980016002524.
10. USDA. child-and-adult-care-food-program @ [www.fns.usda.gov](http://www.fns.usda.gov).  
<https://www.fns.usda.gov/cacfp/child-and-adult-care-food-program>.
11. Yaktine AL, Murphy SP. Aligning nutrition assistance programs with the Dietary Guidelines for Americans. *Nutr Rev*. 2013;71(9):622-630. doi:10.1111/nure.12046.
12. CHAUDRY A, TING JMPHSADMGMSS, URBAN. *Child Care Choices for Working Families Child Care Choices for Working Families*; 2011.
13. Swinburn B, Egger G, Raza F. Dissecting obesogenic environments: the development and application of a framework for identifying and prioritizing environmental interventions for obesity. *Prev Med (Baltim)*. 1999;29(6 Pt 1):563-570. doi:10.1006/pmed.1999.0585.
14. Raine KD, Plotnikoff R, Nykiforuk C, et al. Reflections on community-based population health intervention and evaluation for obesity and chronic disease prevention: The Healthy Alberta communities project. *Int J Public Health*. 2010;55(6):679-686. doi:10.1007/s00038-010-0187-7.
15. Simmons A, HM M, AC B, et al. Creating community action plans for obesity prevention using the ANGELO (Analysis Grid for Elements Linked to Obesity) Framework. *Health Promot Int*. 2009;24(4):311-324 14p. doi:heapro/dap029.
16. Faulkner GEJ, Gorczynski PF, Cohn T a. Psychiatric illness and obesity:

- recognizing the “obesogenic” nature of an inpatient psychiatric setting. *Psychiatr Serv.* 2009;60(4):538-541. doi:10.1176/appi.ps.60.4.538.
17. Porter CM. Community action to prevent childhood obesity: lessons from three US case studies. *Child Obes.* 2013;9(2):164-174. doi:10.1089/chi.2012.0018.
  18. Hales D, Vaughn AE, Mazzucca S, et al. Development of HomeSTEAD’s physical activity and screen time physical environment inventory. *Int J Behav Nutr Phys Act.* 2013;10:132-155 24p. doi:10.1186/1479-5868-10-132.
  19. Vine MM, Elliott SJ. Examining local-level factors shaping school nutrition policy implementation in Ontario, Canada. *Public Health Nutr.* 2014;17(6):1290-1298. doi:10.1017/S1368980013002516.
  20. Ward D, Hales D, Haverly K, et al. An Instrument to Assess the Obesogenic Environment of Child Care Centers. *Am J Heal Behav.* 2008;32(4):380-386.
  21. LYNN MR. Determination and Quantification Of Content Validity. *Nurs Res.* 1986;35(6):382-386. doi:10.1097/00006199-198611000-00017.
  22. Haering SA, Franco M. The Baltimore City Food Environment The Johns Hopkins Center for a Livable Future About the Johns Hopkins Center for a Livable Future. 2010. [http://www.jhsph.edu/clf/PDF\\_Files/BaltimoreCityFoodEnvironment.pdf](http://www.jhsph.edu/clf/PDF_Files/BaltimoreCityFoodEnvironment.pdf).
  23. Glanz K, Sallis JF, Saelens BE, Frank LD. Nutrition Environment Measures Survey in Stores (NEMS-S). Development and Evaluation. *Am J Prev Med.* 2007;32(4):282-289. doi:10.1016/j.amepre.2006.12.019.
  24. ESRI. ArcGIS Desktop: Release 10. 2011.
  25. Zandbergen P a. Ensuring Confidentiality of Geocoded Health Data: Assessing Geographic Masking Strategies for Individual-Level Data. *Adv Med.* 2014;2014:1-14. doi:10.1155/2014/567049.

26. StataCorp. Stata Statistical Software: Release 14. 2015.
27. Freedman MR, Alvarez KP. Early childhood feeding: assessing knowledge, attitude, and practices of multi-ethnic child-care providers. *J Am Diet Assoc.* 2010;110(3):447-451. doi:10.1016/j.jada.2009.11.018.
28. Lindsay AC, Salkeld JA, Greaney ML, Sands FD. Latino Family Childcare Providers' Beliefs, Attitudes, and Practices Related to Promotion of Healthy Behaviors among Preschool Children: A Qualitative Study. *J Obes.* 2015;2015:1-9. doi:2015/409742.
29. Natale R, Page M, Sanders L. Nutrition and physical activity practices in childcare centers versus family childcare homes. *Early Child Educ J.* 2014;42(5):327-334. doi:10.1007/s10643-013-0607-4.
30. Tovar A, Mena NZ, Risica P, Gorham G, Gans KM. Nutrition and Physical Activity Environments of Home-Based Child Care: What Hispanic Providers Have to Say. *Child Obes.* 2015;11(5):521-529. doi:10.1089/chi.2015.0040.
31. Brann LS. Child-feeding practices and child overweight perceptions of family day care providers caring for preschool-aged children. *J Pediatr Heal Care.* 2010;24(5):312-317. doi:10.1016/j.pedhc.2009.09.001.
32. Rice KR, Trost SG. Physical Activity Levels Among Children Attending Family Day Care. *J Nutr Educ Behav.* 2014;46(3):197-202. doi:10.1016/j.jneb.2013.09.001.
33. Rosenthal MS, Crowley AA, Curry L. Family Child Care Providers' Self-perceived Role in Obesity Prevention: Working With Children, Parents, and External Influences. *J Nutr Educ Behav.* 2013;45(6):595-601. doi:10.1016/j.jneb.2013.03.016.

34. Tovar A, Vaughn AE, Fallon M, et al. Providers' response to child eating behaviors: A direct observation study. *Appetite*. 2016;105:534-541. doi:10.1016/j.appet.2016.06.020.
35. Lyn R, Maalouf J, Evers S, Davis J, Griffin M. Nutrition and physical activity in child care centers: the impact of a wellness policy initiative on environment and policy assessment and observation outcomes, 2011. *Prev Chronic Dis*. 2013;10:E83-E83. doi:10.5888/pcd10.120232.
36. Battista RA, Oakley H, Weddell MS, Mudd LM, Greene JB, West ST. Improving the physical activity and nutrition environment through self-assessment (NAP SACC) in rural area child care centers in North Carolina. *Prev Med (Baltim)*. 2014;67:S10-6. doi:10.1016/j.ypmed.2014.01.022.
37. Alkon A, Crowley AA, Neelon SE, et al. Nutrition and physical activity randomized control trial in child care centers improves knowledge, policies, and children's body mass index. *BMC Public Health*. 2014;14:215. doi:10.1186/1471-2458-14-215.
38. Fram MS, Ritchie LD, Rosen N, Frongillo EA. Child Experience of Food Insecurity Is Associated with Child Diet and Physical Activity. *J Nutr*. 2015;145(3):499-504. doi:10.3945/jn.114.194365.

## CHAPTER FIVE: IMPLICATIONS OF DISSERTATION FINDINGS

Much of the studies on assessing food environments of child care have focused heavily on center-based child care facilities. In the literature review, there are only 20 studies published in the past decade that have examined the food environment of FCCHs. The literature review presented in this dissertation informs us that FCCHs across the US are not well regulated regarding ensuring best practices in the nutrition, physical activity and sleep environment. Nutrition and physical activity training is not widely accessible to providers and poor perceptions, attitudes, and feeding norms among providers may affect what's offered in the FCCH. This review, however, did not provide any meaningful information on the food environment outside of FCCHs as well as the association between the food environment and what's offered to children in the FCCH. Furthermore, only one study compared the food environment of FCCHs by CACFP status.

In this dissertation study, the significant findings contribute to the body of research on the food environment of FCCHs. With the help of an innovative framework, key food environmental factors were identified that may play a role in a child's risk for becoming overweight or obese. This dissertation shows that FCCH providers mostly engage in child care best practices in nutrition. Notwithstanding, there are areas worth noting. We found that the sociocultural food environment or what is sometimes called the mealtime environment is positively associated with the quality and frequency of foods served to 2-5 year olds in FCCHs. Additionally, non-CACFP participating FCCHs were associated with lower sociocultural food environment mean scores. Regarding the physical food environment, although there were no significant associations between the food desert status of a FCCH and the CACFP status of FCCHs as well as the quality

and frequency of foods offered, this study provided meaningful data on the physical food environment outside of the FCCH. Providers who reported not having nutrition training within the past year in which a certificate of completion was provided was associated with lower physical food environment mean scores, even when adjusting for CACFP participation status. Finally, CACFP status of a home was not associated with the quality and frequency of foods offered.

### **Implications for Nutrition Policy**

In this dissertation, it is demonstrated that a greater percentage of providers who participate in the Child and Adult Care Food Program engage in best nutrition child care practices. Also, CACFP providers were associated with better mealtime environments in the FCCHs compared to their non-CACFP peers. Additionally, providers who reported not having nutrition training within the past year in which a certificate was provided was associated with lower physical food environment mean scores, even when adjusting for CACFP participation status. Since the level of nutrition training is associated with the CACFP status of a FCCH, it is safe to say that the Child and Adult Care Food Program should cast a wider net and aggressively recruit providers who are not currently part of this program. Finally, local governments should enforce CACFP's nutrition guidelines on all FCCHs, irrespective of CACFP participation status.

### **Implications for Nursing Research and Practice**

In a recent systematic review on the randomized trials of nurse-delivered interventions in weight management research, it was shown that nurses typically work in multidisciplinary teams in various settings with the goal of achieving



positive weight outcomes. However, nurses and nurse researchers were underrepresented in the research efforts to address obesity in children.<sup>1</sup> Nurses and nurse researchers play an important role in ensuring people and communities have evidence-based feeding practices for their young children. Whether in the hospital, clinic or community setting, nurses are charged with providing holistic health assessments, evidence-based education and even coaching to help prevent chronic disease. Disseminating education on the best practices in mealtime interactions between caregiver and child will be instrumental in preventing obesity in young children. Research efforts like this dissertation should be encouraged among nurse researchers to provide evidence-based practices to the larger research community.

## Reference

1. Petit Francis L, Spaulding E, Turkson-Ocran R-A, Allen J. *Randomized Trials of Nurse-Delivered Interventions in Weight Management Research.*; 2017.  
doi:10.1177/0193945916686962.

## Appendices

### Appendix A: Recruitment Materials

#### Recruitment Letter



Date:

Address

Dear (Name of Participant)

You are being contacted because you are a licensed family child-care provider in Baltimore City. We would like to tell you about a research study and see if you are interested in participating. The purpose of this study is to learn more about the feeding routines in Family Child Care Homes. This will be a telephone survey that will take about 45-60 minutes. It will include questions about the types of food you offer children 2-5 years old and how you do it. This survey will be done at your convenience. The information reported will not be identified with any specific childcare home.

We have included a stamped return postcard. If you are NOT interested in receiving a phone call from us, please print your name where indicated and return it. If you decide not to participate, that is fine. It will not affect your standing as a licensed family childcare provider. If we don't receive the postcard, Lucine Francis, the project coordinator, will call you within the next two weeks. She will provide more details about the study, see if you can and want to participate and schedule a time to conduct the phone interview. If you decide to participate, you will be mailed a \$25 gift card following the interview.

If you have any questions right now, please feel free to contact us.

**Sincerely,**

Lucine Francis, RN Project Coordinator  
Contact Phone # 443-608-5415  
Contact Email Address: [lfranc12@jhu.edu](mailto:lfranc12@jhu.edu)

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## Postcard

<p>Dear Lucine Francis,</p> <p>I do not wish to be contacted for this study.</p> <p>Thank you.</p> <p><b>Please Print Name Here:</b></p>  <p><small>Protocol Title: Examining Food Environments of Family Child Care Homes Application No.: IRB00061086 Principal Investigator: Jerilyn Allen, SD, RN, FAAN #</small></p>	<p style="text-align: right;">postage</p> <p>Johns Hopkins School of Nursing Office of Science and Innovation c/o Lucine Francis, RN 525 North Wolfe Street, Room 332 Baltimore, MD 21205</p>
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## Telephone Screening Script

Hello, my name is Lucine Francis. I am the project coordinator for a research study at Johns Hopkins School of Nursing. I am calling because we are working on a research study about the types of foods offered to children 2-5 years old in Family Child Care Homes in Baltimore. We recently mailed out a letter to you with a description of the study and a self-stamped return postcard to send back to me if you did not want to receive a phone call from me. Have you received the letter and postcard?

**If no:** Oh, I apologize! (Proceed)

**If yes,** (proceed).

We will be collecting information about you during this phone call to see if you may qualify for the study. Your taking part in this phone call is completely voluntary.

Your information will only be seen by people working with me in this study. We try to make sure that the information we collect from you is kept private and used only for the research study we are discussing. If you do not agree to continue the phone call, it will not affect your standing as a registered family childcare provider.

May I continue to ask you questions to see if you qualify for the study?

**(If response is no)-** Thank you for your time. Have a good day.

**(If yes)-** Ask questions

**Question 1-** Are you currently a licensed/registered Family Child Care Provider in Baltimore City?

**Question 2-** Do you serve lunch and snacks in your Family Child Care Home?

**Question 3-** Do you have at least one child between the ages of 2 and 5 under your care full time or part time at the Family Child Care home?

### **If person does not meet the eligibility requirements**

If no to any of these questions, please stop! Tell them the reason for stopping. For example, if response to question 1 is yes but to question 2 is no, please say, "Thank you for your time. At this moment you are not eligible to participate in this study because you do not serve lunch and snacks in your Family Child Care Home."

(Please note, it will be up to the discretion of the project coordinator to determine if the provider can understand English by responding to questions asked to screen for eligibility)

### **If person meets eligibility requirements**

Thank you, You can participate in this study! Once again the purpose of this study is to learn more about the feeding routines in Family Child Care Homes. It requires that you answer questions over the phone regarding the types of foods you offer your children in

your care. It also includes a few questions about your background. The interview is a one-time interview and will take about 45-60 minutes. You can choose to continue with the interview at the end of me telling you more about this study or schedule the interview at a later time at the end of this call. Can I continue to tell you more about this study?

**If Yes:** Proceed to oral consent process

**If No:** Thank you very much!

## Oral Consent Script

The purpose of this research study is to see what types of foods Family Child Care Providers offer to 2-5 year old children in their care. You are being asked to participate because you are a licensed Family Child Care Provider registered in Baltimore City and the screening questions show you are eligible to participate.

The study is expected to take about 45 to 60 minutes.

You will be asked questions about food and what food is offered in your family childcare home. You will also be asked questions about your background, for example your height and weight and years of education.

The information collected will be kept confidential. Only the study team will be able to link your answers to your personal information. It is intended that your information will only be seen by the study team. We try to make sure that everyone who needs to see your information uses it only for the study and keeps it confidential - but we cannot guarantee this.

As a childcare provider, we know that your time is valuable. We don't want to take you away from your children so you can always reschedule to talk over the phone. If there are any questions that make you feel uneasy, you do not have to answer those questions. You may refuse to answer any question (s) that you do not wish to answer. It won't disqualify you from the study. If you're ever uncomfortable for any reason and would like to stop participating, that is OK, just say so. You can stop altogether or always reschedule.

This study has no direct benefit to you. However, you may find that being able to talk about feeding children in your care to be useful. Results from this study may be used to inform policy makers on the type of help Family child care providers should receive.

Again, You do not have to agree to be in this study. If you do not want to join the study, it will not affect your standing as a licensed Family Child Care provider in Baltimore City. If you have any questions about your rights as a research participant, or if you think you have not been treated fairly or if you change your mind and don't want your information used for the study anymore, you may call the Johns Hopkins Institutional Review Board (IRB) at 410-955-3008. Just remember, if we have already used your information for the study, the use of that information cannot be cancelled.

**You can choose to proceed with the interview now or schedule at a convenient time for you when you are not caring for children.**

There is no cost to participate in this study.

You will receive a small gift, a \$25 gift card, for completing the study.

- Do you have any questions?
- Do you think you would like to take part in this research?
  - If no, thank you for your time. Have a nice day.
  - If yes, continue below

Again, you can choose to proceed with the study now or schedule at a convenient time for you. Which would you prefer?

If provider chooses to continue with study in call- Begin Interview



If provider chooses to schedule a convenient time- Re-schedule time

### Phone Call Screening Log

	Day Date	Time	Status	Notes
1.				
2.				
3.				
4.				
5.				
6.				
7.				
<b>Notes:</b>				

**Status:**

1= No Answer/Left Message, call back in 2 days

2= No Answer/Did not leave message (voicemail full, no voicemail, etc.), call back next day

3= Answered- Person not available, call back when indicated

4= Answered, interested but no time to screen for eligibility, call back

5= Answered, Not interested in study

6= Wrong number  
7= Not in Service/Disconnected

**Eligibility:** Yes No

**Reasons for ineligibility:** Not currently licensed or registered  
Do not serve lunch and snacks  
Do not have at least 1 2-5 year old in FCCH

**Oral Consent Obtained:** Yes No, call back No-not interested in study

**Date Oral Consent Obtained:**

**Time Oral Consent Obtained:**

**FCCH provides care to 2-5 year olds:** Full-time  
Part-time  
Both

**Notes:**

**Date of Interview:**

**Time of  
Interview:**

**Interview Completed**      Yes                      No

**If no, Need to reschedule**      Yes                      No-Participant no longer interested

**Date/Time of  
Reschedule**

**Appendix B: Instrument**

**Instructions for Participants**

There are some questions and response options that will be a bit complex so I would recommend having a paper and pen. There are 3 sections to this interview. In the first section, I will ask you demographic questions concerning you and your home. The second section will be about foods including beverages that you provide to children in your care and the third section will be about what's available in your home. Please note, there is no right or wrong answer. Please do not hesitate to ask me to repeat questions. Are you ready to proceed?

**Home Information & Demographics**

1. **How many children do you currently care for in your family childcare home?**  
\_\_\_\_\_
  
2. **What is the approximate number of children you have in your care who are**
  - a. 0-23 months \_\_\_\_
  - b. 2-5 years and \_\_\_\_
  - c. 5 years and above \_\_\_\_
  
3. **How many children in your care are**

Hispanic \_\_\_  
African-American or black \_\_\_  
Caucasian \_\_\_  
Asian/Pacific Islander \_\_\_  
American Indian or Alaskan Native \_\_\_  
Mixed Race \_\_\_\_\_

*\*\*Interviewer will translate the percentage to these options  
Almost None (<10%), Some (10-30%), Half (40-60%), Most (70-90%), and  
Almost All (>90%)*

- 4. Does your family childcare home accept any type of childcare subsidy vouchers? \_\_\_\_\_**

**Prompt:** A childcare subsidy voucher is any form of financial assistance by governmental agencies, ie Maryland State Department of Education, which usually has well defined eligibility requirements that helps pay for childcare.

- 5. Does your childcare home participate in the Child and Adult Care Food Program (CACFP)? \_\_\_\_\_**

**Prompt:** The CACFP sponsored by the United States Department of Education and administered by the Maryland State Department of Education reimburses eligible childcare providers for meals.

- 6. (If yes to 5), How much do you spend on food per month for children under your care? \_\_\_\_\_**
- 7. How much of your food costs are reimbursed by the CACFP? \_\_\_\_\_**

*\*\*Interviewer will translate percentage to these options: less than 50%, 50-74%, 75-99% or 100%.*

- 8. (If no to 5), Have you ever heard about the Child and Adult Care Food Program? \_\_\_\_\_**

*If no, Provide a definition if asked- the Child and Adult Food Program provides reimbursement to eligible providers for foods served that meet specific meal pattern requirements*

- 9. (If yes to 7) Have you ever considered enrolling in this program?**

\_\_\_\_\_

**10. (If yes or no to 8)- What have been some reasons you are not enrolled in the Child and Adult Care Food Program?**

**Prompt: Some examples of responses: Not eligible, not satisfied, not enough money**

**11. This question pertains to how food is provided and prepared for your children in your family child care home. I want you to please choose the best statement that describes how food is provided and prepared in your home**

- a) The foods are provided and prepared by a vendor meaning an outside company brings food to the home)
- b) Foods are provided by a vendor and prepared at the home
- c) Foods are purchased and prepared by home provider or
- d) Other, and please specify

**12. (If foods are not vended), where do you usually purchase foods?**

**Prompt: Here are some examples. Corner grocery store, supermarket like Giant or Safeway, a food service distributor like US Foods or Sysco, the Farmers Market or other ways**

**13. What is your race and ethnicity? \_\_\_\_\_**

**Prompt: Examples of Race include Black, White, and Asian. Examples of ethnicity include Hispanic and non-Hispanic White**

**14. How many years of childcare experience have you had as a licensed child care provider \_\_\_\_\_**

**15. What is your highest level of education completed? \_\_\_\_\_**

**Prompt: Here are some examples, Some HS, Completed HS or GED, Some**

College, College graduate and above

16. Have you had any formal nutrition training within the past year in which a certificate was provided? \_\_\_\_\_

The final 2 questions for this section are

17. Can you please tell me how tall are you? \_\_\_\_\_

18. Can you please tell me how much do you weigh? \_\_\_\_\_

## **Foods Provided**

### **Instructions for Participants**

We are now moving on to the second section of the survey which will be questions concerning the types of foods you provide to **2-5 year old children in your care**. You will be asked to select the best statements that describe what is provided in your home. Please note, there is no right or wrong answer. Please do not hesitate to ask me to repeat options.

**Fruit-** The following questions pertain to fruit. Please remember, the questions pertain to what is offered to 2-5 year olds in your care. When relevant, feel free to answer in times per week, per day or per month.

1. How often does your program offer fruit, not including fruit juice?

\_\_\_\_\_

**PI will translate response to any of these items below**

- 3 times **per week** or less (Half-day: 2 times per week or less)
- 4 times **per week** (Half-day: 3 times per week)
- 1 time **per day** (Half-day: 4 times per week) OR
- 2 times **per day** or more (Half-day: 1 time per day or more)

2. How often does your program offer fresh, frozen or canned fruit (in juice, not in syrup)? Would you say

- Rarely or never
- Sometimes
- Often OR

- Every time fruit is served

**Vegetables**-The next series of questions will be about vegetables. Please note, vegetables do not include French fries, tatar tots, hash browns or dried beans.

**3. How often does your program offer vegetables?**

\_\_\_\_\_

**PI will translate response to any of these items below**

- 2 times **per week** or less (Half-day: 1 time per week or less)
- 3-4 times **per week** (Half-day: 2-3 times per week)
- 1 time **per day** (Half-day: 4 times per week)
- 2 times **per day** or more (Half-day: 1 time per day or more)

**4. How often does your program offer dark green, orange, red or deep yellow vegetables, not including corn?**

\_\_\_\_\_

**Prompt: examples-spinach, carrots, beets.** Rationale for not including corn, if asked  
\*\*Corn is not included as a deep yellow vegetable because it has more starch and fewer vitamins and minerals than other vegetables\*\*

- 3 times per month or less
- 1-2 times per week
- 3-4 times per week
- 1 time per day or more

**5. How often does your program offer vegetables that are cooked or flavored with meat fat, margarine, or butter? Would you say**

- Rarely or never
- Sometimes
- Often
- Every time vegetables are served

**6. How often does your program serve fried or pre-fried potatoes, including French Fries, tater tots and hash browns that are pre-fried, sold frozen and prepared in the oven. \_\_\_\_\_**

- 3 times per week or more
- 2 times per week
- 1 time per week

Less than 1 time per week or never

**Meats** The next several questions will be about meat. Please remember, the questions pertain to what is offered to 2-5 year olds in your care.

7. How often does your program serve fried or pre-fried meats or fish, including breaded and frozen chicken nuggets and fish sticks?

\_\_\_\_\_

3 times per week or more  
 2 times per week  
 1 time per week  
 Less than 1 time per week or never

8. How often does your program offer foods such as lunch/deli meats, sausage, bacon and ground beef that is less than 93% lean?

\_\_\_\_\_

3 times per week or more  
 2 times per week  
 1 time per week  
 Less than 1 time per week or never

9. How often do you offer meat or meat alternatives such as skinless, baked or broiled chicken, fish and ground beef or turkey that is 93% lean or meat alternatives including low-fat dairy foods, baked, poached or boiled eggs and dried beans

\_\_\_\_\_

3 times per month or less  
 1-2 times per week  
 3-4 times per week  
 Every time meats or meat alternatives are served

**Whole Grains** - The next several questions will be about Whole Grains. Please remember, the questions pertain to what is offered to 2-5 year olds in your care.

10. How often does your program offer whole grain foods including whole wheat bread, whole-wheat crackers, oatmeal, brown rice, Cheerios and whole grain pasta?

\_\_\_\_\_

\_ 1 time per week or     \_ 2-4 times per week     \_ 1 time per day (Half-     \_ 2 times per day or



less (Half-day: 3 times per month or less)	(Half-day: 1 time per week)	day: 2-4 times per week)	more (Half-day: 1 time per day or more)
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**11. How often do you offer foods like cookies, cakes, doughnuts, muffins, ice cream, and pudding? Would you say you offer these (keep response options)**

- 1 time per day or more
- 3-4 times per week
- 1-2 times per week
- Less than 1 time per week or never

**Beverages-The next few questions are about beverages that are provided. Please tell me the best statement that reflects what is provided. Please remember, the questions pertain to what is offered 2-5 year olds in your care.**

**12. Is Drinking water available:**

- Only when children ask
- Only when children ask and during water breaks
- Only indoors, where it is always **visible and freely available**
- Indoors and outdoors, where it is always **visible and freely available**

**\*\*Please note, availability means that the water is always visible and freely available which means that water is always available to children either from water bottles, pitchers, portable or stationary water coolers, but may or may not be self-serve.**

**13. How often does your program offer children a small box of 100% fruit juice:**

\_\_\_\_\_

- |   |
|---|
| <ul style="list-style-type: none"> <li><input type="checkbox"/> 2 times per day or more</li> <li><input type="checkbox"/> 1 time per day</li> <li><input type="checkbox"/> 3-4 times per week</li> <li><input type="checkbox"/> 2 times per week or less</li> </ul> |
|---|

**14. How often does your program offer drinks like Kool-Aid, fruit drinks, sweet tea, sports drinks and soda? Would you say**

- 1 time per month or more
- 1 time every few months
- 1-2 times per year
- Never

**15. Does your program offer milk to 2-5 year olds without milk allergies that is:**

- Whole (Regular)
- Reduced fat (2%)
- Low fat (1%)
- Fat free (Skim)

**16. How often does your program offer flavored milk:**

\_\_\_\_\_

- 1 time per day or more
- 3-4 times per week
- 1-2 times per week
- Never

**Socio-cultural Environment**

**17. How are meals and snacks are served? Choose one of the following:**

- I serve children their plates with set portions of each food
- I portion out servings to children at the table
- Children serve some foods themselves, while you plate or serve other foods
- I allow children who are developmentally ready to choose and serve foods most or all foods themselves

**18. How often do you eat and drink the same foods and beverages as children during meal and snack times:**

- Rarely or never
- Sometimes
- Often
- Always

**19. How often do you eat or drink foods or beverages like soda, chips, cookies, cakes, fried foods in front of children?**

- Rarely or never
- Sometimes
- Often
- Always

**20. Enthusiastic role modeling is when you eat healthy foods in front of children and show how much you enjoy them. For example, you might say, “Mmm, these peas taste yummy!” How often do you enthusiastically role model\* eating healthy foods served at meal and snack times:**

- Rarely or never
- Sometimes
- Often
- Every meal and snack time

**21. How often do you praise children for trying new or less-preferred foods:**

- Rarely or never
- Sometimes
- Often
- Always

**22. When children eat less than half of a meal or snack, how often do you ask them if they are full before removing their plates:**

- Rarely or never
- Sometimes
- Often
- Always

**23. When children request seconds, how often do you ask them if they are still hungry before serving more food:**

- Rarely or never
- Sometimes
- Often
- Always

**24. How often do you require that children sit at the table until they clean their plates:**

- Rarely or never
- Sometimes
- Often
- Every meal and snack time

**25. How often do you reason with a child to eat foods like broccoli and spinach?**

- Rarely or never
- Sometimes
- Often
- Every meal and snack time

**26. How often do you use children's preferred foods, including treats or desserts, to encourage them to eat new or less-preferred foods, like vegetables and broccoli?**

**Prompt:** Use in this sense can include offering a treat only if a child finishes his/her vegetables, or taking away a treat if a child does not finish his/her vegetables.

**Would you say you use children's preferred foods to encourage them to eat new or less-preferred foods**

- Rarely or never
- Sometimes
- Often
- Every meal and snack time

**27. How often do you use food to calm upset children or encourage appropriate behavior:**

- Rarely or never
- Sometimes
- Often
- Every day

**28. Would you say during meal and snack times, you give hands-on help, including encouraging finger-feeding, praising children for feeding themselves, and helping children use cups or other utensils to guide toddlers as they learn to feed themselves:**

- Rarely or never
- Sometimes
- Often
- Always

**29. How often do you remind children to drink water during indoor and outdoor physically active playtime**

- Rarely or never
- Sometimes
- Often, during most, but not all play periods
- Always, At least 1 time perplay period

**We are now moving on to the third and final section of the survey which will be questions concerning what's available in your home. You will be asked to select the best statements that describe what is provided in your home. Please remember,**

there is no right or wrong answer. Please remember that the questions pertain to 2-5 year olds in your care.

## What's Available

**30. How often are TVs or videos on during meal or snack times:**

- Rarely or Never
- Sometimes
- Often
- Always

**31. This question pertains to materials you have such as posters, books and other learning materials which can include MyPlate posters, pictures of fruits and vegetables, fruit or vegetable garden areas, and bowls of fruit. Do you have**

- Few or no materials
- Some materials with limited variety
- A variety of materials
- A large variety of materials with new items added or rotated seasonally

**32. And how about materials that display foods such as bowls of candies, ice cream and cookies:**

- Few or no materials
- Some materials with limited variety
- A variety of materials
- A large variety of materials with new items added or rotated seasonally

**33. How often does your program offer beverages to developmentally-ready toddlers in an open, child-sized cup:**

- Rarely or never
- Sometimes
- Often
- Always

### *Menus & Variety*

**34. How often do you repeat your program's menu cycle**

- Every 1 week or less
- Every 2 weeks

- Every 3 weeks or longer without seasonal change
- Every 3 weeks or longer with seasonal change

**35. How often do your menus include a variety of dark vegetables, lean meats, and whole grain foods:**

- Rarely or never
- Sometimes
- Often
- Always

**The next few questions will address Education & Professional Development.**

**36. How often do you lead planned nutrition education with the children in your care? Please know that planned nutrition education can include circle time lessons, story time, and cooking and gardening activities.**

- Rarely or never
- 1 time per month
- 2-3 times per month
- 1 time per week or more

**37. Would you say you talk with children informally about eating foods such as dark leafy vegetables, lean meats and whole grains:**

- Rarely or never
- Sometimes
- Often
- Each time I see an opportunity

**38. Not including topics of food safety and food program guidelines, how often have you completed professional development on child nutrition, including in-person or online training for contact hours, continuing education credits, reading brochures, books or online articles from trusted organizations**

- Never
- Less than 1 time per year
- 1 time per year
- 2 times per year or more, including at least 1 in-person or online training, when available

**39. If never, skip. In past professional development, which of the following components were covered (Please say yes or no for each):**

- Food and beverage recommendations for children
- Serving sizes for children
- Importance of variety in the child diet
- Creating a healthy mealtime environment, meaning children can choose what to eat from the foods offered, television and videos are turned off, and providers sit with children and enthusiastically role model eating healthy foods.

- Using positive feeding practices which include praising children for trying new foods, asking children about hunger/fullness before taking their plates away or serving seconds, and avoiding the use of food to calm children.
- Talking with families about child nutrition

**\*\*\*\*\*Interviewer will code  None  1-2 topics  3-4 topics  5-6 topics\*\*\*\*\***

**40. How often do you offer information on child nutrition to parents (which can include brochures, tip sheets, or your program's newsletters, website, or bulletin board and can be offered informally or during meetings or educational sessions with families)**

- Never
- Less than 1 time per year
- 1 time per year
- 2 times per year or more

**41. (If never, skip). Which of the following topics have been covered by the information your program offers to families: Say yes or no to the options**

- Food and beverage recommendations for children
- Serving sizes for children
- Importance of variety in the child diet
- Creating a healthy mealtime environment
- Using positive feeding practices

**\*\*\*\*\*Interviewer will determine which group  None  1-2 topics  3-4 topics  5 topics\*\*\*\*\***

**Thank you! You have completed the survey. Please provide the email address or mailing address in which to send your \$25 gift card!  
Have a great day!**

**Gift Card Information:** Walmart or Target  
**Verify Delivery Address:**

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## Curriculum Vitae Part I: Research and Scholarship

### PERSONAL DATA

#### **Lucine P. Francis**

The Johns Hopkins University School of Nursing  
525 N. Wolfe Street  
Baltimore, Maryland 21205-2010  
Email: [lfranc12@jhu.edu](mailto:lfranc12@jhu.edu)

### EDUCATION

<b>Year</b>	<b>Degree Earned</b>	<b>Institution &amp; Location</b>
2017 (expected)	Ph.D., Nursing	Johns Hopkins University, Baltimore, MD
2011	B.S., Nursing	Johns Hopkins University, Baltimore, MD
2004	B.A., Neuroscience	Smith College, Northampton, MA

### CURRENT LICENSE

<b>Year</b>	<b>Source</b>	<b>Certification Type/License#</b>
2012	Maryland Board of Nursing	Registered Nurse, R201308

### PROFESSIONAL/RESEARCH EXPERIENCE

<b><u>Years</u></b>	<b><u>Position</u></b>	<b><u>Institution/Project</u></b>
2012-present	Research Nurse/Doctoral student	Johns Hopkins University School of Nursing, <i>Baltimore, MD</i>
2014-2016	Research Residency	University of Maryland School of Medicine- <i>Baltimore, MD</i>
2007-2008	Research Assistant	The Reach Institute - <i>New York, New York</i>
2005-2007	Research Assistant	Rockefeller University, Cellular Physiology Immunology, <i>New York, New York</i>
2004-2005	Research Assistant	Massachusetts General Hospital/ Harvard Medical School Edwin Steele Laboratory of Tumor Biology- <i>Boston, MA</i>

### HONORS AND AWARDS

**Year**

2014	Sigma Theta Tau International Honor Society, Nu Beta Chapter, Johns Hopkins University
2010	Robert Wood Johnson Foundation New Careers in Nursing (NCIN) Scholarship
2010	The Johns Hopkins University School of Nursing Undergraduate Honors Research Program
2004	Howard Hughes Medical Institute travel grant
2004	Sigma Xi Research Society-Smith College Chapter
2002	Smith College Dean's List

## **RESEARCH**

### **Sponsored Research**

- 2014-2017 *Examining Food Environments of Family Child Care Homes*, Principal Investigator (100%) NIH/NINR-Ruth L. Kirschstein National Research Service Award for Individual Pre-doctoral Fellows in Nursing Research 1F31NR015399
- 2013-2014 Interdisciplinary Training in Cardiovascular Health Research (PI: Allen, J) Pre-doctoral Trainee (100%) NIH/NINR 5T32NR012704
- 2012-2013 Johns Hopkins University School of Nursing Doctoral Scholarship, Pre-doctoral Trainee (100%),

## **SCHOLARSHIP**

### **Working Papers**

1. **Petit Francis L.**, Akinleye L., Black M., Allen J. (in preparation) Examining the obesogenic attributes of the Family Child Care Home (FCCH) environment: A Literature Review
2. **Petit Francis L.**, Black MM., Allen J. (in preparation) Mealtime Environment Matters: Examining the Sociocultural Food Environment of Baltimore's Family Child Care Homes
3. **Petit Francis L.**, Black MM., Allen J. (in preparation) Examining the macro and micro physical food environment of Family Child Care Homes
4. Hager, E., Armstrong, B., **Petit Francis L.**, Kilby, S., Bussell, K., Black, M. (in preparation, unordered list of authors) Examining Nutrition and Physical Activity Policies and Practices in Early Child Care Centers using a Mixed-Methods Approach

### **Peer Reviewed Journal Articles (\*reflects data-based)**

1. **Petit Francis L.**, Spaulding E., Turkson-Ocran RA., Allen J. (2017) Randomized Trials of Nursing Interventions in Weight Management Research: A Systematic Review, *Western Journal of Nursing Research*, January, 08, 2017, DOI: 10.1177/0193945916686962

2. \*Lucea MB, **Francis L**, Sabri B, Campbell JC, Campbell DW (2012). Disordered eating among African- American and African- Caribbean women: The influence of intimate partner violence, depression, and PTSD, *Issues Ment Health Nurs*, 33(8):513-21
3. \*Tarbell KV, **Petit L**, Zuo X, Toy P, Luo X, Mqadmi A, Yang H, Suthanthiran M, Mojsov S, Steinman RM (2007). Dendritic cell-expanded, islet-specific, CD4+ CD25+ CD62L+ regulatory T cells restore normoglycemia in diabetic NOD mice, *The Journal of Experimental Medicine*, 204(1):191-201.
4. \*Willett CG, Boucher Y, Duda DG, di Tomaso E, Munn LL, Tong RT, Kozin SV, **Petit L**, Jain RK, Chung DC, Sahani DV, Kalva SP, Cohen KS, Scadden DT, Fischman AJ, Clark JW, Ryan DP, Zhu AX, Blaszkowsky LS, Shellito PC, Mino-Kenudson M, Lauwers GY (2005). Surrogate Markers for Antiangiogenic Therapy and Dose-Limiting Toxicities for Bevacizumab With Radiation and Chemotherapy: Continued Experience of a Phase I Trial in Rectal Cancer Patients, *Journal of Clinical Oncology* 23(31).

### ***Conference Meetings/Presentations***

#### ***Local***

**2016- Petit Francis, L.** Examining Food Environments of Family Child Care Homes: Methodology and Update on Recruitment Efforts, *Building Healthy Habits into Childcare Symposium*, University of Maryland School of Medicine , Podium Presentation  
**2016- Shodeinde,L., Petit Francis, L., Allen, J,** Examining the Socio-cultural Environment of Family Child Care Homes, *JHU SON Honors Research Program*  
**2003- Petit, L.** Is obesity a risk factor for childhood asthma? A fat chance of developing asthma, Summer Research Program, Pediatrics Asthma Center of Excellence, SUNY Downstate Medical Center

#### ***National***

**2011-Petit Francis, L., \*Lucea, M., Gibbons, K., Boylard, R., Campbell, J** (2011) Examining the relationship between disordered eating and intimate partner violence (IPV) among African-American and Afro-Caribbean women , *139th American Public Health Association Annual Meeting (Women's Caucus Program)*, Washington, DC. (\*presented by Marguerite Lucea due to labor and delivery of child several days before conference)

#### ***International***

**2004- Petit, L, Jerry, DJ, Bittman, EL, and Harrington, ME.** Effects of circadian rhythm disruption on radiation-induced Apoptosis (June, 2004). *Society for Research on Biological Rhythms Journal of Research Abstracts-* Whistler, British Columbia

### **EDITORIAL ACTIVITIES**

#### **Manuscript review**

2013 Co-reviewer, European Journal of Cardiovascular Nursing

## **PROFESSIONAL ACTIVITIES/MEMBERSHIPS**

### **Society/Association Membership and Leadership**

2015-Present	Member, Preventive Cardiovascular Nurses Association
2015-Present	Member, Southern Nursing Research Society
2014-Present	Member, Sigma Theta Tau International Nursing Honors Society, Nu Beta Chapter
2013-2014	Secretary, Biomedical Scholars Association, Tri-institution Johns Hopkins School of Medicine, Public Health and Nursing
2013-2014	Secretary, Johns Hopkins School of Nursing Doctoral Student Organization
2012-Present	Member, American Public Health Association
2004-Present	Sigma Xi Research Honor Society

## **Curriculum Vitae Part II, Teaching and Service**

### **EDUCATIONAL ACTIVITIES**

#### ***Johns Hopkins University School of Nursing***

Spring 2017 Reduction Nursing: Entry	<b>Guest Lecturer:</b> “Health Policy and Environmental Justice” NR.120.510.0101 & 0201: Health Promotion and Risk Across the Lifespan, 144 students (Master of Science in into Nursing Practice Program)
Spring 2017 NR.120.510.0101 into	<b>Guest Lecturer:</b> “Ecological Perspectives of Health” & 0201: Health Promotion and Risk Reduction Across the Lifespan, 144 students (Master of Science in Nursing: Entry Nursing Practice Program)
Spring 2017 Promotion and Science	<b>Teaching Assistant,</b> NR.120.510.0101 &0201: Health Risk Reduction Across the Lifespan, 144 students (Master of in Nursing: Entry into Nursing Practice Program)

Fall 2016                    **Teaching Assistant**, NR.110.200.8301: Nutrition, 30 students  
(Pre Baccalaureate Program)

Spring 2016                **Teaching Assistant**, NR.110.200.8301: Nutrition, 30 students  
(Pre Baccalaureate Program)

Fall 2015                    **Teaching Assistant**, NR.110.200.8301: Nutrition, 30 students  
(Pre Baccalaureate Program)

Fall 2015  
Evidence-  
program)                    **Teaching Assistant**, NR.210.803.0101: Nursing Inquiry for  
Based Practice, 18 students (Doctor of Nursing Practice-DNP)

**MENTORING**

***Johns Hopkins School of Nursing***

2015-2016    Lara Shodeinde, BSN student, JHU SON Honors Research Program,  
*Examining the Socio-cultural Environment of Family Child Care Homes*