

The Center-Level Predictors of Non CACFP and CACFP Participation in Arizona:

A Cross-Sectional Study

by

Kala Narramore

A Thesis Presented in Partial Fulfillment
of the Requirements for the Degree
Master of Science

Approved March 2021 by the
Graduate Supervisory Committee:

Meg Bruening, Chair
Maureen McCoy, Member
Erin Raczynski, Member

ARIZONA STATE UNIVERSITY

May 2021

ABSTRACT

Background: The Child and Adult Care Food Program (CACFP), as a federal nutrition assistance program, provides guidance and financial support to early childcare education centers (ECECs) who provide nutritious foods to children in care.

Understanding factors that predict participating in CACFP is necessary to expanding CACFP reach. The purpose of this study was to assess center-level predictors of ECECs participating in CACFP in Arizona to guide state-wide recruitment efforts.

Methods: This study analyzed data from ECECs in Arizona in 2020 (n=2228), sourcing data from the Arizona Department of Economic Services (Quality First rating (an Arizona-based score for quality of the ECE centers), accreditation Status, highest educational attainment, enrichment center status, and total licensed capacity), Arizona Department of Education (CACFP), Arizona Department of Health and Sanitation (SNAP-Ed participation), and the US Census. Logistic regression was used to examine the association between the predictors and participating in CACFP, adjusting for SNAP-Ed eligibility by census tract.

Results: Centers had a significantly greater odds of participating in CACFP if they were an enrichment site (OR=5.9; 95% CI: 4.6, 7.5), had a Quality First rating (OR=2.5; 95% CI: 2.0, 3.0), and when the highest educational attainment by staff was a bachelor's degree or higher (OR=1.4; 95% CI: 1.1, 1.7).

Discussion: The findings support indicate that certain modifiable center-level factors were related to participation in CACFP. Findings may assist possible linkages with other state-level programs to improve the recruitment and retention of ECE centers to CACFP.

DEDICATION

I am elated to dedicate this thesis to all first-generation college students. It is tough to navigate not only through an undergraduate degree but to continue into higher education. All the encouragement from my faculty, family, and friends helped to support me through this academic endeavor. We can accomplish far more than our minds will even allow us to dream. It is up to each of us to realize our potential and internalize all the wisdom and inspiration that is poured onto us by our mentors. Keep chugging along, the only person that can get in your way, is yourself. Please be proud of all that you have accomplished and leave your impact in this scientific world.

ACKNOWLEDGMENTS

I would like to acknowledge the individuals who have helped me through the graduate process as well as those that assisted in the accomplishment of this thesis. Dr. Meg Bruening has been the most encouraging and supportive mentor I could have ever asked for. Thank you for framing my obstacles in a way that improved my attitude on overcoming them. I left every meeting with you feeling confident and empowered. Thank you for selecting me for your team and I hope that I have made you proud.

I would also like to acknowledge Maureen McCoy and Erin Raczynski for their contributions and constructive feedback throughout this research process. Your feedback was invaluable and integral to the importance of this project. Lastly, I would like to acknowledge my family, fiancé, and future in-laws for keeping me caffeinated and encouraged during tireless nights of research. I acknowledge all the support I received in the different aspects of this thesis and am grateful.

TABLE OF CONTENTS

	Page
LIST OF FIGURES.....	v
CHAPTER LIST OF TABLES	v
1 INTRODUCTION	1
Study aims	3-4
2 REVIEW OF LITERATURE.....	5-21
Summary	20-21
3 METHODS	22-24
Analyses	25
4 DATA AND RESULTS	26
5 DISCUSSION	32
Strengths and Limitations	35
6 CONCLUSION	36
REFERENCES	37-41

LIST OF TABLES

Figure Page

1. Data flow chart.....24

Table

1. ECE Center Demographics and Key Variables.....27

2. Bi-variate analyses examining associations with CACFP & non-CACFP sites ..29

3. Adjusted odds ratio of participating in by predictor variable31

CHAPTER 1

INTRODUCTION

We are currently experiencing a time when millions of children under the age of five are not meeting their developmental potential.¹ Nutrition is an important factor during childhood with the rapid growth and development that is taking place.² These early years of life are also the time when food and taste preferences are forming.³ There is strong research that stresses the importance of a child's nutritional status in preschool years as it continues into not only adolescence but also into adult life:⁴ adult health and wellbeing begins in the first 5 years of life.¹ As of 2016, the number of 3 to 5-year-old children in the United States that are cared for in early childhood care centers is greater than 60%.⁵ Federally-funded programs are currently in place to help ensure that adequate nutrition is given to children during this crucial time, yet some centers are still not taking advantage of them.

Child development is defined as an orderly progression of skills (gross and fine motor, cognitive and language, and personal/social) that are formed both by genetics and by their environment.^{1,23} There is consistent evidence that indicates that children should be exposed to optimal nourishing and nurturing environments from conception throughout childhood¹. Early childhood developmental skills form the basis for subsequent development down the road, including content readiness and performance in school.^{7,23-25} Children growing up in poverty may not receive the nutrition and nutrition practices required to promote optimal development.¹ They are often exposed to additional risk factors that can interfere with the developmental process within these crucial first years of life.⁶ As children approach school age, individual differences between children

become more evident. Early childhood education (ECE) programs have been shown to increase a child's motivation for learning, increase the child's readiness for learning, and helps to identify barriers to learning at a younger age. There is evidence to support that participation in early childhood education improves educational outcomes, improves standardized test scores, and improves long term social and health outcomes.⁷

The Child and Adult Care Food Program (CACFP) is a federally-funded program that started in 1968 and provides participating centers with reimbursement for meals and snacks that are served to eligible children and adults.⁸ The program was designed to help support child care centers that were established in poor communities.⁹ One of the missions is to ensure that these underserved populations have access to meals and snacks that are nutritious⁸. With the success of the program, it was extended to childcare homes in 1978 and adult care centers in 1987. It was in 1994 with the Healthy Meals for Healthy Americans Act that eligibility was extended and now all children participating in Head Start are able to receive free meals⁹. As of 2017, more than 7 million 3-5-year olds were attending early childhood education centers¹⁰. CACFP provided meals to 4.2 million children and 130,000 adults on a daily basis in 2021,⁸ or an estimated 67% of preschool-aged children are being fed through this program. With its large reach, CACFP is one of the major solutions to helping children meet their developmental potential in the first 5 years of life by ensuring adequate, quality nutrition.

In 2016, the USDA made the first major changes to the meal pattern requirements for CACFP which went into effect in October 2017.¹¹ USDA's CACFP website indicates many positive results from the meal provision changes required in CACFP.⁸ One of the positive findings is that children are reportedly eating more fruits and vegetables since

the new changes in the program. They also report that the new meals provide more grains, less sugar, and more lean proteins¹². A study by Gurzo et al. examined the differences between the food and beverages offered between childcare sites participating and not participating in CACFP and reported that non-CACFP sites provided fewer meals and snacks.¹¹ Non-CACFP sites were also less likely to provide vegetables, proteins such as meat, eggs, whole grains, and milk and more likely to provide candy, sodium-filled snacks, and sugar-sweetened beverages¹¹. CACFP sites were shown to not only serve more nutritious foods but also found to have more supportive nutrition practices (e.g. family-style meals) than non-CACFP sites.^{12,19,39} Other research indicates CACFP participation may help promote healthier child care environments that would support healthier nutrition practices.¹³ Healthy eating policies in ECEs have the potential to improve children's diet quality and may be an important intervention to improve long term health¹⁴. It is critical to identify factors associated with sites participating in CACFP, to expand the reach of this effective federal nutrition assistance program.

There have been several studies examining the barriers to participating in nutrition-related programs^{15,16} as well as healthy eating strategies in child care settings^{17,18}. By understanding barriers, we can better identify modifiable factors to expand the number of sites participating in CACFP. For example, the barriers range from staff disbelief in the potential benefits^{17,18} to difficulty in obtaining healthy foods in rural environments³⁹. Educator leadership can be very instrumental for the adoption and implementation of new practices since leadership can positively or negatively affect staff implementation of programs such as CACFP. If the supervisor fully believes in an intervention, the staff are also more likely to believe in the intervention and put more

effort into the implementation. Directors from CACFP centers were twice as likely to report no barriers to serving healthy foods in comparison to directors from non-CACFP centers¹⁹, which may indicate that once enrolled in CACFP, the learning curve to navigating the program isn't so steep. In other words, CACFP may help centers and directors to serve healthy foods rather than act as a hurdle in the process. To better understand possible modifiable and non-modifiable factors associated with participating in CACFP in Arizona, the aim of this study is to assess center-level predictors of early childhood education centers not currently participating in CACFP. The hypothesis is that the zip code, and as a proxy poverty, of the centers as well as the size of the establishment will predict CACFP participation of ECEs in Arizona. No study has yet to examine the specific center-level predictors to CACFP implementation. The results could help to close this gap and provide an even larger number of children with nutrition as a promotor of optimal growth and development.

CHAPTER 2

REVIEW OF LITERATURE

Child Development

Child development is defined as an orderly progression of skills (gross and fine motor, cognitive and language, and personal/social) that are formed both by genetics and by the environment¹. Early childhood developmental skills form the basis for subsequent development down the road, including content readiness and performance in school^{1,20}. As children approach school age, individual differences between children become more evident. There is consistent evidence that indicates that children should be exposed to optimal nourishing and nurturing environments from conception throughout childhood¹. There is a strong relationship between a child's early nutritional status and the motor and cognitive skills they will develop in infancy and throughout their preschool years²⁰. The difference in motor and cognitive skills are even shown to continue into adolescence and young adulthood⁴. As a result of this, most early childhood education settings are required to integrate some type of nutrition education within the preschool curriculum.²¹ The research behind nutrition and development emphasizes the importance of the education component that goes alongside the improvements in meal components.

Nutrition and Child Development

Optimal nutrition during childhood is ideal for neurodevelopment and brain function throughout the life of the child.²² Smith et al. suggested that providing education where and when fruit and vegetables are offered may help increase total consumption²². Proper nutrition is known to contribute to the promotion of positive child development.¹ Early childhood education is one way to help promote the growth and development of

these young children and many centers exist to help with optimizing these important years of life.^{20,24} Health, nutrition, child safety, and childcare learning can together improve child development. Having the mental stimulation component in nutrition programs such as in Head Start, preschool, or other early childcare centers can improve developmental outcomes.²³ A literature review published in 2018 concluded that it is vital that children establish good eating habits as toddlers in order to contribute to lifelong health eating practices and consistent nutritional intake.²⁴ This nutrient consistency is vital to the growth and development of young children. The preschool years may be enriched not only with nutritional foods but with early childhood education.

Early Childhood Education

Early childhood education (ECE) is a term used to describe any and all types of educational programs that takes place prior to kindergarten. ECE may consist of any activities that are designed to promote the development of cognitive and social development of children. These programs can be home-based, center-based, or public school-based. They may be full day or half day and can take place all year long²⁵. Early childhood education that takes place in a classroom has been shown to lead to substantial decreases in later special education placement in school²⁶. Children in low-income areas often experience delays in growth and development by the age of three with indications that they would benefit from center-based early childhood education. ECE programs have been shown to increase a child's motivation for learning, increase the child's readiness for learning, and help to identify barriers to learning at a younger age. ECE centers are an important setting for influencing the dietary intake of America's youth^{19,24-25}. There is

evidence to support that participation in early childhood education improves educational outcomes, standardized test scores, and long term social and health outcomes^{7,23-27}.

Bakken et al. examined the long-term effects observed after participating in early childhood education. Greater than 50% of the students that were followed in this study were exceeding the standard in math in the fourth grade. They, too, found less special education placements within their students being examined after completion of early childhood education²⁷. Children growing up in poverty may not receive the nutrition they need for growth and development. Food insecurity and neglect are two of the contributing factors and the participation in ECE programs could help bridge this gap⁶. Socially, the children appear to be better off as well by being able to trust their environments and conduct themselves normally with other students. Reported attendance rates were also shown to be improved in those that participated in ECEs²⁷. A review written by Hahn et al. concluded that there is strong evidence that ECE centers improve both educational and health outcomes that can promote long-term effects as well as increase health equity⁷.

A one size fits all approach does not appear to work for early childhood centers in rural, urban, and mixed areas. Head Start was shown to be more effective in increasing children's receptive vocabulary in urban areas versus oral comprehension in rural areas^{18,26}. This is likely secondary to the characteristics of the child's environments such as language spoken at home, and provision of transportation as seen with previous research. There seems to be stronger impacts of Head Start on language and literacy outcomes for children who come from low socioeconomic families and Spanish-speaking homes.²⁸ Head Start, as a whole, focuses on delivering vocabulary instruction. The impact that Head Start has on oral comprehension in rural areas may be associated with

the high density of Spanish-speaking learners²⁸. Zip code / census tract could be an identifiable barrier to participation in programs such as those qualifying as early childhood education centers. Additionally, ECE programs are settings for promoting nutrition which is followed by positive growth outcomes in children¹⁸. CACFP is a program that could help with the nutrition promotion in these ECE centers.

What is CACFP?

CACFP is a federally-funded program through the USDA that provides participating centers with reimbursement for meal and snacks that are served to eligible children and adults⁸. CACFP started in 1968 as a three-year pilot program under the name Child Care Food Program. The program was designed to help support child care centers that were established in poor communities⁹. One of the missions is to ensure that these underserved populations have access to meals and snacks that are nutritious⁸ as well as to promote the development of good eating habits²⁹. With the success of the program, it was extended to childcare homes in 1978 and adult care centers in 1987. It was then in 1994 with the Healthy Meals for Healthy Americans Act that eligibility was extended, and now all children participating in Head Start are able to receive free meals⁹.

The Healthy Hunger Free Kids Act of 2010 established nutrition requirements similar to the requirements under the National School Lunch Program for meals served by CACFP providers. There was \$10 million in funding assigned to USDA to conduct training, provide technical assistance, and distribute educational materials to child care providers to help them serve healthier food more effectively³⁰. In 2017, the standards were revised to require centers and day care homes participating in the CACFP to serve more whole grains and a greater variety of vegetables and fruit and reduced the amount

of added sugars and solid fats in meals¹⁹. These changes positively affected the nutrition intake of participants as evidenced by the literature.³⁴⁻³⁵ This first study found that post standard changes, centers were serving less sugar-sweetened cereals, less flavored milk, more whole grains, and less processed meats.³¹ These findings were similar to those found at tribal centers participating in CACFP. These centers reported higher intakes of fiber and lower intakes of sugar. Sisson et al. also noted that best practice compliance improved overall.³² This last study examining 2017 updates reported that centers felt positively about the updates and experienced little to no challenges in implementing the changes.³³ Currently, CACFP provides meals to 4.2 million children and 130,000 adults on a daily basis.⁸

The state agency that distributes funds to the local centers in Arizona is called the Arizona Department of Education (ADE). In order to find out more about the program at a local level, a person would log on to the ADE website and click on health and nutrition services, and locate the CACFP tab. There are a series of six steps in the site application process and the website specifies sponsors who wish to participate in the CACFP in Arizona must complete a series of trainings and submit applications for ADE's review and assessment of eligibility²⁹. Those that are eligible include public or private nonprofit child care centers, after school care centers, Head Start programs, and other licensed or approved institutions to provide the service of daycare may participate in CACFP⁸. More specifically for childcare centers and Head Start, other requirements may include providing non-residential care, be 25% free and reduced or 25% title 20, licensed by ADHS or exempt, and meet the nonprofit 501c3 tax exempt status. As of 2018, CACFP

provided over 12 million meals and over seven million snacks to preschool and Head Start throughout the state of Arizona²⁹.

ADE currently has 1,034 centers listed as current CACFP participants with 292 of these located in the Phoenix area (28%). Research shows that it does make a positive difference if a state has policy surrounding the food served. The Healthy Eating Index-2015 (HEI) scores were measured in this study by examining the diet consumed before and after the policy was enacted. Mixed-effects linear models were used to estimate differences in HEI scores by state by first adjusting for the child's race, the number of children enrolled, the director's education, and participation in CACFP. The policy increased HEI scores for whole fruits, total fruits, and lean proteins. Thus, the policy was associated with some enhancements in dietary intake.

Centers that are not currently utilizing the meal reimbursement through CACFP could consider applying as the meals that are provided to these children and adults, could be the only meals they receive each day. The reimbursement allows the center to afford more desirable food choices by helping to supplement the food costs²⁹. The USDA based the meal pattern on Dietary Guidelines for Americans¹¹, expert recommendations by the Institute of Medicine¹², and stakeholder's input¹¹. The major changes that took place included serving more whole grains, greater variety of fruit and vegetables, less added sugar, and less fat. It also improved the nutrition standards for the beverages including low-fat and fat-free milk³⁴. The guidelines of CACFP have helped to make a nutritional impact on the children that are participating.

Quality First

Quality First is a star rating system in Arizona that focuses on quality improvement for preschools administered by an organization called First Things First.³⁵ Quality First developed their rating system based on The Early Childhood Rating Scale (ECERS) and the Infant/Toddler Environment Rating Scale (ITERS) which were published by the University of North Carolina. These scales investigate a list of items that are organized into 7 subscales which are space/furnishings, personal care routines, language/reasoning, activities, interactions, program structure, and staff.³⁶ For the purposes of this review, the focus will be under personal care routines where the importance of meal and snack time are described. There should be adequate supervision during mealtime such that an adult is within arm's reach of any child that is eating. Bottles containing milk or juice cannot be left in room temperature for longer than one hour. If a child is feeding themselves, they should have adequately washed their hands and immediately sat at the table to avoid recontamination.³⁷ The meals and snacks that are served in a CACFP-participating site follow the United States Department of Agriculture (USDA) meal pattern model that supports good nutritional practice for life-long practice. These sites also ensure proper hand washing, careful food preparation and sanitation, and promotes sanitary conditions.³³ Instructors are taught about items that are possible choking hazards and how to cut them into smaller pieces for safer consumption. They also learn about using food (e.g. uncooked macaroni) as art and how this may need to be avoided to be respectful of families that are food insecure.³⁸

Choosing a preschool is an important decision for parents to make and most of them are looking for quality care. Quality First has the primary goal of quality

improvement in ECE centers. Participation in such a program may show that those centers are interested in providing the best care as they are receiving more intense training.³⁹ The training and coaching they receive is designed to help their centers nurture the emotional, social, and academic development of participants. The star rating system is designed to measure the progress of the centers on a scale of one star to five stars with five being the highest rating. Centers are assessed every one to two years and will receive a new star rating at that time. Meeting the established standards is considered a three-star rating. Nearly 75% of centers participating in Quality First are meeting or exceeding the standards at this time.³⁹

Nutrition Impact of CACFP on Child Nutrition

CACFP has been shown in the literature to provide more nutritious foods and beverages compared to non-CACFP sites^{28,31-33}. In this oldest study (1999), the diets of children consuming CACFP meals in a child-care center were superior in content for three vitamin A, riboflavin, and calcium as well as more vegetables and milk compared with the diets of children who brought meals and snacks from home. Children at the center participating in the CACFP also experienced fewer days of illness³¹. The Academy of Nutrition and Dietetics (formerly known as the American Dietetic Association at the time of this article) recommends that day-care meals for children in full-time care should provide 50% to 67% of the RDA for nutrients⁴⁰. In this particular study, two meals and a snack were examined and included and therefore 67% was used as the reference. The cutoff point of 67% is consistent with Head Start performance standards, which require that one-half to two-thirds of the child's daily nutrition needs be provided, depending on the length of the program day²⁸⁻³⁰. CACFP provides reimbursement for up to two meals

and one snack per child per day and are therefore aligned with this guidance as well¹¹. Mean intakes of children at the non-CACFP centers (in comparison to CACFP sites) were below this standard for vitamin A, niacin, pyridoxine, and magnesium⁴¹.

USDA's website claims many positive results from the meal provision changes that occurred in 2017. One of the claims is that children are eating more fruits and vegetables than they were prior to the change. They also report that the new meals provide more whole grains, less sugar, and more lean proteins¹². A longitudinal study was conducted on a sample of four-year-olds examining the effects of CACFP vs. non-CACFP sites. The study found that among low-income children, participating in CACFP was moderately associated with higher intakes of milk and vegetables which has been found to decrease rates of obesity.⁴² Also, a study by Gurzo et al (2020) examined the differences between the food and beverages offered between childcare sites participating and not participating in CACFP to investigate these claims. Their team looked into randomly selected childcare providers from California databases that included both CACFP and non-CACFP sites. Non-CACFP sites provided fewer meals and snacks in total. They were also less likely to provide vegetables, meats/poultry/fish, eggs, whole grains, and milk. The non-CACFP sites were more likely to provide candy, sodium-filled snacks, and sugar-sweetened beverages. They concluded that child care sites participating in CACFP are more likely to provide nutritious foods/beverages compared with non-CACFP sites⁴³. Lastly, HEI was higher for those centers participating in CACFP indicating consumption.³²

Research has looked into food security and its relationship with food assistance programs such as CACFP in reference to weight status in children. Ngyuen et al. reported

that the typical relationship between food insecurity and weight status in school-aged children may actually differ when there is participation in food programs such as NSLP⁴⁴. This suggests that federal nutrition assistance programs may negate the obesogenic effect of food insecurity. This was confirmed with another study examining the nutrition of low-income home childcare providers.³⁸ In their cross-sectional, observational study they found that the in-home care providers not participating in CACFP tend to overserve refined grains, protein, carbohydrates, added sugars, and sodium and underserving of whole grains and vegetables. The food and beverages met vitamins A, C, and D recommended intakes as well as folate, calcium, zinc, and magnesium, however, iron and potassium recommendations were not met³⁴. These critical federal nutrition assistance programs provide low-income, often food insecure, children with access to critical nutrients for their growth and development. It is critical that we identify ways to expand programs such as CACFP in order to support the growth and development of food insecure, low-income children.

Legislative mandates for healthier meal patterns not only make the menu healthier but does, in fact, impact what the child is actually consuming. Kroeger et al. assessed if diet quality differs in early childcare centers in terms of what is listed on the menu, what is actually served, and what is ultimately consumed³⁶. Twenty-eight early childhood education centers were included in the study examining menus vs meals served. Total healthy eating index (HEI) scores were significantly higher for the menus in comparison with food served and food consumed. The food that was served and the food that was consumed were comparable but did always not match the menu. This indicates education is needed to stress the importance of menu adherence would be of value⁴⁵. Another study

reported that a significantly higher proportion of CACFP sites reported offering whole grain foods daily and that providers always ate the same foods that are offered to the children. CACFP participation may help promote child care environments that support healthy nutrition.¹³

Parents and ECE centers are the main influencers of children's diets, but there is limited information about just how each environment (home vs. ECE) contributes to children's overall diet quality. A study investigated if the diet quality is higher at ECE centers in comparison to weekend meals and reported that the quality of foods consumed by children at ECE centers was higher than that consumed elsewhere.⁴⁶ Overall, diet quality was low for the children in the study, but the quality of foods consumed by children at ECE centers are higher than that consumed elsewhere. ECE centers remain an important source of nutrition for children and further investigation is warranted to identify ways to support both the ECE centers and the families to provide healthier eating environments.⁴⁶

Barriers to Program Participation

There are several factors that may impact participation in federal nutrition assistance programs such as CACFP. Some of these may be non-modifiable (e.g., location) and others may be modifiable (e.g., education). For example, researchers have looked into whether belonging to a rural or urban community would be associated with higher or lower participation in Supplemental Nutrition Assistance Program-Education (SNAP-Ed). SNAP-Ed is another government-funded nutrition program that provides nutrition education to SNAP-eligible participants and may have valuable information to offer in terms of participation barriers. Haynes-Maslow et al. found through interviews

that the largest barrier to SNAP-Ed participation was lack of access to healthy foods and funding restrictions.¹⁵

Another potentially modifiable barrier could be the rigidity of the meal pattern guidelines. With the latest guidelines, researchers examined which centers were following these outlined requirements and if they matched the publicized menu or not. In this next study with nine ECE centers participating in CACFP, the match between the posted menus and foods actually served to children was high when the acceptable menu substitutions were considered. Only a few studies have examined the match between posted menus in ECE centers and the foods and beverages actually served to the children⁴⁷. There are more stringent guidelines called best practices within the CACFP umbrella. These practices are not required, although they are encouraged in order to promote the best nutrition and optimal growth. It is best practice, for example, that legumes are served in place of high-fat meats, as well as to serve whole fruit more often than fruit juice. Research has found that regular beef and full fat cheese products are commonly served despite the recommendations given in best practices⁴⁷. Serving a variety of vegetables, including dark green, red orange, other and starchy vegetables including legumes, will require careful menu planning and budgeting.³⁹

Overall, CACFP center participants report fewer barriers to serving healthy foods in their early childcare setting. A study found that the most prevalent reported barriers to serving healthier foods were cost of food items and children's taste preferences.²⁰ Directors from CACFP centers were twice as likely to report no barriers in comparison to directors from non-CACFP centers¹⁹. Directors from CACFP centers were less likely to report cost as a barrier to serving healthy foods which could indicate that reimbursement

is an effective way for centers to provide food to the children.²⁰ Reimbursement is the financial payment that the US government distributes out for every compliant meal that is served once a center has applied for the program. The reimbursement rates are adjusted annually each July, specifically by the regulations governing CACFP.⁴⁸ Parsons and colleagues looked into similar variables if identifying the factors that influence implementation of healthy eating policies and strategies in early childcare setting in low-income areas. They utilized focus groups, interviews, and an expert panel to find the top-rated factors that go into policy implementation. They found that the availability of the organization to support strategy implementation, whether or not the parents were agreeable, the added value of interacting with others who were supportive of the specified strategies, and the community's investment in healthy eating strategies in early childcare settings¹⁷. A prominent barrier in studies was the belief on whether or not the intervention was viewed as effective or not^{18,49}. Educators are more likely to implement a program if the benefits are well explained. In relation to CACFP, ECE center employees would likely be more enthusiastic about the fresh produce and whole grains if they were made aware of how quality nutritional intake improves child development.

Cooper and Contento examined preschool teachers' nutrition-related beliefs and practices through a specified training in New York City that were serving low-income children. They were investigating if the teachers were a possible barrier to new practice implementation. They found that providing specific training for preschool directors and addressing food quality may further improve teachers' nutrition-related attitudes, beliefs, and practices. Preschool teachers' beliefs and practices can influence children's eating behaviors⁴⁹. Educator leadership can be very influential for the adoption of new practices.

Leadership can positively influence the staff's success in the implementation of programs such as CACFP. Despite these known barriers, there are no studies to our knowledge that have examined site specific factors that are related to participating in CACFP. No studies have examined modifiable or non-modifiable factors on a systems level. For example, it is not known how education level at sites is related to participation in CACFP. By understanding these factors, as possible barriers to program participation, we can potentially expand the reach of CACFP.

Childhood Obesity

Let's Move is an initiative that was first launched by Michelle Obama to help reduce the rate of childhood obesity. Combining comprehensive strategies with common sense, *Let's Move!* is about putting children on the path to a healthy future during their earliest months and years⁴². The program involves giving parents helpful information and fostering environments that support healthy choices, providing healthier foods in our schools, ensuring that every family has access to healthy, affordable food, and helping kids become more physically active. Everyone has a role to play in reducing childhood obesity, including parents, elected officials from all levels of government, schools, health care professionals, faith-based and community-based organizations, and private sector companies.⁵⁰ Healthy eating policies in ECE have the potential to improve children's diet quality and may be an important intervention to improve health and reduce childhood obesity¹⁴.

Khalsa and colleagues examined the efficacy of the obesity prevention guidelines outlined in this movement. This was the first study to have examined the attainment of the '5-2-1-0' recommendations in preschool-aged children who attend childcare for a full

day in the US. The study demonstrated that there was a lot of room for improvement in preschool-aged children's dietary intake as well as physical activity and time in front of a screen. The study showed limited associations of dietary intake with BMI, however, each of the four individual recommendations were associated with positive health outcomes.⁵¹ This next study recruited two classrooms per childcare center in Hamilton County, OH. Children within each classroom were eligible if: they were between 36–72 months old, attended the center more than five hours a day, and were not enrolled in kindergarten. Data collection occurred for 24 hours from drop-off at the child care center on day 1 and ending at drop-off the following day⁵². Seventeen percent of children with complete dietary data (n = 307) consumed greater than or equal to five servings of fruits and vegetables. The findings suggested that children who attend full-time childcare may be consuming more daily calories when they leave childcare, but less than the recommended servings of fruit and vegetables.⁴³

In order to prevent obesity, public health interventions encourage preschool settings to promote healthy eating, in particular, to increase the consumption of fruits and vegetables. Insufficient intake of vegetables in children remains an area of concern for parents and public health agencies. To improve children's nutrition, it is important that they eat the recommended quantity of vegetables. Repeated taste exposure strategies are the best evidenced for increasing intake of unfamiliar vegetables⁵³. The number of 3-5-year-old children in the United States that are cared for in early childhood care centers is greater than 60%, as of 2016.⁵

In an obesogenic environment, authoritative behavior and some parental control is likely needed to moderate children's intake of palatable calorie-dense foods. Limiting

how often certain foods are brought into the home environment, avoiding stores and restaurants that sell unhealthy foods, and serving small but adequate portions should provide children with opportunities to develop self-regulation in eating behaviors⁵⁴. Early-life experiences with various tastes and flavors have a role in promoting healthy eating and favoring wider consumption of fruits and vegetables. Socioeconomic status is involved in these issues, as families where the parents have high educational levels consume more healthy foods than other families who are less aware of the issues³⁴. Prevention programs (e.g. CACFP) are ideally effective in addressing the factors influencing a child's eating behavior while also considering the socioeconomic aspects and education. It was also discovered that BMI percentile in children from households with low food security was significantly higher than that of children from fully food-secure households⁴⁴. For NSLP participants, there is evidence showing that as BMI percentile increases, household food security decreases. Although this study was not performed on CACFP participants, the results could be estimated to be similar as the guidelines for CACFP have been modeled after NSLP.

Summary

Childhood obesity and suboptimal growth and development within preschool-age children are a concern in the United States. There is consistent evidence that indicates that children should be exposed to optimal nourishing and nurturing environments from conception throughout childhood¹. There is a strong relationship between a child's early nutritional status and the motor and cognitive skill they will develop in infancy and throughout their preschool years, as well as even into adolescence and young adulthood⁴. Centers that are not currently utilizing the meal reimbursement through CACFP could

consider applying as the meals that are provided to these children and adults, could be the only meals they receive each day. The reimbursement allows the center to afford more desirable food choices by helping to supplement the food costs²⁹. Improved food quality could contribute to better growth and development as well as chronic disease prevention and better overall health outcomes.

The aim of the current study is to compare center-level predictors of early childhood education centers participating in CACFP. We hypothesize that the zip code of the centers as well as the size of the establishment will predict CACFP participation of early childcare centers in Arizona. This cross-sectional study will hopefully guide states with more information to help these centers implement the federally funded program, CACFP, which has been shown to improve educational, childhood²², and adult outcomes^{1,4}.

CHAPTER 3

METHODS

Study design

This study analyzed cross-sectional data from a sample of childcare centers in Arizona in summer 2020. We compiled a list of all currently licensed early childhood education centers across the state (although some are closed secondary to COVID-19) and compared characteristics of those participating and not participating in CACFP. No incentives were offered or given. The ASU institutional review board (IRB) reviewed this study and determined it to be exempt from the IRB.

Measures: Four datasets were used to for this study. Data from the Arizona Department of Economic Security (DES) as well as CACFP participant data from ADE were used. Centers that had a licensed capacity for 11 or more children were included in the study. (n=2,228). CACFP participation was defined as the centers that completed the application process and were utilizing program reimbursement (n=540). We merged these two data sets by site physical address and site name. Poverty was assessed by census tract data from **The United States Census Bureau**. A final data set was used for the secondary analysis in which centers utilizing NSLP were removed. Please see **Figure 1** below.

DES Data (<https://des.az.gov/services/child-and-family/child-care>) In the licensure process, all ECE sites must provide information about their center. The paperwork is extensive and can be found at https://des.az.gov/documents-center?qt-content-tab=0&cshs_field_dl_category_tid_forms=117. These data are uploaded to a public facing website so that families can find potential ECEs (<https://www.azccrr.com/>). DES

provided us with their database used for this public facing website. The following variables were used for this study:

Licensed capacity –The maximum number of enrolled children for whom a licensee is authorized by the Department to provide childcare services in a facility.

Quality First Star rating - An assessment using valid tools that focus on the key components of quality early care that includes adult-child interactions, learning environments, and staff qualifications with 1 star being the lowest and 5 stars being the highest⁵⁵, administered by First-things-First in Arizona.

Highest educational attainment – The highest level of education within the center.

Enrichment center status - provide childcare for first responders, critical health care workers, essential public sector workers, grocery store employees and food bank workers.

CACFP participation – A list of participating CACFP (<https://www.azed.gov/hns/cacfp>) sites was provided by the ADE by the Health and Nutrition Services Department via email through the Director of Community Nutrition Programs. CACFP participation is defined as defined as a center that is currently running the CACFP program after a satisfactory application and granting process.

US Census Data (<https://data.census.gov/cedsci/>) Census tract poverty data for children ages 0-5 years old. was drawn from the US Census Bureau. Poverty rate was evaluated via the census tract using 185% poverty line, looking for those <50% and >50% related to the poverty line, which is the SNAP-Ed eligibility criterion. This data was used to determine if certain ECE centers were SNAP-Ed eligible.

SNAP-Ed Data – Information on whether the site was participating in SNAP-Ed was provided via Stephanie Martinez, Office Chief, Community Innovations, Bureau of Nutrition & Physical Activity at AZ Department of Health and Sanitation.

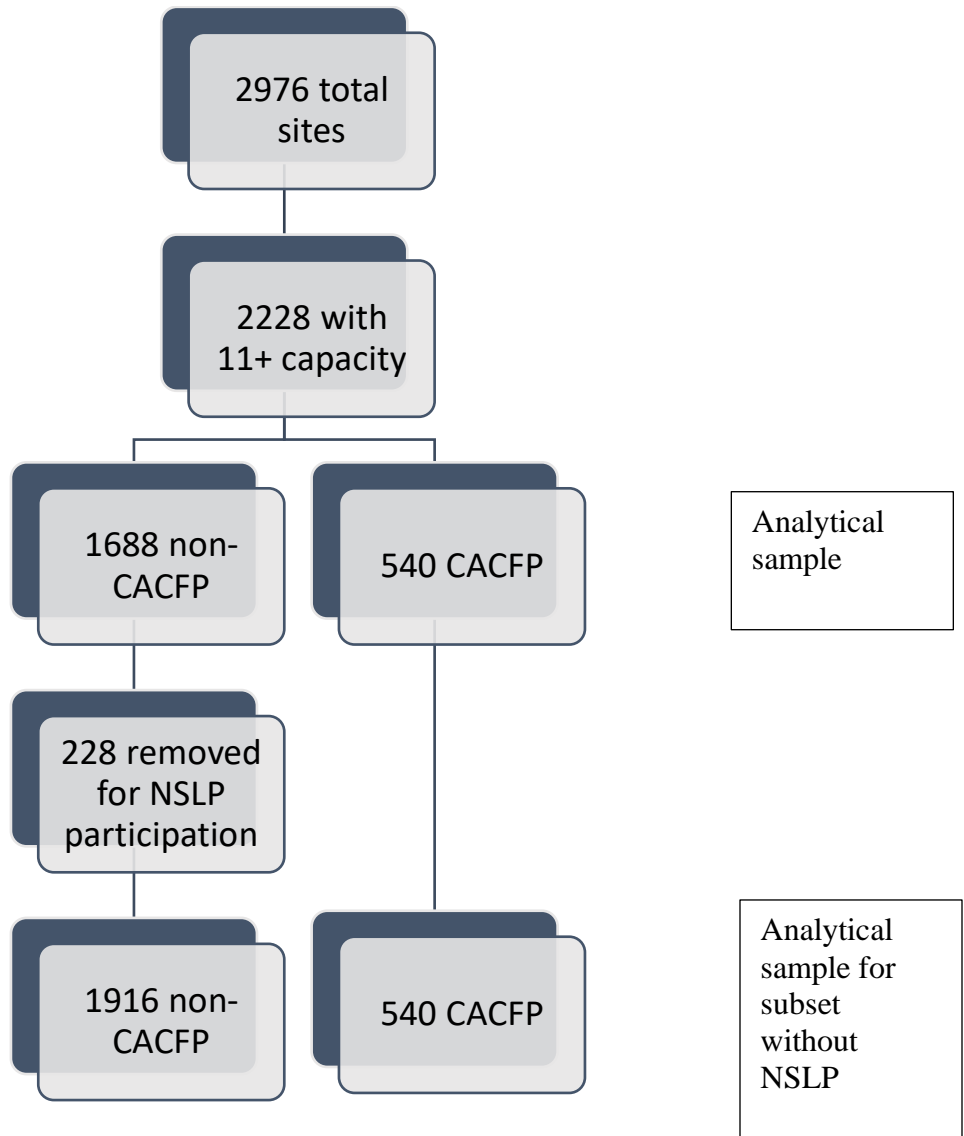


Figure 1: Data flow chart

Statistical Analyses

Secondary analyses were used in this study from a data set depicting one time period in order to summarize center-level characteristics. Descriptive data were presented as mean +/- SD. Chi square and t-test were used to examine associations between predictor variables and CACFP participation. Logistic regression models were run to test the association between the site-level predictors (Maricopa county location, SNAP-Ed participation, SNAP eligibility, Quality First participation, Quality First score of 5, enrichment center status, highest educational attainment, and licensed capacity). A similar sub analyses was run, removing sites that potentially participated in NSLP (n=180). All analyses were done using Stata analytical software version 15. Statistical significance was assessed at $p < 0.05$.

CHAPTER 4

DATA AND RESULTS

Descriptive Characteristics

A total of 2,228 early childhood education centers in Arizona were included in this analysis. Centers with a total licensed capacity of eleven or more participants were used. A capacity cutoff was used to eliminate any at-home childhood care centers. Of the 2,228 centers, 1,688 were not participating in CACFP (75.7%). The smallest licensed capacity of the centers could accommodate 14 participants and the largest could accommodate 751. The average center had a licensed capacity of 108 ± 88 . Of the total, 879 were eligible for the SNAP-Ed program based on their census tract and poverty level. The SNAP-Ed data is a proxy for CACFP eligibility/an area where CACFP would be beneficial. Only 32 (1.44%) were actively participating at the time the data was collected. 798 (35.8%) of centers were participating in the Quality First rating with 60 centers receiving a 5-star rating.

The center data descriptive data were also divided by county with 1,411 (63.4%) located in Maricopa County. The second and third most highly center-rich counties included Pima and Pinal Counties, respectively. Highest educational attainment among center employees was also measured 44.3% (n=985) having a bachelor's followed by some college at 27.1% (n=603). Centers were also classified as being an enrichment center or not with the majority not being an enrichment center (80.1%). All key variables are presented in Table 1.

Table 1 ECE Center Demographics & Key Variables: Early Childcare Education Sites in AZ

		n	%	mean ± standard deviation
CACFP Site	Yes	540	24.27	
	No	1,688	75.73	
County	Apache	17	0.76	
	Cochise	39	1.75	
	Coconino	58	2.60	
	Gila	12	0.54	
	Graham	7	0.31	
	Greenlee	3	0.13	
	La Paz	6	0.27	
	Maricopa	1,411	63.33	
	Mohave	53	2.38	
	Navajo	21	0.94	
	Pima	339	15.22	
	Pinal	94	4.22	
	Santa Cruz	16	0.72	
	Yavapai	64	2.87	
Yuma	88	3.95		
Maricopa County	Yes	1,411	63.44	
	No	813	36.56	
Participating in SnapEd	Yes	32	98.56	
	No	2,196	1.44	
Eligible for SnapEd	Eligible	879	39.45	
	Ineligible	1,349	60.55	
Participating in Quality First	Yes	798	35.82	
	No	1,430	64.15	
Star Rating	2 stars	156	19.55	
	3 stars	308	38.6	
	4 stars	274	34.34	
	5 stars	60	7.52	
Quality First = 5	Yes	60	2.69	
Accreditation Status	Accredited	177	7.94	
	Not accredited	2,051	92.06	
Highest Educational Attainment	High school	289	12.99	
	Some college	603	27.11	
	Bachelors	985	44.29	
	Higher Education	347	15.60	
Enrichment Center	Yes	431	19.34	
	No	1,797	80.66	
Licensed Capacity	Smallest	14		108 ±88
	Largest	751		

Unadjusted Relationship between CACFP and non-CACFP Centers

The results of the bi-variate analyses examining associations with CACFP and non-CACFP sites and potential center-level indicators are included in Table 2. There was no significant difference in licensed capacity between CACFP and non-CACFP sites ($p=0.924$). Non-CACFP sites showed a 63.5% eligibility for SNAP-Ed participation with only 1.25% currently participating. The current study's results show that 79.5% of non-CACFP sites are located in metropolitan Maricopa county followed by 13.9% in Pima County. A significant difference existed within Quality First participation with CACFP sites having 36.5% ($n=291$) and non-CACFP sites having 63.5% ($n=506$) participating. Additionally, non-CACFP sites had a significantly higher Quality First rating with a score of 5 equaling 71.7% of sites compared to 28.3% of CACFP sites. A significant larger amount of CACFP site staff had a bachelor's degree or higher (65.2%) compared to non-CACFP sites at 58.0%.

Table 2 Bi-variate analyses examining associations with CACFP and non-CACFP sites

	CACFP % (n=540)	Non-CACFP % (n=1688)	p-value
Counties			<0.000
Apache	0.37 (2)	0.89 (15)	
Cochise	2.41 (13)	1.54 (26)	
Coconino	1.48 (8)	2.97 (50)	
Gila	0.37 (2)	0.59 (10)	
Graham	0.74 (4)	0.18 (3)	
Greenlee	0.19 (1)	0.12 (2)	
La Paz	0.19 (1)	0.30 (5)	
Maricopa	53.5 (289)	66.4 (1,119)	
Mohave	2.59 (14)	2.31 (39)	
Navajo	0.83 (7)	1.30 (14)	
Pima	20.37 (110)	13.59 (229)	
Pinal	5.19 (28)	3.92 (66)	
Santa Cruz	0.93 (5)	0.65 (11)	
Yavapai	3.52 (19)	2.67 (45)	
Yuma	6.85 (37)	3.03 (51)	
Maricopa County (%yes)	20.5 (289)	79.5 (1,119)	<0.000
Participated in SNAP-Ed	2.04 (11)	1.25 (21)	0.017
Eligible for SNAP-Ed (%yes)	39.5 (321)	63.5 (558)	<0.000
Participated in Quality First (%yes)	36.5 (291)	63.5 (506)	<0.000
Enrichment Center (%yes)	51.7 (223)	48.3 (208)	<0.000
Star rating			<0.000
2 stars	27.2 (79)	15.2 (77)	
3 stars	39.5 (115)	38.1 (193)	
4 stars	27.5 (80)	38.1 (193)	
5 stars	5.8 (17)	8.5 (43)	
Quality First =5	28.3 (17)	71.7 (43)	0.457
Accreditation Status (%yes)	53.7 (95)	46.3 (82)	<0.000
Highest education			<0.000
High school	8.5 (46)	14.5 (244)	
Some college	26.3 (142)	27.4 (461)	
Bachelors	53.7 (290)	41.2 (693)	
Higher Ed	11.5 (62)	16.8 (283)	
College degree (Bachelors+)	65.2 (352)	58.0 (976)	<0.000
Licensed Capacity (mean ± s.d)	113.2 ± 85.4	106.9 ± 89.4	0.924

Adjusted Relationship Between Participating in CACFP and Predictor Variables

Adjusted mixed model logistic regression results can be found in Table 3. Models are adjusted for SNAP-Ed program eligibility (more than 50% of the population being 180% below the poverty line) by census track that the early childcare site is located within as a proxy for neighborhood poverty. ECE centers that are also existing as enrichment centers have the highest odds ratio of being a CAFCP site. The next biggest predictor variable of CACFP participation was involvement in the Quality First star rating (OR=2.5, 95%, CI= 2.0, 3.0). The last significant predictor variable was educational attainment of a bachelor's degree or higher. Centers in this education category were 1.4 times more likely to be a CACFP site. Finally, being located in Maricopa County was shown to have a 30% less chance of being a CACFP site. No other predictors were statistically significant.

Table 3 examines sites that were not already being served by NSLP. These further exclusion criteria were to help remove sites that were not in current need of CACFP. The largest significant difference from the full sample is that those that are eligible for SNAP were 3.5 times more likely to be participating in CACFP (compared to 1.2). Similarly, centers with staff with higher educational attainment were more likely to be participating (OR=1.5). Again, centers located in Maricopa were less likely to be participating in CACFP (OR=0.6).

Table 3 Adjusted odds ratio (and 95% CI) of participating in CACFP by predictor variable among early childcare sites in Arizona ¹

	Full sample (n=2,228)		Sample with NSLP sites removed (n=1916)	
	Odds ratio	95% Confidence interval	Odds ratio	95% Confidence interval
Maricopa	0.7*	0.5, 0.8	0.6*	0.5, 0.8
SNAP-Ed Participation	1.4	0.6, 2.9	1.7	0.8, 3.9
Eligible for SNAP	1.2	0.8, 1.8	3.5*	2.9, 4.3
Quality First	2.5*	2.0, 3.0	3.6*	2.9, 4.4
Quality First = 5	1.2	0.6, 2.1	1.6	0.8, 2.9
Enrichment Center	5.9*	4.6, 7.5	5.4*	4.2, 6.8
Highest Education (Bachelors+)	1.4*	1.1, 1.7	1.5*	1.2, 1.8
Licensed Capacity	1.0	1.0, 1.0	1.0	1.0, 1.0

1. Models are adjusted for SNAP-Ed program eligibility (more than 50% of the population being 180% below the poverty line) by census track that the early childcare site is located as a proxy for neighborhood poverty

* indicates statistical significance at $p < 0.05$

CHAPTER 5

DISCUSSION

The purpose of this study was to assess center-level predictors of early childhood education centers predicting participation in CACFP in Arizona. To our knowledge, this is the first study to examine CACFP participation and possible center-level predictions in Arizona. Existing literature has investigated the barriers to existing nutrition programs^{14,15} and the effects of healthy eating strategies in ECE^{16,17}. This study sought to identify the predictors of CACFP participation in order to identify more non-participating centers and provide them with the opportunity to receive meal reimbursements for healthy meals served. While some factors were non-modifiable (e.g., location in Maricopa county), others were modifiable (e.g., Quality First rating) and may be possible points for intervention to expand CACFP.

Existing literature has investigated the barriers to existing nutrition programs^{14,15} and the effects of healthy eating strategies in ECEs^{16,17}. Sites that had higher Quality First ratings also had higher odds of participating in CACFP. This may indicate that once a site navigates the application process for one program, they may be better able to navigate for other programs as well. The application process, paperwork involved, and continued requirements could be viewed as a barrier to government program utilization secondary to the information and precision required for successful completion. A study identified barriers for food systems to implement hazard analysis and critical control points, in order of largest to smaller barrier reported: need for simple guidelines, lack of prerequisite programs, lack of personnel training, and paperwork.⁵⁶ Future studies may want to conduct interviews and/or focus groups with ECE centers in order to understand

the relationship between the application process and participating in CACFP, as well as better understand the link between participating in CACFP and Quality First.

Similarly, these results from this study also suggest that centers with an employee having a bachelor's degree or higher were significantly more likely to be participating in CACFP. This finding suggests that perhaps the application process and program management is involved and that centers with lower educational attainment would benefit from application and program assistance. Directors from centers participating in CACFP were less likely to report barriers to program implementation and participation¹⁶. Centers with staff with higher educational attainment were again shown to be more likely to participate, and this relationship became stronger with NSLP sites removed. As a bachelor's degree is required for Head Start administration, this finding may be a result of that requirement. An assessment of the literacy required for the application process also appears to be indicated and could be considered as an implication for practice.

In the current study, only 24% of the ECE sites included in this study were currently participating in CACFP with 66% living in the Maricopa county area. When accounting for sites that were already being served by NSLP this statistic changed. The largest significant difference from the full sample is that those that are eligible for SNAP-Ed were 3.5 times more likely to be participating in CACFP (compared to 1.2) when removing those being served by NSLP. This aligns more closely with our hypothesis as SNAP-Ed eligibility predicts likely CACFP eligibility based on census tracts and poverty rates. A study conducted during the current pandemic found service locations across cities that were participating in summer food programs and/or NSLP⁵⁷ which could explain why SNAP-Ed eligibility was only significant when removing ECE centers that

were covered by these programs. Nearly 64% of the non-CACFP participating centers were possibly eligible for SNAP-Ed given their location in specific census tracts, making them also likely eligible for CACFP. State departments could use the census tract data and this data to seek out those centers not currently participating and inquire if they would be interested in meal reimbursement. Research needs to confirm the correlation between census-tract poverty and ECE site eligibility for CACFP and SNAP-Ed.

There was no significant difference between CACFP and non-CACFP sites in terms of licensed capacity as hypothesized. The assumption that the larger centers would benefit more greatly from the program and therefore promote participation for larger centers, but this was incorrect. There was also no statistical difference between SNAP-Ed eligibility or participation between CACFP sites and non-CACFP sites. Even though SNAP-Ed eligibility predicts likely CACFP eligibility, there was no difference in participation as initially hypothesized. This could be similar to the findings by Haynes-Maslow et al. in which implementation in rural communities was difficult secondary to lack of healthy food availability, funding restrictions, and transportation¹⁵. Future research needs to replicate these null findings to ensure that these are not modifiable factors to improve CACFP outreach.

Implications for practice could include state programs increasing their outreach to sites to discuss possible next steps. State departments could narrow their focus to recruit more ECE centers for CACFP participation. According to the literature, expansion of the CACFP would be beneficial for the youth in Arizona and across the country^{8-9,28,30}. Furthering CACFP would help to ensure better growth and developmental outcomes. Quality, consistent nutrition is vital not only as a child, but these practices are important

to continue into adulthood (CACFP supports adult programs as well). CACFP not only provides nutritious foods, but also nutrition education and good nutrition practices. ECE centers participating in CACFP remain an important source of nutrition for children^{13,34,37}. Further investigation is warranted to identify ways to support both the ECE centers and the families to provide healthier eating environments⁴⁶.

Strengths and Limitations

The strengths of this study were that the data was state-wide and therefore generalizable to the state of Arizona, and states with similar ECE licensure processes and demographics, with the exception of the sites potentially on Native American Reservations. This cross-sectional study will hopefully provide states with more information to help guide ECEs in implementing CACFP.

The limitations of this study are that this is a secondary data analysis using data collected for a different purpose. There may be unmeasured confounders that will explain the differences in participation in CACFP. The data were obtained in the summer of 2020, during the COVID-19 pandemic; therefore, these findings may not be generalizable to the current situation. The data from the AZ DES are self-reported and may be subject to social desirability or recall bias. Some preschools may appear to be non-participants, however, many of these sites may be participating in NSLP by being located on a school campus. The last limitation is that Head Start programs are required to participate in CACFP which may skew some of the data. ADE did review non-CACFP sites that were participating in Quality First to account for those participating in NSLP. Future research should investigate the linkage between adult literacy and the CACFP application process.

CHAPTER 6

CONCLUSION

Nutrition is essential to childhood growth and development and the future successes of today's youth. Nutrition is also an important factor in combatting childhood obesity. Programs such as CACFP seek to help those that are living in poverty and bring them nutritious foods. ECE sites were more likely to participate in CACFP if they were also Quality First rated and if the highest staff education on site was a bachelor's degree or higher. Participation in Quality First indicates that a site is interested in quality improvement and providing the best care (and nutrition practices) for participants. Participation in a quality improvement programs is consistent with participation in CACFP as the standards are more stringent for meal service. Educational attainment being a predictor likely indicates that a literacy review of the program is warranted. Future research should assess the literacy required for the application process and if this is a key factor to not participating in CACFP. Studies could investigate which intervention would be most beneficial for assisting in the application process and maintaining satisfactory participation.

REFERENCES

1. Black MM, Pérez-Escamilla R, Fernandez Rao S. Integrating Nutrition and Child Development Interventions: Scientific Basis, Evidence of Impact, and Implementation Considerations¹²³. *Adv Nutr*. 2015;6(6):852-859. doi:10.3945/an.115.010348
2. De Cosmi V, Scaglioni S, Agostoni C. Early Taste Experiences and Later Food Choices. *Nutrients*. 2017;9(2). doi:10.3390/nu9020107
3. Alles MS, Eussen SRBM, van der Beek EM. Nutritional challenges and opportunities during the weaning period and in young childhood. *Ann Nutr Metab*. 2014;64(3-4):284-293. doi:10.1159/000365036
4. DiGirolamo AM, Ochaeta L, Flores RMM. Early Childhood Nutrition and Cognitive Functioning in Childhood and Adolescence. *Food Nutr Bull*. 2020;41(1_suppl):S31-S40. doi:10.1177/0379572120907763
5. Digest of Education Statistics, 2018. Accessed October 18, 2020. https://nces.ed.gov/programs/digest/d18/tables/dt18_202.40.asp
6. Alderman H, Fernald L. The Nexus Between Nutrition and Early Childhood Development. *Annu Rev Nutr*. 2017;37(1):447-476. doi:10.1146/annurev-nutr-071816-064627
7. Hahn RA, Barnett WS, Knopf JA, et al. Early Childhood Education to Promote Health Equity: A Community Guide Systematic Review. *J Public Health Manag Pract JPHMP*. 2016;22(5):E1-E8. doi:10.1097/PHH.0000000000000378
8. Child and Adult Care Food Program | USDA-FNS. Accessed October 26, 2020. <https://www.fns.usda.gov/cacfp>
9. History of CACFP. National CACFP Forum. Accessed October 26, 2020. <http://www.cacfpforum.com/history-of-cacfp.html>
10. Nearly two-thirds of preschool-aged children attend early education programs. USAFacts. Accessed March 4, 2021. <https://usafacts.org/articles/nearly-two-thirds-preschool-aged-children-attend-early-education-programs/>
11. Nutrition Standards for CACFP Meals and Snacks | USDA-FNS. Accessed March 4, 2021. <https://www.fns.usda.gov/cacfp/meals-and-snacks>
12. FACT SHEET: Healthy, Hunger-Free Kids Act School Meals Implementation | USDA-FNS. Accessed October 26, 2020. <https://www.fns.usda.gov/pressrelease/2014/009814>

13. 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 Health J.* 2016;20(9):1933-1939. doi:10.1007/s10995-016-2007-z
14. Zaltz DA, Hecht AA, Neff RA, et al. Healthy Eating Policy Improves Children's Diet Quality in Early Care and Education in South Carolina. *Nutrients.* 2020;12(6). doi:10.3390/nu12061753
15. Haynes-Maslow L, Osborne I, Pitts SJ. Examining Barriers and Facilitators to Delivering SNAP-Ed Direct Nutrition Education in Rural Communities. *Am J Health Promot AJHP.* 2019;33(5):736-744. doi:10.1177/0890117118821845
16. Haynes-Maslow L, Osborne I, Jilcott Pitts SB. Best Practices and Innovative Solutions to Overcome Barriers to Delivering Policy, Systems and Environmental Changes in Rural Communities. *Nutrients.* 2018;10(8). doi:10.3390/nu10081012
17. Parsons AA, Monteban M, Lee E, et al. Indicators of Readiness and Capacity for Implementation of Healthy Eating Strategies in Child Care Settings Serving Low-Income Children. *J Nutr Educ Behav.* 2019;51(4):465-477. doi:10.1016/j.jneb.2018.09.004
18. Swindle T, Johnson SL, Davenport K, et al. A Mixed-Methods Exploration of Barriers and Facilitators to Evidence-Based Practices for Obesity Prevention in Head Start. *J Nutr Educ Behav.* 2019;51(9):1067-1079.e1. doi:10.1016/j.jneb.2019.06.019
19. Zaltz DA, Hecht AA, Pate RR, Neelon B, O'Neill JR, Benjamin-Neelon SE. Participation in the Child and Adult Care Food Program is associated with fewer barriers to serving healthier foods in early care and education. *BMC Public Health.* 2020;20. doi:10.1186/s12889-020-08712-7
20. Williams AM, Suchdev PS. Assessing and Improving Childhood Nutrition and Growth Globally. *Pediatr Clin North Am.* 2017;64(4):755-768. doi:10.1016/j.pcl.2017.03.001
21. Statutory framework for the early years foundation stage. :37.Department of Education.
22. Georgieff MK, Ramel SE, Cusick SE. Nutritional Influences on Brain Development. *Acta Paediatr Oslo Nor 1992.* 2018;107(8):1310-1321. doi:10.1111/apa.14287
23. Britto PR, Lye SJ, Proulx K, et al. Nurturing care: promoting early childhood development. *The Lancet.* 2017;389(10064):91-102. doi:http://dx.doi.org.ezproxy1.lib.asu.edu/10.1016/S0140-6736(16)31390-3

24. Riley LK, Rupert J, Boucher O. Nutrition in Toddlers. *Am Fam Physician*. 2018;98(4):227-233.
25. What is Early Childhood Education | What is a Preschool Teacher. Accessed October 27, 2020. <https://www.preschoolteacher.org/what-is-early-childhood-education/>
26. McCoy DC, Yoshikawa H, Ziol-Guest KM, et al. Impacts of Early Childhood Education on Medium- and Long-Term Educational Outcomes. *Educ Res Wash DC* 1972. 2017;46(8):474-487. doi:10.3102/0013189X17737739
27. Bakken L, Brown N, Downing B. Early Childhood Education: The Long-Term Benefits. *J Res Child Educ*. 2017;31(2):255-269. doi:10.1080/02568543.2016.1273285
28. McCoy DC, Morris PA, Connors MC, Gomez CJ, Yoshikawa H. Differential Effectiveness of Head Start in Urban and Rural Communities. *J Appl Dev Psychol*. 2016;43:29-42. doi:10.1016/j.appdev.2015.12.007
29. Child and Adult Care Food Program | Arizona Department of Education. Accessed October 26, 2020. <https://www.azed.gov/hns/cacfp>
30. Healthy, Hunger-Free Kids Act of 2010 Summary. Accessed November 23, 2020. <https://www.ncsl.org/research/human-services/healthy-hunger-free-kids-act-of-2010-summary.aspx>
31. Chriqui JF, Leider J, Schermbeck RM, Sanghera A, Pugach O. Changes in Child and Adult Care Food Program (CACFP) Practices at Participating Childcare and Education Centers in the United States Following Updated National Standards, 2017–2019. *Nutrients*. 2020;12(9). doi:10.3390/nu12092818
32. Sisson SB, Sleet K, Rickman R, et al. Impact of the 2017 Child and Adult Care Food Program Meal Pattern Requirement Change on Menu Quality in Tribal Early Care Environments: The Food Resource Equity and Sustainability for Health Study. *Curr Dev Nutr*. 2019;4(Suppl 1):12-22. doi:10.1093/cdn/nzz094
33. Lessard L. Implementation of Revised Nutrition Standards in US Department of Agriculture’s Child and Adult Care Food Program. *J Nutr Educ Behav*. 2020;52(5):535-538. doi:10.1016/j.jneb.2019.10.011
34. CACFP Proposed Meal Patterns. Accessed October 26, 2020. <https://www.cacfp.org/regulations-legislation-advocacy/cacfp-meal-patterns/>
35. About. Quality First. Accessed March 16, 2021. <https://qualityfirstaz.com/about/>

36. Daycare Environment Rating Scales: ECERS and ITERS Requirements | Blog - Commercial Playground Equipment. Accessed April 4, 2021.
<https://www.americanparkscompany.com/blog/eters-iters-daycare/>
37. ITERS November 2005. Accessed April 8, 2021.
https://ers.fpg.unc.edu/sites/ers.fpg.unc.edu/files/ITERS-R_Notes_Nov_2005.pdf
38. Resources. First 5 SF. Accessed April 4, 2021.
<http://qualityconnections.first5sf.org/resources/>
39. What is Quality First? Quality First. Accessed April 4, 2021.
<https://qualityfirstaz.com/parents/what-is-quality-first/>
40. Benjamin Neelon SE, Briley ME, American Dietetic Association. Position of the American Dietetic Association: benchmarks for nutrition in child care. *J Am Diet Assoc.* 2011;111(4):607-615. doi:10.1016/j.jada.2011.02.016
41. Bruening KS, Gilbride JA, Passannante MR, McCLOWRY S. Dietary Intake and Health Outcomes among Young Children Attending 2 Urban Day-care Centers. *J Am Diet Assoc.* 1999;99(12):1529-1535. doi:10.1016/S0002-8223(99)00375-2
42. Korenman S, Abner KS, Kaestner R, Gordon RA. The Child and Adult Care Food Program and the Nutrition of Preschoolers. *Early Child Res Q.* 2013;28(2). doi:10.1016/j.ecresq.2012.07.007
43. Gurzo K, Lee DL, Ritchie K, et al. Child Care Sites Participating in the Federal Child and Adult Care Food Program Provide More Nutritious Foods and Beverages. *J Nutr Educ Behav.* 2020;52(7):697-704. doi:10.1016/j.jneb.2020.02.009
44. Nguyen BT, Ford CN, Yaroch AL, Shuval K, Drope J. Food Security and Weight Status in Children: Interactions With Food Assistance Programs. *Am J Prev Med.* 2017;52(2, Supplement 2):S138-S144. doi:10.1016/j.amepre.2016.09.009
45. Kroeger EN, Fernandez J, Jones P, Bertrand B. Diet Quality in Early Care and Education Centers: A Comparison of Menu, Served, and Consumed Lunch Measures. *J Nutr Educ Behav.* 2020;52(1):39-44. doi:10.1016/j.jneb.2019.10.007
46. Luecking CT, Mazzucca S, Vaughn AE, Ward DS. Contributions of Early Care and Education Programs to Diet Quality in Children Aged 3 to 4 Years in Central North Carolina. *J Acad Nutr Diet.* 2020;120(3):386-394. doi:10.1016/j.jand.2019.09.018
47. Dave JM, Cullen KW. Foods served in childcare facilities participating in the Child and Adult Care Food Program: Menu match and agreement with the new meal patterns and Best Practices. *J Nutr Educ Behav.* 2018;50(6):582-588. doi:10.1016/j.jneb.2018.01.010

48. CACFP Reimbursement Rates | USDA-FNS. Accessed March 5, 2021.
<https://www.fns.usda.gov/cacfp/reimbursement-rates>
49. Cooper CC, Contento IR. Urban Preschool Teachers' Nutrition Beliefs, Mealtime Practices, and Associations With Training. *J Nutr Educ Behav*. 2019;51(9):1047-1057. doi:10.1016/j.jneb.2019.06.006
50. Learn The Facts | Let's Move! Accessed November 24, 2020.
<https://letsmove.obamawhitehouse.archives.gov/learn-facts/epidemic-childhood-obesity>
51. Khalsa AS, Kharofa R, Ollberding NJ, Bishop L, Copeland KA. Attainment of '5-2-1-0' obesity recommendations in preschool-aged children. *Prev Med Rep*. 2017;8:79-87. doi:10.1016/j.pmedr.2017.08.003
52. Robson SM, Khoury JC, Kalkwarf HJ, Copeland K. Dietary Intake of Children Attending Full-time Child Care: What are they eating away from the Child-Care Center? *J Acad Nutr Diet*. 2015;115(9):1472-1478. doi:10.1016/j.jand.2015.02.029
53. Nekitsing C, Hetherington MM, Blundell-Birtill P. Developing Healthy Food Preferences in Preschool Children Through Taste Exposure, Sensory Learning, and Nutrition Education. *Curr Obes Rep*. 2018;7(1):60-67. doi:10.1007/s13679-018-0297-8
54. Scaglioni S, De Cosmi V, Ciappolino V, Parazzini F, Brambilla P, Agostoni C. Factors Influencing Children's Eating Behaviours. *Nutrients*. 2018;10(6). doi:10.3390/nu10060706
55. Star Rating. CCR&R - Arizona. Accessed November 22, 2020.
<https://www.azccrr.com/star-rating.html>
56. Baş M, Yüksel M, Çavuşoğlu T. Difficulties and barriers for the implementing of HACCP and food safety systems in food businesses in Turkey. *Food Control*. 2007;18(2):124-130. doi:10.1016/j.foodcont.2005.09.002
57. McLoughlin GM, McCarthy JA, McGuirt JT, Singleton CR, Dunn CG, Gadhoke P. Addressing Food Insecurity through a Health Equity Lens: a Case Study of Large Urban School Districts during the COVID-19 Pandemic. *J Urban Health Bull N Y Acad Med*. Published online September 21, 2020:1-17. doi:10.1007/s11524-020-00476-0