8-2020

Summer Nutrition Program Availability in Tennessee

Abigail Grace Rider
University of Tennessee, arider2@vols.utk.edu

To the Graduate Council:

I am submitting herewith a thesis written by Abigail Grace Rider entitled "Summer Nutrition Program Availability in Tennessee." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Nutrition.

Elizabeth Anderson Steeves, Major Professor

We have read this thesis and recommend its acceptance:

Marsha Spence, Katherine Kavanagh

Accepted for the Council:
Dixie L. Thompson

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

Summer Nutrition Program Availability in Tennessee

A Thesis Presented for the

Master of Science

Degree

The University of Tennessee, Knoxville

Abigail Grace Rider

August 2020

ACKNOWLEDGEMENTS

Thank you to my advisor, Dr. Elizabeth Anderson Steeves, for her generous support, patience, and guidance. My thesis, and educational experience at UT, was greatly impacted by her investment. Thank you to my committee members, Dr. Marsha Spence and Dr. Katie Kavanagh for their collaboration and insight on this project. Thank you to Morgan Adkisson, the undergraduate research assistant, for the tremendous help with data analysis. Thank you to Randa Meade at the Tennessee Department of Education for providing great counsel and direction on this project.

And finally, thank you to all of the SNP personnel that graciously agreed to participate in my project. Learning from nutrition professionals with such a heart and passion for what they do was an incredible privilege.

ABSTRACT

Background: The United States Department of Agriculture (USDA) Summer Nutrition Programs (SNPs) provide free meals to children during the summertime when the National School Lunch Program (NSLP) and School Breakfast Programs (SBP) are not available. Only 14.1% of students who participated in free/reduced-price NSLP participated in SNP in 2018. Increasing the availability of SNP sites is one strategy to increase participation. A comprehensive understanding of current SNP site availability is an important first step towards increasing site availability.

Objective: To present a robust examination of SNP site availability per county in Tennessee to assess density and consistency of SNP availability and to document perspectives of SNP personnel to identify key features that aid in program success.

Design: This study used a mixed methods design. A heat map presented SNP site availability data to represent density (the number of sites in a given area) and consistency of site availability (the fluctuation of site availability throughout the summer). The heat map ranked the counties based on site availability and identified positive deviants. Next, semi-structured interviews were conducted. Thematic analysis was done on the qualitative data to identify five themes that contributed to high levels of site availability.

Dataset/Subjects: Data were retrieved from the USDA FNS Capacity Builder on all open SNP sites in Tennessee in 2018 (n=2073). Interview participants (n=12) were SNP staff members.

Results: The weekly average standardized density of SNP sites was 2.36 (SD=3.85) sites. Weeks in June had significantly higher site densities (3.32±4.02) than July (2.41±4.09, p=0.017) and August (0.61±0.92, p=0.001). Heat map analysis identified positively deviant counties (n=16). Thematic analysis revealed five themes that promoted SNP program success: *site accessibility*, *sites linked*

with community programs, *kid-friendly foods*, *approach to administrative requirements*, and *staff values.*

Conclusions: This study presented a novel assessment of SNP site availability by using heat map and positive deviant methodologies in SNP research and by assessing density and consistency of site availability. The five themes revealed key features that participants believed contributed to the overall success and high availability.

TABLE OF CONTENTS

CHAPTER ONE: LITERATURE REVIEW

Introduction and Background

Childhood food insecurity (CFI) in America is a public health concern. In 2017, 15.7% of United States' households with children under the age of 18 were food insecure[1]. Roughly 4% of children in the US lived in households with very low food security, the most extreme level of food insecurity that is often characterized by bouts of inadequate food access or hunger[1,2]. In Tennessee, the rates of CFI were higher than national averages; 21.1% of Tennessee children lived in food insecure households in 2015[3]. CFI rates during the summer are higher than school-year rates, due in part to the lack of nutrition safety net programs, such as the National School Lunch Program (NSLP) and the School Breakfast Program (SBP)[4-6].

Summer nutrition programs (SNP) aim to fill the gap left by school-year programs (NSLP and SBP) by providing nutritious meals to children in low-income areas at no cost to the child. SNPs are federally funded programs by the United States Department of Agriculture (USDA). SNP is an umbrella term used to capture several summertime nutrition safety net programs. For the purposes of this project, SNP refers to both the Summer Food Service Program (SFSP) and the Seamless Summer Option (SSO)[7,8]. The priority population of SNPs is similar to the population of children utilizing the free/reduced-price NSLP and SBP meals during the school year. SNP metrics often use NSLP data as a comparison to assess SNP progress. In 2015, only 15.8% of children who qualified for free/reduced-price lunches through NSLP participated in SNP nationwide, indicating that SNPs are underutilized[9]. The USDA has prioritized increasing the availability of SNP sites nationwide[10]. The Food Research and Action Center (FRAC), a nationwide organization dedicated to ending food insecurity, identified increasing SNP site availability as a potential strategy to improve summertime CFI rates[11].

Additionally, there is a dearth of literature regarding SNPs, making the program both underutilized and understudied. Due to SNPs potential role in addressing summertime CFI and the charge by the USDA and FRAC to increase SNP site

availability, additional research is needed to assess SNP availability in a robust manner that captures multiple aspects of program availability, particularly in areas such as Tennessee where CFI rates are higher than the national average[1,3].

Childhood Food Security

Food security is defined as, "access by all people at all times to enough food for an active, healthy life."[2] Food insecurity is the "reduction of quality, variety, or desirability of diet," with or without reduction of food intake or disrupted eating patterns[2]. The USDA describes food security status on a continuum with four levels: high food security, marginal food security, low food security, and very low food security. Individuals who identify in the low food security and very low food security category are considered food insecure, while individuals who identify in the high or marginal food security categories are considered food secure[2].

Food security is especially critical at early ages as children grow physically and developmentally [4-6,12-15]. Food insecurity during this critical time can lead to increased risk of obesity later in life[13,16,17]. Infants living in households with persistent food insecurity had 22% greater odds of obesity at age 5 than their food secure counterparts[13]. Children living in low food secure households were ten times as likely to be overweight or obese while children living in very low food secure households were thirty times as likely to be overweight or obese compared to children in food secure households[16]. Therefore, public health efforts to address food insecurity are especially critical during childhood to promote health and wellbeing and prevent short- and long-term health complications.

Childhood Food Insecurity in the Summer

CFI is not equally distributed throughout the year[18,19]. Researchers have found increased rates of CFI in the summer months, May through August, compared to the school year[18,19]. Huang and associates conducted a study to examine food insufficiency status, a measure synonymous with food insecurity, of households participating in the National School Lunch Program (NSLP)[19]. Researchers used data from four panels of the Survey of Income and Program Participation (SIPP) which includes a nationally representative sample of roughly 37,000 households[19]. The results of this study found

that food insufficiency rates were higher in the summer months for households with children receiving free/reduced-price lunch during the school year[19]. Another study found a similar seasonal rise in food insecurity rates among Mexican-American children[18]. This study suggested that the NSLP and the SBP are protective against CFI during the school year, and their absence may contribute to the rise in prevalence of food insecurity in the summer[18]. Due to the seasonal rise in CFI rates, special interest should go towards studying programs, such as SNP, that aim to reduce CFI during the summer[18,19].

The Summer Meal Gap

The absence of school nutrition programs (the National School Lunch Program [NSLP] and the School Breakfast Program [SBP]) may contribute to the increased rates of CFI during the summer[18,19]. NSLP and SBP are federal USDA programs managed at the state-level by the Department of Education that provide free/reduced-price, nutritious meals to eligible students in schools[20]. These programs are provided in the context of the school day and follow the same schedule as the school system, so they do not operate during the summer[20]. The Community Eligibility Provision (CEP) is an opportunity for qualifying schools or districts to provide their entire student population free NSLP meals[21]. A school or district qualifies for CEP is greater than 40% of students are direct certified, meaning that the students fall into one of the following categories Supplemental Nutrition Assistance Program (SNAP) recipient, Temporary Assistance for Needy Families (TANF) recipients, Medicaid recipients, or foster children[21]. This program has shown to increase participation in NSLP and SBP which may have a positive impact on CFI rates[22].

Afternoon snacks and evening NSLP meals can be provided to children through Community Schools[23]. Community schools are schools that act as trusted neighborhood centers to provide additional programming and resources to students and families beyond typical school-based resources[23]. These programs are designed to reduce barriers to student success and care for the whole child[23]. Community schools aim to reduce CFI by providing additional opportunities for students to receive free, nutritious meals[23].

The NSLP has been shown to be an effective tool to reduce CFI and improve child diet quality[18,24]. These programs may work in part by increasing students' food availability. Uncertain availability is a key characteristic of food insecurity[25]. The suspension of NSLP and SBP during the summer may decrease food availability overall and, therefore, contribute to increased food insecurity rates[25]. Furthermore, the nutrition requirements of the NSLP and SBP ensure the meals provided are nutritious[26]. The absence of NSLP and SBP may reduce the availability of nutritious foods, further contributing to increased food insecurity rates during the summer[24]. Food availability, the presence and density of food sources, is a critical component of food security. The availability of programs, such as SNP, that provide free, nutritious meals to children should be evaluated, because of their impact on CFI[25].

Summer Nutrition Programs

More research is needed to examine SNP, because research has shown the negative impacts of food insecurity during childhood and has reported the challenges children at risk for food insecurity face during the summer [13,16-19]. SNP was designed to address these concerns. The next sections describe the programs under the SNP umbrella in detail. Both SFSP and SSO are designed to provide nutritious meals to children in low-income areas during the summer[7]. Both SFSP and SSO are federal programs, funded by the USDA Department of Food and Nutrition Services (FNS) and administered at the state-level. In Tennessee, SFSP is administered by the Tennessee Department of Human Services, and SSO is administered by the Tennessee Department of Education[8,27]. Nationally, SFSP served 70 million meals, and SSO served 26 million meals in July of 2017[28]. SFSP served a total of over 112 million meals in the summer of 2017[28].

Summer Food Service Program

SFSP is a federal program that provides nutritious meals to low-income children during the summer. SFSP has two tiers of participating organizations: sponsors and sites[7]. Sponsoring organizations are central hubs that have the capacity to order, prepare, and store large amounts of food to support the SNP. Sponsoring organizations

are responsible for the administration and organization of the summer meal program[7]. These organizations attend training by the state Department of Human Services, recruit sites and personnel, procure food and supplies, prepare claims for reimbursement, and monitor and evaluate sites[7]. Sponsoring organizations must be capable of supporting the SNP with both human resources and financial resources[7]. These organizations may include schools, units of the government, non-profit organizations such as food banks, nonprofit camps, or colleges and universities[7].

Sites are the locations where the food is actually served to participating children[7]. Sites must be readily accessible to children in the community, but do not need to have the same food production capacity of sponsoring organizations[7]. Any community organization that is located in an income-eligible area can act as a SFSP open site[7]. Organizations such as schools, Boys and Girls Clubs, YMCAs, libraries, and other community centers make good SFSP sites[7,29]. Children often visit these organizations for other reasons throughout the year, and they often already have the capacity to prepare or serve food[7]. SFSP is not limited to these sites, however. Other unique community locations can serve as sites. Convenience stores, apartment complexes, city parks, sports complexes, churches, summer camps, and a variety of other sites also provide free meals through SFSP[7,29]. Sites can be classified as open, closed enrolled, camp, or migrant[7]. Closed enrolled, camp, or migrant sites require participating children to enroll in a separate program to receive free meals or, in the case of migrant sites, require appropriate certifications[7]. Open sites do not require the individual child to qualify; instead, SFSP qualifies geographic areas as low-income and therefore allows the area, and any individual under the age of 18 to participate in the program, in a somewhat similar process to the community eligibility designation[7]. Open sites have the greatest impact on CFI rates and were the focus of SFSP sites for this project.

SFSP sites can operate for any portion of the summer; they do not have to remain open for the entire time schools are out of session. Sites, such as schools or larger community organizations with ample space and staff, may operate throughout the whole summer[7]. Sites, such as libraries or parks, may have other events or varying staffing schedules, so they may only be able to operate for a month or a couple of weeks[7]. Furthermore, some sites only operate for one week [29]. Vacation Bible School

(VBS) camps are often week-long day camps run by local churches[7]. These VBS camps can act as SFSP sites; therefore, many of these sites are only open for one week during the summer[7]. Sites can also be mobile sites where sponsor organizations prepare the food and transport it to a variety of locations such as apartment complexes, mobile home parks, neighborhoods, or parks[7].

Assessing the availability of SNP sites is complex due to the number of factors that influence site availability individually at each location and cumulatively in a community. One important factor to consider when assessing overall SNP site availability is the density of site availability, which refers to the number of sites present in a defined area. Another factor to consider is the consistency of site availability, which refers to the duration of each site's operation over the course of a summer. Individual sites vary in their capacity to serve SNP meals throughout the summer, so the availability of SNP sites in a given community can fluctuate over the course of the summer. Currently, only one study has assessed the density of SNP site availability[30], and no study has assessed the consistency of availability, despite SNP's unique program design that suggests both the density and consistency of availability are important factors to consider.

SFSP meals must follow specific nutritional guidelines in order to be eligible for reimbursement[7]. These nutritional guidelines are similar to NSLP and SBP guidelines and were developed based the Dietary Guidelines for Americans[7,26,28]. Currently, SFSP lunches must consist of four components: milk, fruit or vegetable, grains, and meat or meat alternative[28]. Milk can be whole, low-fat, or fat-free milk and must be 8 ounces[28]. Meals must include two different fruits or vegetables[28]. One hundred percent fruit juice can count as half of this requirement[28]. Lunches must also contain one serving of grains[28]. Grain components must be made with whole-grain[28]. Finally, lunches must include a meat or meat alternative which can include a variety of protein-rich products such as two ounces of lean meat or cheese, eggs, beans, peas, nut butter, nuts, seeds, or yogurt[28]. Breakfasts must include eight ounces of milk, two servings of fruits and vegetables, and one grain item. The meat or meat alternative component is optional for breakfast [28].

Research has shown that some SFSP sites do not follow these nutritional guidelines perfectly[24] [31]; however, SNP meals, on average, were more nutritionally complete than the meals that low-income children would have received at home if the program did not exist, suggesting that while not perfect the SNPs are still effective at improving nutrient intake of their priority population[32].

SFSP uses a reimbursement model. Sponsoring organizations are responsible for funding the program initially[7] Then, sponsoring organizations present claims to the state agency running SFSP, in Tennessee that is the Department of Human Services, to receive reimbursement[7]. Sponsors are reimbursed for meals that meet the nutrition requirements that are served to children under the age of 18 years old[7]. Proof of compliance with nutritional requirements and other program polices is required to receive reimbursement. If sponsors cannot provide proof of compliance, they may not be eligible for reimbursement[7].

Seamless Summer Option

SSO is an extension of NSLP, so schools are the only organization that can participate as sponsoring organizations[8]. This option allows schools to maintain the same food service offered during the school year during the summer, in other words schools provide “seamless” food service from the school year to summer months. The same regulations, procedures, and reimbursement requirements are carried through the school year to the summer[8]. SSO follows a similar structure to SFSP, in that one sponsoring organization operates several sites which are the locations in the community where food is served. The sites in SSO are not limited to schools. SSO sponsors often serve meals at a variety of community locations like SFSP. SSO sites can vary in the length of time during the summer that they serve SSO meals.

The main differences between SSO and SFSP are administrative requirements, such as the nutritional requirements. SSO meals must follow the same meal pattern as NSLP[8]. SSO is a continuation of NSLP food service, so NSLP nutritional requirements are maintained from school year to summer. The NSLP guidelines state that elementary school and middle school lunches should contain one-half cup of fruit, three-fourths cup of vegetables, one cup of low-fat or fat-free milk per day[26]. Lunches for this age must also contain at least one ounce of whole-grain rich grains each day and a total of eight

to nine ounces each week[26]. Similarly, lunches must contain one ounce of meat or meat alternative each day and a total of eight to ten ounces each week[26]. High school lunches must contain one cup of fruits, one cup of vegetables, two ounces of whole-grain rich grains, two ounces of meat or meat alternatives, and one cup of low-fat or fat-free milk[26].

Additionally, SSO meals must stay within specific calorie requirements. Elementary school lunches must contain 550 - 650 calories[26]. Middle school lunches must contain 600 - 700 calories[26]. High school lunches must contain 750 – 850 calories[26]. Lunches for all ages must contain less than 10% of the total calories from saturated fat[26]. Meals must also contain less than 1,230 mg, 1,360 mg, and 1,420 mg of sodium for elementary, middle, and high school students respectively[26].

SSO is funded through reimbursements from the Department of Education, following the same reimbursement procedures as NSLP and SBP[33]. Food service managers submit claims for reimbursement based on the number of meals distributed[33]. Schools are only reimbursed for complete meals served to children under 18 that meet the nutritional guidelines[33]. Proof of compliance is required for reimbursement[33].

Summer Nutrition Program Research

A search of the literature was conducted to review any study that examined one or both of the SNP programs. Overall, there is a dearth of literature regarding SNP. However, one area of SNP research evaluates the nutritional standards of meals served by SNP[31,32,34]. An observational study by Cotugna and Vickery in a sample of six urban SFSP sites in Delaware found that SFSP meals as consumed were low, when compared to Recommended Daily Allowances (RDA) and Adequate Intakes (AI), in protein, vitamin C, calcium, and iron[34]. Focus groups of a subsample of the participants indicated that taste and food quality influenced consumption and satisfaction[34]. Hopkins and associates conducted a case study on 304 SFSP sites managed by one sponsor in Columbus, Ohio, in 2014 to assess the nutrient composition of the summer meals served compared to NSLP and SBP nutritional standards[31]. SFSP meals, in this sample, were found to have provided too much protein and carbohydrates and not enough fiber[31]. In this study, SFSP meals met micronutrient recommendations for most

children, but the meals were low in vitamin C, iron, and zinc for older children[31]. Stuhldreher and associates found that, in a low-income population in West Virginia, SFSP lunches provided greater variety of food, more fiber, more fruits, vegetables, and beans, and more vitamin C from more nutrient dense sources than lunches consumed from home[32]. Taken together with other research on the nutrient content of SNP meals, this study suggests that SNP meals provide higher quality nutrition than low-income children may otherwise eat without the program[31,32,34].

Documented Perceptions of SNP

Bruce and colleagues conducted a mixed methods study to examine one set of SNPs in a library setting[35]. The programs included in this study used USDA funds to serve children through SNP and private funds to serve meals to adults either accompanied by a child or without a child. Surveys and semi-structured interviews were completed with adult participants[35]. Results found that 41% of participants were at risk for food insecurity, 91% of participants participated in the SNP at least once a week, and 21% of participants participated every day[35].

Results from the semi-structured interviews summarized participants' perceptions of libraries as SNP sites[35]. Participants agreed that libraries were suitable locations for SNP sites[35]. Additional research should be conducted on SNP to identify key features of SNP that may contribute to its success. Future research should add to the existing literature by including additional diverse examples of SNP implementations beyond only library-based programs.

Quigley and associates conducted a case study on an innovative approach to SNP: an intergenerational model[36]. The program included in this study combined two programs SFSP and the Older Americans Act Nutrition Program (OAANP)[36]. Researchers conducted focus groups with children, older adults, and site staff who participated in the program. Results found that the program provided nutritious meals and high levels of participation and satisfaction[36]. Researchers concluded that using innovative approaches can create more SFSP sites which has been cited as a need and a potential mechanism to reduce rates of CFI in the summer[36,37]. This study is similar to the study conducted by Bruce and associates[35] in that it highlights key features that participants viewed as influential in the success of SNP sites[36]. Future research should

build upon these studies to capture the perceptions of diverse individuals involved in SNP from a variety of implementation settings[35,36].

Molaison and Carr conducted a study to examine the benefits and challenges involved with SFSP as perceived by program sponsors and state directors [38]. The study used a mixed-methods design with two phases: phase one consisted of phone interviews with state agency directors and program sponsors, and phase two consisted of a survey sent to 803 SFSP sponsors in the Southeastern United States that was developed based on the interviews[38]. A total of 18 individuals were interviewed for phase one, and 316 surveys were included in phase two[38].

Participants were asked about barriers and benefits of the program, program participation strategies, helpful resources that support the program, and factors that may contribute to stopping a program[38]. The survey results found that the large amount of paperwork involved was perceived as the most common reason for sponsors to stop SNP as well as the most common reason staff would not want to offer SNP again after they left the program once before[38]. Results identified adequate funding prior to the launch of SNP, sufficient personnel, and access to appropriate meal preparation facilities as important to the launch and maintenance of SNP sites[38]. Lack of transportation to sites was identified as the leading barrier for children, and including activities of some kind was identified as the leading strategy to increase participation[38].It also highlights the administrative burden associated with SNP in terms of the amount of paperwork, human resources, and physical resources required[38]. Additional research is needed to document SNP administrators' experiences with the program to identify key features and strategies employed by these administrators, specifically around administrative burden, that may alleviate barriers and contribute to SNP success[38].

SNP and CFI

A study by Nord and associates examined summer meals and food insecurity at the state level using data from a nationally representative survey, the Current Population Survey Food Security Supplements (CPS-FSS)[39]. A ratio of the average number of summer meals offered in July compared to the average number of free/reduced-price school meals offered in March was used as an approximation of SNP participation rates[39]. Researchers found that states that provided more summer meals

(identified by having higher SNP participation rates) had lower rates of food insecurity among families with school age-children[39]. The method used to approximate SNP participation rates is supported by other literature. This study suggest the work SNPs do during the summer is important and may be effective at reducing summertime CFI rates. More research is needed on SNPs, however, to better understand SNPs effectiveness.

A study by Miller examined the relationship between the geographic accessibility of SNP sites and household food insecurity, in low-income households with children in California[37]. In this study, a gravity model was used to examine geographic accessibility of SNP sites, which acted as a proxy for program participation[37]. In this model, an accessibility score was calculated using the supply of summer meals at a site, the drive time from a home to the site, and the population demand for SNP sites[37]. Miller found that increases in the accessibility score of SNP sites in an area were associated with decreases in the percentage of households with very low food security[37]. This association was only found with very low food security, not low food security, suggesting that geographic accessibility may improve food insecurity status for those experiencing the worst effects of it, but it may not resolve the problem of food insecurity entirely[37]. This study focused on site accessibility which is related to site availability but not exactly the same. Both accessibility and availability are important dimensions of food security. More research is needed to provide robust assessments of SNP site availability to complement research such as this study that focus on site accessibility.

Availability Research

One recent study of SNPs in California aimed to describe the SNP site availability in the state and assess how it varied in different communities[30]. This study is important to the body of SNP literature, because it was the first to define SNP site availability. Authors adapted the general definition of food availability as a dimension of food security which is “the presence and/or density of food sources.”[30] Therefore, the definition of SNP site availability is the “presence and/or density of SNP sites in a defined area”.[30] The study used this definition to assess site availability in different locations across California while accomplishing the studies other aims which addressed additional components of SNP such as meals served and measures of participation.

SNP in California served 4.7 million, 4.5 million, and 817,000 meals in June, July, and August 2016 respectively[30]. The number of daily meals served per site in urban/suburban counties was significantly higher than the number of daily meals served per site in rural/township counties in all three summer months[30]. Urban areas on the coast had greater uptake, or participation, in SNP than Northern rural areas[30]. Among urban schools, SNP sites were more common near high schools than elementary or middle schools[30]. Sites were more common around schools with a higher percentage of students eligible for free/reduced-price lunch through NSLP[30]. Among rural schools, SNP sites were less common around schools with low student enrollment when compared with schools with high enrollment. Sites were more common near schools that had a majority non-white population; this association was seen with urban schools as well[30]. This is the only study to date to analyze SNP site availability directly[30]. However, this study documents the density of SNP availability in various communities but does not include a measure of the consistency of availability, meaning the study did not account for the fluctuation in SNP site availability based on the frequent opening and closing of SNP sites throughout the summer. Based on the known characteristics of SNP sites, specifically the frequent short-term nature of the SNP sites, it is critical to account for changes in SNP availability throughout the summer by measuring the consistency of SNP site availability.

Additionally, studies are needed to assess SNP site availability in a robust manner in locations outside of California. Tennessee has higher rates of CFI than national averages, which is characteristic of the Southeastern region of the US[1,3]. Therefore, research that presents a robust assessment of the density and consistency of SNP site availability in Tennessee should be conducted in order to grow the SNP availability literature and document the important metric in a high-need area.

Gaps in the Literature

Research has shown that CFI is a pressing public health problem, and Tennessee has higher rates of CFI than the national average[3]. Summer is a vulnerable time for children who are at-risk for food insecurity, because the lack of school nutrition programs leading to a potential decrease in food availability and diet quality[18-20,24,28,40-

[42]. Because of these reasons, SNP exists to help reduce summertime CFI. However, the program is understudied and underutilized.

The USDA and FRAC have identified the strategy of increasing SNP site availability as a potential mechanism to increase SNP participation and improve summertime CFI rates. However, only one study presents a direct assessment of SNP site availability, and it does not capture important elements of SNPs that contribute to overall site availability. SNP sites can vary in the length of time that they serve meals in the summer, so it is important to measure SNP site availability in a way that captures multiple aspects of availability.

In addition, due to the documented challenges of the program and the nationally low participation rates seen by the program, SNP is a challenging program to administer. The norm of SNP administration is often characterized with challenges and barriers; however, exceptional SNPs do exist. There is a need to document examples of SNPs that have overcome these barriers and have administered high-performing SNPs with a high density and consistency of SNP site availability, because these perspectives are currently underrepresented in the SNP literature. Including these perspectives in the literature could identify key features and characteristics of the SNPs that may contribute to their programmatic success.

Specific Aims

Based on these gaps, more robust methods are needed to describe SNP site availability accounting for the density and consistency of site availability. Additionally, due to the challenges associated with operating an SNP that is able to provide a high density and consistency of SNP site availability, there is a need to capture additional rich data from programs that are able to provide a high density and consistency of SNP site availability. The additional rich contextual data may help understand characteristics of programs that offer high SNP site availability in both metrics. Therefore, this study has two specific aims.

1. To present a robust assessment of SNP site availability per county in Tennessee, on a weekly basis during one summer to assess density and consistency of SNP availability

2. To document perspectives of SNP personnel working in Tennessee counties that provided a high density and consistency of SNP site availability, using a positive deviance approach, to identify key features of program success

Heat Maps

To fulfill research aim one, a heat map, which is a visual representation of data that captures variability of schedules and distribution patterns across a large are, was created to represent SNP availability across the state of Tennessee and throughout the summer. This method captured the density and consistency of SNP site availability in Tennessee. A color-coding system was used to identify categories of frequencies.

Heat maps have been used previously in public health research, but not in relationship to SNP. For example, Kretzman and associates used heat maps to classify and analyze alcohol consumption among alcoholics at various stages of treatment [43]. In this study, they perceived that the heat map analysis provided additional insight than other, more traditional methods of analysis[43].

Currently, no research study has used heat maps to describe SNPs; however, there is a geospatial heat map feature on the USDA's FNS Capacity Builder[29]. The USDA heat map lacks county-level data[29]. The heat map created in this project provides more complete data. Additionally, like many current SNP publications and reports, the heat map on the USDA's FNS Capacity Builder does not capture the consistency of SNP site availability throughout the summer[29]. Dates of operation are listed on the tool; however, this is difficult to visually interpret[29]. The heat map created in this project provides county-level, weekly counts of site availability which is a novel contribution to the field.

Positive Deviance Approach

To fulfill research aim two, thematic analysis of qualitative interviews with SNP personnel were conducted to identify key features of the programs that aid to their success. Positive deviance is a theory that aims to describe cases that achieve a favorable outcome or possess desirable characteristics, especially when those positive

outcomes are not the norm[44,45]. This approach was developed in the 1990s when researchers were trying to create an intervention for an “impossible task.”[46] Researchers discovered that by studying cases that exhibited a positive outcome or characteristic even when exposed to the same challenging circumstances, they could learn strategies and principles that contributed to the positive outcome, and those principles and strategies could be applied to others who did not exhibit positive outcomes[46]. This approach has since been used in many research studies in a variety of disciplines[46].

CHAPTER TWO: MANUSCRIPT

Introduction

More than 15.7% of US children experience childhood food insecurity (CFI)[1]. CFI is a significant public health concern, because it can lead to a variety of physical and developmental issues such as increased risk of childhood obesity[13,16,17], poorer dietary patterns[4,5], risk factors for type 2 diabetes[6], and overall poorer health[12]. CFI is not evenly distributed across the United States (US). Geographic disparities exist, with the Southeastern region having some of the highest rates of CFI in the US[47]. This is consistent in the state of Tennessee, which had a higher rate of CFI than national averages at 21.1% compared to 15.7% respectively[3].

CFI is also disproportionately distributed throughout the year[19,20,48]. Summertime rates of CFI are higher than school-year rates, due in part to the lack of nutrition safety net programs, such as the National School Lunch Program (NSLP) and the School Breakfast Program (SBP)[19,20,24]. Summer Nutrition Programs (SNPs) aim to fill the gap left by school-year programs and address the seasonal rise of CFI[7,8]. These programs are administered by community organizations, referred to as 'sponsors' within the program, and provide free, nutritious meals to children at community locations, referred to as 'sites'[7,8].

Only 14.1% of children who qualified for free/reduced-price lunches through NSLP participated in SNP nationwide in 2018[49], indicating a large gap between the number of students served through SNP and students served through school-year programs, despite having the same priority population[9]. Because of the significant underutilization of SNPs, the United States Department of Agriculture (USDA) has prioritized increasing the availability of SNP sites[10] and the Food Research & Action Center (FRAC), a nationwide organization dedicated to ending food insecurity, has identified increasing availability of SNP sites as a strategy to improve summertime CFI rates[11].

However, there is little in the current literature about SNP programs, as they are studied much less frequently than other federal food and nutrition programs[30,37].

Comprehensively defining and describing the current availability of SNPs is an important first step in increasing SNP site availability. The one study that has examined SNP site availability defined 'availability' as the density or number of sites in a defined area[30]. While geographic density of SNP sites is critical to understanding SNP availability, it should not be the only factor considered, because sites can operate for varying lengths of time from one week to an entire summer. Thus, this study proposes two factors of SNP site availability: density of site availability and the consistency of site availability. The density of SNP site availability refers to the number of SNP sites in a defined area. For example, the number of sites per zip code or county. The consistency of SNP availability refers to the fluctuation of the density of site availability throughout the summer a summer in a given area. According to federal SNP guidelines, sites can operate for any portion of the summer. In Tennessee, some sites operate all summer long while others operate for just a select number of weeks or months. Thus, it is insufficient to assess SNP availability by the density of SNP availability alone, a measure of consistency that captures fluctuations in density of availability over time is needed. This is the first study to robustly assess SNP availability by examining both density and consistency.

One previous study analyzed the variation in SNP density in the state of California for one summer and found that certain community characteristics were associated with a higher density of SNP availability[30]. In urban areas, SNP sites were more likely to be located near schools with greater free/reduced-price NSLP eligibility and near schools with more diverse student populations[30]. In rural areas, more SNP sites were available around large schools compared to small schools[30]. These findings suggest that different communities, with varying community characteristics such as school size and racial diversity, may have different densities of SNP availability[30].While important, these findings are limited, because they do not take into account the consistency of SNP site availability.

Challenges of SNP delivery have been documented in SNP literature and include: the burdensome administrative requirements of SNPs, insufficient staff to support the labor intensive work of meal preparation and delivery, and transportation challenges that limit participation [38,50]. These challenges are reflected in the low

participation rates seen across the US[9]. Despite these challenges, exceptional SNPs do exist. For this reason, the concept of positive deviance can be applied to SNPs[45]. The positive deviance approach describes cases that achieve a favorable outcome, when favorable outcomes are not the norm[45]. Positive deviance approaches have been used before in other areas of public health nutrition in breastfeeding promotion[51], enhancing diet quality among low-income women[52], and maternal pregnancy outcomes[53], but not in SNP literature prior to this study.

This study had two aims: 1) to present a robust assessment of SNP site availability per county in Tennessee, on a weekly basis during one summer to assess density and consistency of SNP availability and 2) to document perspectives of SNP personnel working in Tennessee counties that provided a high density and consistency of SNP site availability, using a positive deviance approach, to identify key features of program success.

This study adds to literature by presenting a novel approach to assessing SNP site availability that documents both the density and consistency of SNP site availability. Additionally, it includes the perspectives of SNP personnel working in positive deviant counties that can be useful to characterize SNPs that provide a high density and consistency of SNP site availability, which can then be extrapolated and used as best practices in communities with less SNP site availability[30,38,50].

Methods

Study Design

This study used an explanatory sequential, mixed methods design[54]. Mixed methods designs use both quantitative and qualitative elements to better answer a research question than either element could on its own[54]. In explanatory sequential designs, the quantitative arm is conducted first, followed by the qualitative arm, and results from both arms are integrated throughout the project to allow the qualitative arm to explain and add context to the quantitative results[54]. In this study, the quantitative arm consisted of a heat map of the density and consistency of SNP availability in Tennessee in the summer of 2018. Heat maps are visual tools that display data using color to represent differences or changes in the data[43]. The heat map informed

qualitative data collection by systematically ranking SNP availability among all counties in Tennessee and identifying the counties with the highest levels of SNP site availability as positive deviants. The qualitative arm consisted of semi-structured interviews with SNP staff and key stakeholders who worked in counties identified by the heat map. The results from both arms were interpreted together by using the qualitative results to characterize the sample of positive deviant counties seen the heat map, and to provide understanding about how the positive deviant counties were able to achieve high levels of SNP site availability. Figure 2.1 includes a visual representation of the study design.

Heat Map Methodology

Data for the heat map were obtained from the USDA Food and Nutrition Service (FNS) Capacity Builder[29]. The Capacity Builder is a publicly available federal database of SNP open site information and other community demographic data[29]. Opens sites allow any child under the age of 18 to receive food from the site. Children do not need to be enrolled in other programs or meet other eligibility criteria, beyond the age restriction, to receive a free meal from the SNP site. Data used in the heat map included: the site name, site address (used to determine county location), and site start and end dates. Data from 2018 were used as that was the most current, complete dataset at the time of this study. Eighty-two of 95 counties in Tennessee had at least one SNP site in 2018. To avoid skewing the results, the 13 counties with no SNP sites were excluded from the heat map analyses.

The heat map was created in Microsoft Excel (Microsoft, Version 2001). SNP site availability data were entered as follows: the first column listed the name of each site (n=2,073). The next 13 columns were labeled with the dates of the 13 weeks of

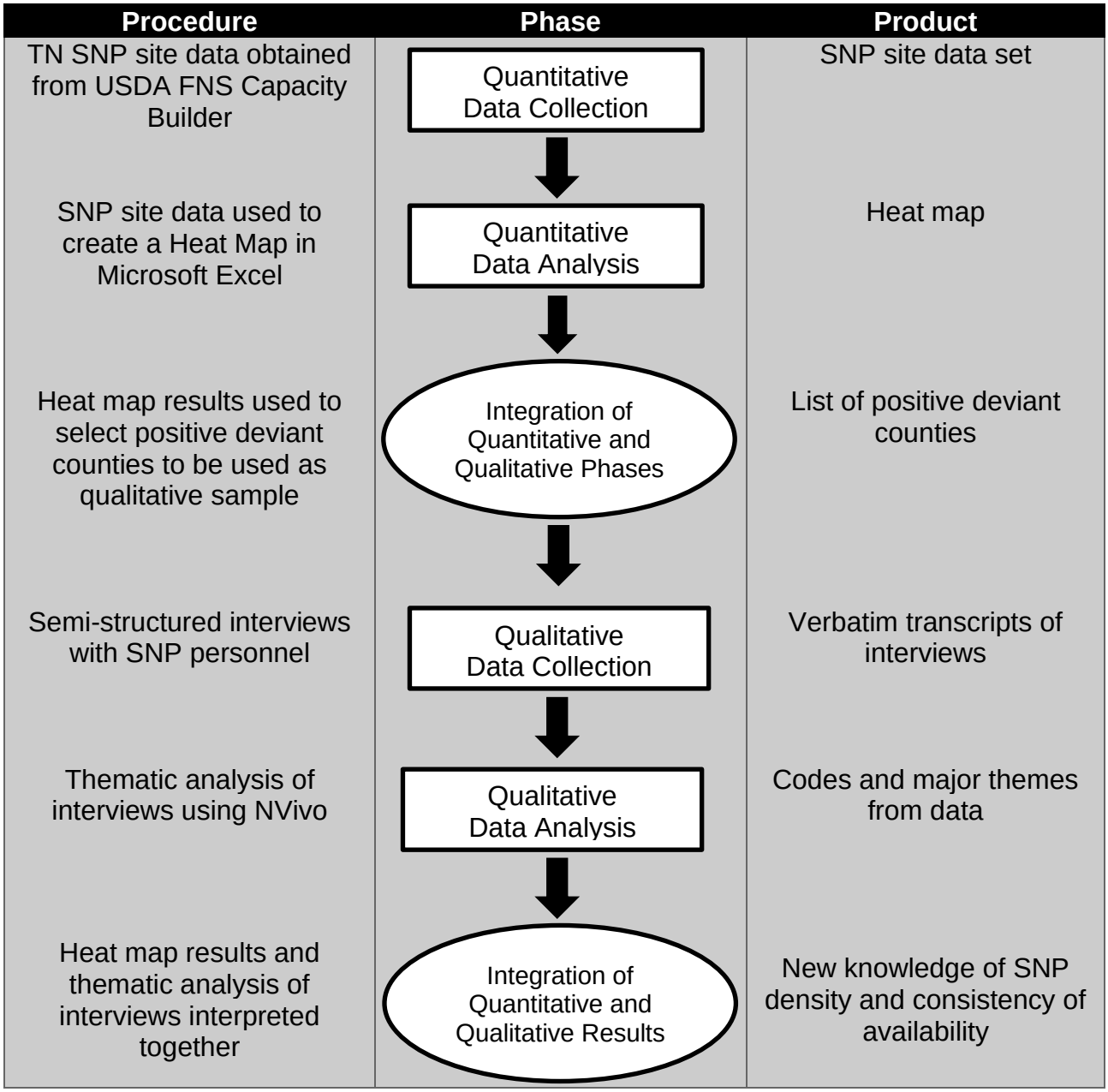

Figure 2.1. Mixed Methods Study Design and Data Integration

summer. A formula populated the cells with a 1 if the site served meals in a given week and a 0 if the site did not serve meals that week. Once availability was calculated by week at each site (n=2,073), data were collapsed by summing site availability at the county-level. In the new, collapsed dataset, the first column of the spreadsheet listed the names of each of the 82 participating Tennessee counties. The next 13 columns were labeled with each week of the summer and contained the total number of open sites in each county for that week.

Data were then standardized to account for population size and need in each county. To do this, data provided by the Tennessee Department of Education on the total number of free/reduced-price NSLP lunches served in March 2018 in each county were used. NSLP data from March were used at the recommendation of partners at the Tennessee Department of Education. This value estimates the size of the priority population of SNPs and has been previously used in SNP literature[39]. The total number of SNP sites that served meals each week in each county was divided by the total number of free/reduced-price NSLP lunches served in March 2018 in each county and multiplied by 10,000. The new values populated in each cell of the heat map represented the number of SNP sites that served meals in a given week in a given county per 10,000 free/reduced-price NSLP lunches served in March 2018 in the same county.

Next, data obtained from each school system were used to determine the exact start and end dates of summer for each county. Summer was defined as the period in which no public school was in session in the county. Summer break durations vary greatly across Tennessee schools and ranged from eight to 13 weeks in summer 2018. Weeks when school was in session were systematically omitted from the analysis (indicated in grey on the heat map), to avoid penalizing a county for not serving summer meals when the schools were open.

To develop the color-coding scheme on the heat map, all standardized density values (the number of SNP sites open in a given week in a given county per 10,000 free/reduced-price NSLP lunches served in March in the same county) from each participating county in Tennessee and each week of the summer were rank ordered and divided in quintiles. Quintile cut points were selected to capture appropriate levels of

variability while maintaining ease of interpretability. The quintile ranges were 0.00-0.56, 0.57-1.24, 1.25-2.18, 2.21-3.63, 3.64-32.45. Each quintile was assigned a unique color, where lighter colors represented lower site density and darker colors represented higher site density. This color-coding scheme was then applied to each cell on the heat map to represent its corresponding quintile to allow for easy visualization of the fluctuation in the density and consistency of SNP availability (See Table 2.1).

To identify positive deviant counties, an *Availability Score,* a single measure of SNP site availability for the entire summer, was calculated by averaging the standardized density scores for each week of summer in each county. The counties were then ranked by their *Availability Score*. Counties with an *Availability Score* above 3.75 were considered positive deviant counties. This cutoff was selected because there was a natural break in the data at this point. Counties below this line had lower densities of availability and less consistent availability than the counties with an *Availability Score* above 3.75.

The consistency of site availability throughout the summer was assessed by examining statistically significant differences in the density of site availability across summer months using one-way analysis of variance (ANOVA). To do this, the weekly standardized site density values (number of sites available in each county per 10,000 NSLP meals served in March 2018) were coded according to their corresponding calendar month (May, June, July, August). This created four groups of data that represented the number of sites open in all counties each week in May, June, July, or August/10,000 NSLP free or reduced-price meals served in March 2018 in each county. An ANOVA test was run in SPSS Software 24.0 (IBM SPSS Statistics for Windows Version 24.0, Armonk, New York) to determine if statistically significant differences in standardized site density values existed across the four months. Post hoc Tukey tests were used to determine which months were significantly different from each other. A probability value of <0.05 was considered to be significant.

Qualitative Methodology

The employees and other key stakeholders of sponsoring organizations working in the positive deviant counties were considered eligible for the qualitative interviews.

Additionally, qualitative interview participants had to be over the age of 18 and provide written informed consent to participate in the interviews. Participants were recruited using purposive[55] and snowball sampling techniques[56] beginning with the supervisor of the selected SNP (whose contact information was available on the FNS Capacity Builder website).

Interviews took place by phone or in person at the SNP sponsoring organization. A semi-structured interview guide was developed using previous SNP literature[30,37,38,50]. The interview guide asked about general characteristics of the SNP and challenges and strategies in eight key program areas: program description, staff and program personnel, program development and growth, administrative requirements, food procurement, food preparation, participation, participant experiences, and community support. Participants received a $25 Walmart gift card upon completion of the interview. All interviews were audio-recorded and transcribed verbatim by both the graduate researcher and an undergraduate research assistant. The researcher who performed each interview reviewed each transcript to ensure the accuracy of the transcriptions. Transcripts were uploaded to NVivo version 12.0 (QSR International, Melbourne, Australia) for analysis.

For qualitative analysis, one rich transcript was open coded to create a preliminary codebook[57,58]. The codebook was adapted in an iterative process throughout coding to include new codes that emerged in the coding process[57]. Each transcript was coded at the thought-level by the graduate researcher and the undergraduate research assistant using the codebook[57]. Data analysis allowed for one thought to be coded with multiple codes. Double coding allowed for analyst triangulation and reduced analyst bias by including multiple perspectives in the data analysis process[57,59]. In lieu of measuring inter-rater reliability, all transcripts were double-coded and consensus was met for each transcript. Data collection and data analysis occurred simultaneously to allow for data collection to be shaped by the results[57]. Saturation was defined as the point when no new information was obtained from additional interviews. When saturation was reached in the current study, an additional three interviews were completed to confirm saturation[57]. The final sample size was n=12. Once all transcripts were coded, queries were conducted on each code, and major themes were identified[57].

All study procedures were approved by the Institutional Review Board at the University of Tennessee, Knoxville (UTK IRB-19-05334-XP).

Results

Quantitative Results

Eighty-two counties with a total of 2,073 open sites were included in the heat map analysis. The full heat map is included in Appendix A. Sixteen (20%) of the counties in Tennessee reached positive deviance status having an *Availability Score* greater or equal to 3.75 (Table 2.1). Of the SNP sites in Tennessee (n=2073), 25% (n=517) were located in a positive deviant county. On average, SNP sites operated for 6.32 (SD = 3.19) weeks, while summer break was an average of 9.93 (SD = 0.68) weeks. June had the highest density of site availability with a weekly average of 3.32 standardized sites per county in June (SD=4.03) compared to 2.03 (SD=3.98), 2.40 (SD=4.01), and 0.66 (SD=0.98) per week in May, July, and August respectively. There was a statistically significant difference in the density of site availability between months as determined by a one-way ANOVA (F=7.34, p=0.00). A Tukey post hoc test revealed that the weekly average of standardized sites per county in June was significantly greater than July (p= 0.02), and August ($p<0.01$), and significantly greater in July and August (p=0.50). There was no significant difference between density of site availability in May and any other month (Figure 2.2).

The *Availability Scores* ranged from 0.13 – 32.45 with a mean of 2.68 (SD=3.85). The median *Availability Score* was 1.85, indicating significant skew in the data. Twenty-five (30%) counties scored an *Availability Score* at or above the mean, while fifty-seven (70%) counties scored an *Availability Score* below the mean. Twenty-two counties (27) scored an *Availability Score* at or below 1.00, with six counties (7%) scoring below 0.5.

Table 2.1: Heat Map of Positive Deviant County's Weekly Density and Consistency of SNP Site Availability by County in Tennessee, 2018

County	Weeks of Summer 2018													AS+
	5/20-5/26	5/28-6/1	6/4-6/8	6/11-6/15	6/18-6/22	6/25-6/29	7/2-7/6	7/9-7/13	7/16-7/20	7/23-7/27	7/30-8/3	8/5-8/11	8/12-8/18	
Pickett		32.45	32.45	32.45	32.45	32.45	32.45	32.45	32.45	32.45				32.45
Obion		2.53	12.21	11.98	11.52	11.52	11.29	11.52	11.29	11.06				10.55
Haywood		8.53	11.87	12.61	11.87	12.24	12.24	12.24	1.85	1.85				9.48
Chester		6.61	8.26	7.71	8.26	6.61	6.06	6.06	7.16	6.61				7.04
Cumberland		5.91	6.87	7.19	7.51	6.87	6.07	6.23	6.39	6.39	4.79			6.42
Unicoi		4.1	5.46	5.46	5.46	5.46	9.56	11.6	10.24	10.24	1.37	1.37		6.39
Fayette		0.28	8.01	8.57	8.01	8.01	8.01	8.01	8.29	7.74	0.28	0.00		5.93
Hancock		5.99	5.99	5.99	5.99	5.99	5.25	5.25	5.99	5.25				5.74
Morgan		2.04	5.52	6.69	5.82	5.52	5.23	5.23	6.4	2.33				4.98
Hawkins			5.23	5.57	5.57	5.4	5.23	5.23	5.06	4.39	0.00			4.63
Bledsoe		0.00	9.64	9.16	9.16	9.16	0.48	0.48	0.48	0.48				4.34
Washington		2.73	5.47	5.47	5.47	5.47	5.22	4.6	4.47	2.48	0.62			4.20
Johnson		5.7	5.7	5.7	5.22	5.22	4.75	4.75	4.75	0.00	0.00			4.18
Henderson		4.6	5.21	5.51	4.9	3.68	3.06	3.37	3.37	3.06				4.08
Tipton		1.6	4.66	4.26	4.53	4.53	4.13	4.4	4	3.73				3.98
Monroe		3.14	5.93	5.06	4.19	4.19	3.66	3.66	4.36	3.32	0.00			3.75

AS+: *Availability Score:* the average of the standardized site density values throughout the entire summer in each county

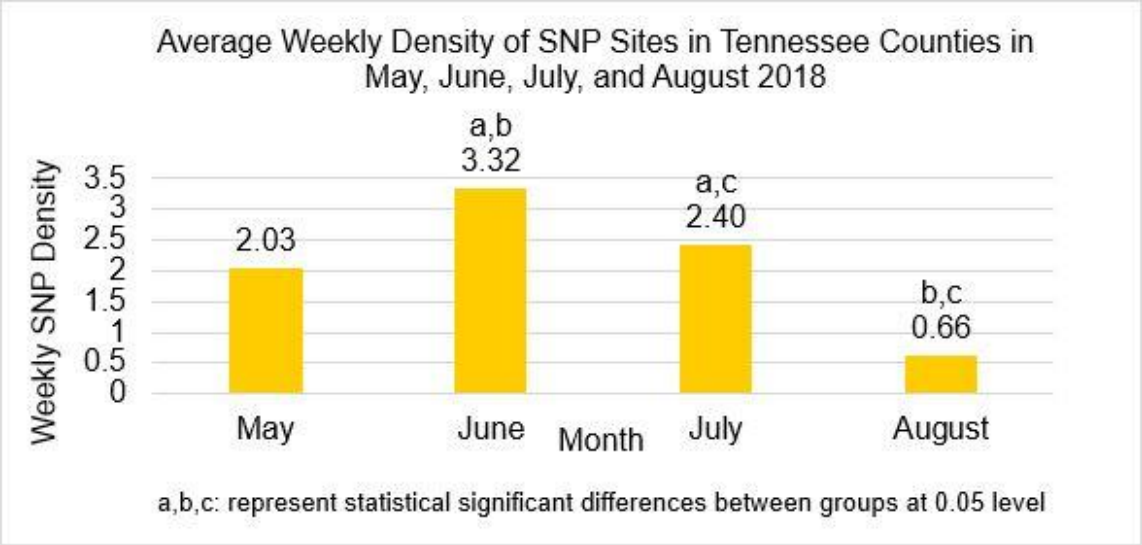

Figure 2.2. Average Weekly Density of SNP Sites in Tennessee Counties in May, June, July, and August 2018

Pickett County was considered an outlier with an *Availability Score* of 32.45*,* making it the highest scoring county by over 20 points. The second highest county, Obion County, scored an *Availability Score* of 10.55. Pickett County operates 13 sites, each for the full nine-week summer in the county and served 4,006 free or reduced-price NSLP meals in March 2018. Pickett County is considered a true outlier due to the large number of SNP sites compared to the number of free or reduced-price NSLP meals served in Pickett County and the consistency of the SNP sites.

A geospatial map of Tennessee (Figure 2.3) was created to visually capture variation across the state using *Availability Score* scores*.* The non-positive deviant counties (*Availability Scores* <3.75*)* are shaded in various shades of blue. Positive deviant counties (*Availability Scores* >3.75) are indicated in shades of orange.

Qualitative Results

Twelve interviews were conducted with SNP personnel from seven SNP sponsoring organizations which operated 259 SNP sites across eight counties. The sample was 67% (n=8) public school employees, 25% (n=3) non-profit employees, and 8% (n=1) faith-based ministry employee. SNP personnel in various roles were represented in the sample including 50% (n=6) department directors or supervisors, 25% (n=3) program assistants, 17% (n=2) program directors or coordinators, and 8% (n=1) program administrative support staff (Table 2.2).

The five main themes that emerged from the data include: *site accessibility, SNP sites linked with community programs*, *kid-friendly foods, approach to administrative requirements*, and *staff values*. The following sections include a description of the theme along with participant quotations that ground the theme in the data.

Sites Accessibility

SNP personnel identified transportation as a common barrier that their priority population experienced. Participants described overcoming this barrier by serving meals where children lived, such as at apartment complexes, mobile home parks, or

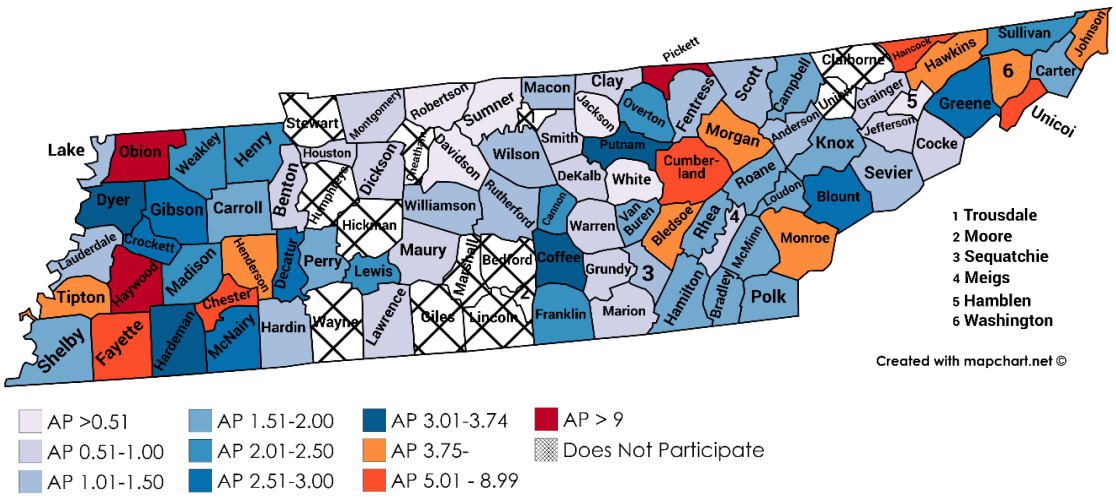

Figure 2.3. Geospatial Map of SNP *Availability Scores* by County in Tennessee, 2018

Table 2.2. Demographic Characteristics of Interview Sample (n=12) of SNP Personnel in Positively Deviant Counties in Tennessee, 2019-2020

Demographic Characteristic	Frequency	Percent
Employer		
Public School System	8	67%
Food Bank	3	25%
Faith-based Ministry	1	8%
Job Title		
Department Director/Supervisor	6	50%
Program Assistant	3	25%
Program Coordinator/Director	2	17%
Administrative Support Staff	1	8%

subsidized housing complexes. Participants attributed low participation rates at sites where parents or caregivers needed to drive the children to the site, specifically for the SNP meal.

> *"We had a weird thing happened in (our) where on Mondays for July, we had to move the site out of the apartment complexes and to a nearby park. Added you know, you know, a five-minute walk or, you know, a short car ride to get to where the meals are, and attendance dropped 90 - 95%... So you have to go where they are. The people that we're trying to reach, the people that we're serving, transportation is one of their biggest problems, especially out here [in rural counties]. And I don't think it's a lack of want. I think it's really just a lack of ability to meet you where you're going to be, so you have to meet them where they are."*
>
> *- Food Bank Employee*

SNP Sites Linked to Community Programs

SNP personnel described the beneficial partnership between SNP sites and community programs or camps. Sponsoring organizations represented in this sample operated SNP sites at camps, programs, or activities in the community that independently enrolled a large number of children. For example, sponsors operated SNP sites at their local high school football practice, band camp, summer school, VBSs, YMCA or Boys and Girls Club summer camps, reading programs, and other community events. SNP personnel stated that this model contributed to the financial sustainability of the SNP. All SNPs have basic costs including labor, fuel, rent, and maintenance. SNPs are reimbursed based on the number of meals served. Programs serving more meals receive more reimbursement. Participants stated that this increased, and steady flow of reimbursement can help offset other costs of the program, making the program fiscally sustainable.

> *"And to be honest, it's our churches that allow us to go to mobile homes and that, because your churches, you're feeding a large number of kids at a site. Well, you may go to a housing project that only has nine kids, but those nine kids really need it."*
>
> *–Public School System Employee*

Kid-Friendly Food

SNP employees stated that even though children participating in the SNP may be hungry or have limited access to food, they often don't eat food that they do not enjoy. Many participants perceived serving hot meals, rather than prepackaged cold meals increased children's satisfaction in the program and contributed to steady levels of participation and reimbursement throughout the summer.

> *"You have to serve food that kids want to eat. Just because they're hungry doesn't mean that they'll eat whatever you put in their hands. As anyone who has, you know, tried to feed a hungry child will know… You know kids, they have strong opinions about what they like and what they don't like, and no amount of whatever is going to persuade them."*
>
> - *Food Bank Employee*

Participants reported providing fresh fruit and vegetables in the program meals, and perceived that participating children enjoyed the produce which introduced variety into the children's diets and incentivized them to continue to participate in the SNP. In addition, serving kid-friendly foods was reported to increase intake and decrease food waste.

> *"We used squash last year and used it fresh and cut it up for kids with dip, and you would not believe how the kids loved it! ... Just little things like that. We did zucchini and squash both."*
>
> *–Public School System Employee*

Approach to Administrative Requirements

While the participants acknowledged that there were a number of administrative requirements of the program, they did not find this to be a barrier to program delivery. Participants reported managing the administrative requirements with a team approach which made the tasks more feasible. Multiple staff members and volunteers contributed to collecting data and completing the paperwork. There was also a shared feeling that the benefits of SNP outweighed the administrative requirements and the extra work involved in the program.

"There is a lot of paperwork to do… But you know, we are a severe need county. You know, it is worth feeding these kids, because a lot of them are hungry."

– Public School System Employee

Staff Values

SNP personnel revealed that the staff working directly with the children and delivering the SNP meals were essential to program success. These staff have formed relationships with many of the children by serving them meals during the summer. The children began to look forward to the SNP meal because of the food, the staff, and the experience they have during the meal.

"They love the bus. And they love the bus drivers. The people that I have, that work with us, they're just wonderful. They just love on the kids, and sometimes you pull into a site, the kids are so excited; they'll be jumping up and down hollering, 'They're here! They're here!' You know, it's heart touching to actually watch them run to the bus and give you a big hug when they get off and scream back 'Thank you!'"

- Faith-based Ministry Employee

SNP personnel emphasized the importance of the entire SNP team being dedicated to serve children in need of the SNP. The summer program is a lot of work, often added on in addition to other year-long work responsibilities. However, the staff in this sample were dedicated to serve the need in their communities.

"When I first started, I was in the van, and I was in one of our housing developments. And there was a little boy, and he was probably, maybe 3 or 4 years old… He came every day. Well, there was this one time he came and um I asked him, and I known him by name, and I said 'What's the matter with you today?' And he just kind of looked at me, and he kind of smiled. And I said, 'Are ya hungry?' He said 'Yes, I'm hungry.' He got about maybe 8 or 10 feet (away) from my bus, and he couldn't go no farther. He set down on that sidewalk and started eating the food. I'll never forget that little boy… I tell that story to everybody. When they go to ask me, 'Now why do you do that?' That's the reason I do it."

–Public School System Employee

Discussion

The USDA set the goal to increase the percentage of children participating in SNP as compared to free/reduced-price NSLP to 17.5% by 2018[10]. According to FRAC, there has been a slight downward trend in these numbers from 15.8% and 15.1% in 2015[9] and 2017[49] to only 14.1% in 2018[49]. FRAC identified increasing the density of sites as an important step to increase participation[11]. This study found that in Tennessee, 16% of counties had no SNP sites at all and 27% of counties had less than 1 SNP site available per 10,000 free/reduced-price NSLP meals served on average, indicating that in many counties in Tennessee, the density of site availability is low and needs improvement.

In addition to site density, another key element of SNP availability is the consistency of sites being open during the summer. This is the first study to present a robust assessment of the density and consistency of SNP availability at the county-level across an entire state. Compared to other summer months, the month of June had the most sites consistently open and operating. SNP availability tended to taper off later in the summer, with there being very low numbers of sites remaining open for weeks in the beginning of August just prior to the start of the school year. A similar trend was seen in another study in California in the number of SNP meals served with 4.7 million meals served in June, 4.5 million in July, and 817,000 in August[30]. The California study did not account for the difference in serving days in August due to schools being back in session[30]. However, the current study did account for these differences, and the relationship remained. The inconsistent SNP site availability over the duration of the summer seen in this study and in previous literature indicate that work needs to be done to increase consistency of SNP site availability over the course of a summer, in addition to the density of site availability in an area. SNPs are designed for daily use as they provide one meal at a time and require children to be present and consume the meal on-site rather than providing a larger quantity of food that can be taken home and eaten later. Significant decreases in the consistency of site availability seen in July and August make the end of the summer a vulnerable time for children who are food insecure. This finding emphasizes this importance of examining the consistency in addition to density

of SNP site availability as an important first step to increasing overall SNP availability in a community.

In this study, Pickett County which is a small rural county on the Tennessee, Kentucky border had the highest level of SNP site density and consistency. Despite the small size and population, the Pickett County Board of Education operated 13 SNP sites for the full nine-week summer. The standardized site availability scores each week in Pickett county were 32.45, while the next highest weekly standardized site availability score was 12.24. Pickett County offered complete consistency, meaning the density of site availability was the same each week of the summer. Whereas, other counties, such as Decatur County, offered variable consistency throughout the summer, with the *Availability Score* fluctuating up to 5 points throughout the summer, further reinforcing the importance of an assessment of both density and consistency of site availability. This data suggested that while Pickett County's score is an outlier, it is a true outlier and was thus included in analysis.

Thirteen counties did not participate in SNP and were excluded from the heat map analysis. Interestingly, the 13 counties that did not have any SNP sites in 2018 served some of the fewest numbers of free/reduced-price NSLP meals in March of 2018. A small number of free/reduced-price NSLP meals served could indicate a low need for nutrition safety net programs in an area or it could indicate a small population overall. SNP federal guidelines indicate which areas can support SNP sites, based on a number of factors including the number of children who are eligible for free/reduced-price NSLP meals in a census block. In each of the 13 non-participating counties, some, if not all, census blocks were eligible for SNP sites, indicating that the lack of eligibility/the lack of need, was not the reason counties did not participate in SNP. The lack of SNP sites in these counties create vulnerability for children at risk for CFI. It is possible that other summer food assistance programs outside of the federal SNPs operate in these counties. While the non-participating counties were not the focus of this study, future research should examine the characteristics of non-participating counties.

A wide range of communities and SNP program structures were represented in the positive deviant counties, indicating that a variety of program structures can be successful in offering a high density and consistency of SNP site availability The

qualitative results identified underlying characteristics that transcended program structure and community demographics. These results suggest that it is the softer characteristics of programs (such as personal characteristics or foods offered), rather than objective programmatic or demographic characteristics, that may influence program success. The findings of this study have practical implications for program evaluation and improvement purposes, because the themes identified in the qualitative analysis are modifiable aspects of SNPs. A variety of program structures can implement the strategies identified in the qualitative analysis.

A strategy to reduce the barrier of transportation was identified by the sample as well as supported in previous studies[38]. A study of SNP sponsors and state directors in the Southeastern US indicated several challenges and benefits involved in operating SNPs, including transportation limitations as a barrier to participation[38], which was consistent with the current study. Participants emphasized the importance of making sites accessible to participants, often times within walking distance of their residence.

In contrast to previous SNP literature, the current sample did not perceive the paperwork involved in the SNP as a limiting barrier. Previous studies have identified the administrative requirements of SNPs as the main reason sponsors may stop operating a SNP[29]. The conflicting results between the current study and previous literature may be because the previous study was published in 2006[38]. Since publication, the federal requirements of SNP administration have been simplified and transitioned online based on sponsor feedback[7]. Additionally, the sponsors included in this sample worked in areas with a high density and consistency of SNP availability. The successful nature of these sponsoring organization may be related to their ability to manage the administrative requirements of the program. The heat map results could be used in tandem with these results to indicate that counties with lower SNP availability may benefit from assistance with the administrative aspect of operating SNPs.

Additionally, previous studies reported maintaining sufficient staffing may be difficult for some sponsors, especially in rural areas[38]. However, this sample reported that their SNP employees appreciated working in the summer. School cafeteria employees typically only work during the school year, leaving a gap in their income. Participants, who were primarily supervisors, reported that many food service workers

would look for other temporary jobs during the summer. SNPs gave these employees the option of full-time work which was perceived to increase employee satisfaction and decrease turnover.

Strengths and Limitations

One challenge in this line of research is to find an appropriate unit of analysis at the local level. In this study, heat map data were analyzed at the county-level, so NSLP data on free/reduced-price meals served could be used to standardize the availability data. However, SNPs are not exclusively administered within single counties. Many different community organizations can act as SNP sponsors, some associated with county government, such as school districts, and some as separate entities, such as faith-based organizations and non-profits that have the potential to provide services across multiple counties. Thus, analysis at the sponsor-level instead of the county-level has potential advantages. However, no standard metric exists to standardize SNP availability data at the sponsor-level. Therefore, this study analyzed SNP availability at the county-level, so NSLP data could standardize the data. This method was both supported by current literature and supported by experts in the SNP field that consulted on this project[39].

One potential limitation of this study was researcher bias, as is common with qualitative work[59]. Effects of this bias were mitigated by double-coding all transcripts and reviewing the themes with multiple researchers[59]. Double coding allowed for analyst triangulation which strengthened the qualitative results[59].

A major strength of this study is the novel methodology. This was the first study to use heat map and positive deviant approaches in the context of SNP. It also added to the body of SNP literature by presenting the consistency of SNP site availability, in addition to density of availability[30]. Increasing SNP availability is a priority of the USDA, and robust assessments of the density and consistency of site availability is an important first step towards this goal[10].

Finally, the mixed methods design provided an enhanced assessment SNP site availability supported by both quantitative and qualitative data[54]. The quantitative arm provided an objective measure of SNP site availability using a national database, the

USDA FNS Capacity Builder. The heat map also quantified and ranked counties based on their SNP site availability by calculating the *Availability Score*. The objective, quantifiable quantitative arm also included two methods of data visualization: the heat map and the geospatial heat map which increases the practicality and interpretability of the results. Similarly, the qualitative arm of this study carries practical implications for program evaluation and improvement.

CHAPTER THREE: EXPANDED METHODS

Qualitative Methods

Details of the qualitative data analysis methodologies are included in this section. These details are important to accurately understand the methodologies used in this study; however, they are too detailed to be included in the manuscript. These sections provide additional details related to the qualitative methodology to augment the information included in the manuscript.

Undergraduate Research Assistant Training

One undergraduate research assistant (URA) was recruited to assist with data analysis on this project. The URA was a senior in the nutrition department with an interest in public health nutrition and experience working in SNP in Tennessee. The URA received a copy of the thesis proposal and met with the graduate researcher to discuss responsibilities of the URA position and the study aims and design. CITI training was required for any researcher on the project. The URA provided proof of completion of CITI training.

The URA assisted with transcription. The graduate researcher and the URA met to discuss the process of transcription. The graduate researcher wrote up detailed instructions for transcription. The graduate researcher and URA went through a sample transcript together using the instructions, and the URA was sent an electronic copy of the instructions for their reference. A procedure for transcription was created and the team met weekly to discuss progress and resolved any issues related to transcription.

Training for data analysis began with an instructional meeting between the graduate researcher and the URA. The graduate researcher explained the protocol for coding the transcripts and general qualitative coding methodology. Together, the graduate researcher and URA along with support from the faculty advisor on this project conducted initial open coding of one rich transcript following the procedures defined by the graduate researcher. The graduate researcher and URA then independently coded one sample transcript and met to compare and discuss their coding. The graduate researcher and URA used the open coding to develop a code book that would be

applied to all transcripts. Both researchers then used the codebook to code the same transcript and met to compare codes and reach consensus. After these tasks, the graduate researcher and the URA were confident in the URA's ability to transcribe and code. The researchers then started systematically transcribing and coding the data.

Transcription

As interviews were completed, the audio recordings were saved onto UT's password protected server. The graduate researcher emailed the URA to assign the audio file to be transcribed. The URA then downloaded the audio file and transcribed the data using the protocol created by the graduate researcher. The URA uploaded the transcript to the password protected server and emailed the graduate researcher when the file was uploaded. The graduate researcher listened to the audio file and confirmed the accuracy of each transcript. The graduate researcher would then email the URA to assign transcripts to be coded. All copies of audio files and transcriptions were deleted from personal computers and stored on the password protected server maintained by UTK.

Thought-level analysis

The transcripts were coded at the thought level. A thought was defined as a statement, roughly one to four sentences long, that encompassed one complete idea. A thought must have enough information that it could stand on its own and be understood in its appropriate context. Data analysis allowed for one thought to be coded with multiple codes. For example, a statement about serving fresh produce that the children said they enjoyed could have been coded as food provided and participant feedback. Applying multiple codes to one unit of text captures the fullness of data included in each thought while maintaining the integrity of the statement.

Double Coding

One undergraduate research assistant (URA), who was familiar with SNPs, was recruited to assist with data analysis. The URA and the graduate researcher collaborated to double code each interview transcript. First, the URA and the graduate researcher coded one transcript on their own using the codebook. Then, the URA and

the graduate researcher met to compare their individual coding. When there was a discrepancy between the two coders, each researcher explained their rational until consensus was met for each code. At the end of each meeting, the two researchers reached consensus for the entire transcript, and that version of the transcript and codes, that had complete consensus, was used in thematic analysis. This process was conducted for each of the 12 transcripts included in this study. The URA and graduate researcher double coded all transcripts, so an interrater reliability score was not calculated. Instead, complete consensus was reached for each transcript.

LIST OF REFERENCES

1. United States Department of Agriculture, Economic Research Service,. Key Statistics & Graphics: Food Security Status of U.S. Households with Children in 2017. 2018.
2. United States Department of Agriculture Economic Research Service. Definitions of Food Security. 2018; https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/definitions-of-food-security.aspx.
3. Feeding America. Map the Meal Gap 2017. 2017.
4. Fram MS, Ritchie LD, Rosen N, Frongillo EA. Child experience of food insecurity is associated with child diet and physical activity. *The Journal of nutrition.* 2015;145(3):499-504.
5. Belachew T, Lindstrom D, Gebremariam A, et al. Food insecurity, food based coping strategies and suboptimal dietary practices of adolescents in Jimma zone Southwest Ethiopia. *PloS one.* 2013;8(3):e57643.
6. Seligman HK, Schillinger D. Hunger and socioeconomic disparities in chronic disease. *The New England journal of medicine.* 2010;363(1):6-9.
7. United States Department of Agriculture Food and Nutrition Services. Administration Guide: Summer Food Service Program. 2016; https://fns-prod.azureedge.net/sites/default/files/sfsp/AdminGuideSponsors.pdf.
8. Tennessee Department of Education. School Nutrition Programs, Seamless Summer Feeding Option. https://www.tn.gov/education/snp-resources/snp-programs.html.
9. No Kid Hungry. Facts About Childhood Hunger in America. 2019; https://www.nokidhungry.org/who-we-are/hunger-facts, 2019.
10. Agriculture USDo. Strategic Plan FY 2014-2018. 2014.
11. Center FRA. Outreach to Increase Participation in the Summer Nutrition Programs. 2017; https://frac.org/wp-content/uploads/outreach-increase-participation-sfsp.pdf.
12. Shanafelt A, Hearst MO, Wang Q, Nanney MS. Food Insecurity and Rural Adolescent Personal Health, Home, and Academic Environments. *The Journal of school health.* 2016;86(6):472-480.

13. Metallinos-Katsaras E, Must A, Gorman K. A longitudinal study of food insecurity on obesity in preschool children. *J Acad Nutr Diet.* 2012;112(12):1949-1958.
14. Morales ME, Berkowitz SA. The Relationship between Food Insecurity, Dietary Patterns, and Obesity. *Current nutrition reports.* 2016;5(1):54-60.
15. Essien UR, Shahid NN, Berkowitz SA. Food Insecurity and Diabetes in Developed Societies. *Current Diabetes Reports.* 2016;16(9):79.
16. Papas MA, Trabulsi JC, Dahl A, Dominick G. Food Insecurity Increases the Odds of Obesity Among Young Hispanic Children. *Journal of immigrant and minority health.* 2016;18(5):1046-1052.
17. Guo SS, Wu W, Chumlea WC, Roche AF. Predicting overweight and obesity in adulthood from body mass index values in childhood and adolescence. *The American journal of clinical nutrition.* 2002;76(3):653-658.
18. Nalty CC, Sharkey JR, Dean WR. School-based nutrition programs are associated with reduced child food insecurity over time among Mexican-origin mother-child dyads in Texas Border Colonias. *The Journal of nutrition.* 2013;143(5):708-713.
19. Huang J, Barnidge E. Low-income Children's participation in the National School Lunch Program and household food insufficiency. *Social science & medicine (1982).* 2016;150:8-14.
20. Mansfield JL, Savaiano DA. Effect of school wellness policies and the Healthy, Hunger-Free Kids Act on food-consumption behaviors of students, 2006-2016: a systematic review. *Nutrition reviews.* 2017;75(7):533-552.
21. Education TDo. Community Eligibility Provision (CEP). https://www.tn.gov/education/health-and-safety/school-nutrition/community-eligibility-provision-cep.html.
22. Turner L, Guthrie JF, Ralston K. Community eligibility and other provisions for universal free meals at school: impact on student breakfast and lunch participation in California public schools. *Translational Behavioral Medicine.* 2019;9(5):931-941.
23. Greater Schools Partnership. Community Schools. 2019; https://www.greatschoolspartnership.com/community-schools/.

24. Vernarelli JA, O'Brien B. A Vote for School Lunches: School Lunches Provide Superior Nutrient Quality than Lunches Obtained from Other Sources in a Nationally Representative Sample of US Children. *Nutrients.* 2017;9(9).
25. Schroeder K, Smaldone A. Food Insecurity: A Concept Analysis. *Nursing forum.* 2015;50(4):274-284.
26. Nutrition Standards in the National School Lunch and School Breakfast Programs. In: Electronic Code of Federal Regulations, ed2018.
27. Tennessee Department of Human Services. Tennessee Summer Food Service Program. 2018; https://www.tn.gov/humanservices/children/dhs-nutrition-programs/learn-about-the-summer-food-service-program.html.
28. United States Government Accountability Office, Report to Congressional Requesters,. Summer Meals: Actions Needed to Improve Participation Estimates and Address Program Challenges. 2018.
29. United States Department of Agriculture Food and Nutrition Services. Capacity builder 2.0. 2017; https://www.fns.usda.gov/capacitybuilder.
30. Turner L, O'Reilly N, Ralston K, Guthrie JF. Identifying gaps in the food security safety net: the characteristics and availability of summer nutrition programmes in California, USA. *Public health nutrition.* 2019:1-15.
31. Hopkins LC, Gunther C. A Historical Review of Changes in Nutrition Standards of USDA Child Meal Programs Relative to Research Findings on the Nutritional Adequacy of Program Meals and the Diet and Nutritional Health of Participants: Implications for Future Research and the Summer Food Service Program. *Nutrients.* 2015;7(12):10145-10167.
32. Stuhldreher WL, Degrave MA, Bowen EP. Does the summer food service program (SFSP) make a difference? A comparison of nutrient content of home and SFSP lunches consumed by West Virginia children. *Journal of Family & Consumer Sciences.* 2001;93(1):54-58.
33. Hauser S, FitzPatrick E, Arendt SW, et al. It Takes a Community: Innovative Approaches and Best Practices in Summer Food Service Program Operation. *Journal of the Academy of Nutrition and Dietetics.* 2016;116(9, Supplement):A24.

34. Cotugna N, Vickery CE. Children rate the summer food service program. *Family Economics and Nutrition Review.* 2004;16:3+.
35. Bruce JS, De La Cruz MM, Moreno G, Chamberlain LJ. Lunch at the library: examination of a community-based approach to addressing summer food insecurity. *Public health nutrition.* 2017;20(9):1640-1649.
36. Quigley KK, Absher AG, Hildebrand D. Feeding the Generations: A Unique Intergenerational Nutrition Program. *Journal of Family & Consumer Sciences.* 2006;98(4):10-14.
37. Miller DP. Accessibility of summer meals and the food insecurity of low-income households with children. *Public health nutrition.* 2016;19(11):2079-2089.
38. Molaison E, Carr D. Summer Food Service Program Sponsors' Perceived Benefits and Barriers Related to Participation in the Program. *The Journal of Child Nutrition & Management.* 2006;30(2).
39. Nord M, Romig K. Hunger in the Summer. *Journal of Children and Poverty.* 2006;12(2):141-158.
40. Brazendale K, Beets MW, Weaver RG, et al. Understanding differences between summer vs. school obesogenic behaviors of children: the structured days hypothesis. *The international journal of behavioral nutrition and physical activity.* 2017;14(1):100.
41. Weaver RG, Beets MW, Brazendale K, Brusseau TA. Summer Weight Gain and Fitness Loss: Causes and Potential Solutions. *American journal of lifestyle medicine.* 2019;13(2):116-128.
42. Stewart H, Watson N, Campbell M. The cost of school holidays for children from low income families. *Childhood (Copenhagen, Denmark).* 2018;25(4):516-529.
43. Krentzman AR, Robinson EAR, Jester JM, Perron BE. Heat Maps: A Technique for Classifying and Analyzing Drinking Behavior. *Substance Use & Misuse, 2011, Vol46(5), p687-695.* 2011;46(5):687-695.
44. Rose AJ, McCullough MB. A Practical Guide to Using the Positive Deviance Method in Health Services Research. *Health Services Research.* 2017;52(3):1207-1222.

45. Herington MJ, Van De Fliert E. Positive Deviance in Theory and Practice: A Conceptual Review. *Deviant Behavior.* 2018;39(5):664-678.
46. Lewis J. Positive deviance: A case study in finding and harnessing the wisdom of organizational communities. *Business Information Review.* 2009;26(4):282-287.
47. Gundersen C, Ziliak JP. RESEARCH REPORT Childhood Food Insecurity in the U.S.: Trends, Causes, and Policy Options. *The Future of Children.* 2014:1-19.
48. Mayer VL, Hillier A, Bachhuber MA, Long JA. Food insecurity, neighborhood food access, and food assistance in Philadelphia. *Journal of urban health : bulletin of the New York Academy of Medicine.* 2014;91(6):1087-1097.
49. Food Research and Action Center. Hunger Doesn't Take a Vacation: Summer Nutrition Status Report. 2019; https://frac.org/wp-content/uploads/frac-summer-nutrition-report-2019.pdf, March 2020.
50. Turner L, Calvert HG. The Academic, Behavioral, and Health Influence of Summer Child Nutrition Programs: A Narrative Review and Proposed Research and Policy Agenda. *J Acad Nutr Diet.* 2019;119(6):972-983.
51. Ma P, Magnus J. Exploring the Concept of Positive Deviance Related to Breastfeeding Initiation in Black and White WIC Enrolled First Time Mothers. *Maternal and Child Health Journal.* 2012;16(8):1583-1593.
52. Banerjee ES, Herring SJ, Hurley K, Puskarz K, Yebernetsky K, Lanoue M. Determinants of Successful Weight Loss in Low-Income African American Women: A Positive Deviance Analysis. *Journal of Primary Care & Community Health.* 2018;9.
53. Ahrari M, Kuttab A, Khamis S, et al. Factors Associated with Successful Pregnancy Outcomes in Upper Egypt: A Positive Deviance Inquiry. *Food and Nutrition Bulletin.* 2002;23(1):83-88.
54. Creswell JW, Plano Clark, V.L. *Designing and conducting mixed methods research.* Thousand Oaks, California: Sage Publications; 2011.
55. Suen L-J, Huang H-M, Lee H-H. A Comparison of Convenience Sampling and Purposive Sampling. *Hu Li Za Zhi.* 2014;61(3):105-111.
56. Crouse, Lowe TPA. Snowball Sampling. 2018:1531-1532.

57. Creswell JW. *Qualitative inquiry & research design: Choosing among five approaches.* Thousand Oaks, California: Sage Publications; 2007.
58. Thomas DR. A General Inductive Approach for Analyzing Qualitative Evaluation Data. *American Journal of Evaluation.* 2006;27(2):237-246.
59. Carter N, Bryant-Lukosius D, Dicenso A, Blythe J, Neville A. The Use of Triangulation in Qualitative Research. *Oncology Nursing Forum.* 2014;41(5):545-547.

APPENDICES

Appendix A. Heat Map of SNP Site Availability per 10,000 NSLP Free/reduced-price Meals Served in March 2018 by County by Week in Tennessee 2018

Key		
Quintile 5	32.45	3.64
Quintile 4	3.63	2.21
Quintile 3	2.20	1.25
Quintile 2	1.24	0.57
Quintile 1	0.56	0.00

Grey cells indicate weeks that were not part of the summer time period, because school was in session.

Green text indicates positive deviant county (*Availability Score* >3.75)

	Weeks of Summer 2018												
County	5/20-5/26	5/28-6/1	6/4-6/8	6/11-6/15	6/18-6/22	6/25-6/29	7/2-7/6	7/9-7/13	7/16-7/20	7/23-7/27	7/30-8/3	8/5-8/11	8/12-8/18	Availability Score
Pickett		32.45	32.45	32.45	32.45	32.45	32.45	32.45	32.45	32.45				32.45
Obion		2.53	12.21	11.98	11.52	11.52	11.29	11.52	11.29	11.06				10.55
Haywood		8.53	11.87	12.61	11.87	12.24	12.24	12.24	1.85	1.85				9.48
Chester		6.61	8.26	7.71	8.26	6.61	6.06	6.06	7.16	6.61				7.04
Cumberland		5.91	6.87	7.19	7.51	6.87	6.07	6.23	6.39	6.39	4.79			6.42
Unicoi		4.1	5.46	5.46	5.46	5.46	9.56	11.6	10.24	10.24	1.37	1.37		6.39
Fayette		0.28	8.01	8.57	8.01	8.01	8.01	8.01	8.29	7.74	0.28	0.00		5.93
Hancock		5.99	5.99	5.99	5.99	5.99	5.25	5.25	5.99	5.25				5.74
Morgan		2.04	5.52	6.69	5.82	5.52	5.23	5.23	6.4	2.33				4.98
Hawkins			5.23	5.57	5.57	5.4	5.23	5.23	5.06	4.39	0.00			4.63
Bledsoe		0	9.64	9.16	9.16	9.16	0.48	0.48	0.48	0.48				4.34
Washington		2.73	5.47	5.47	5.47	5.47	5.22	4.6	4.47	2.48	0.62			4.20
Johnson		5.7	5.7	5.7	5.22	5.22	4.75	4.75	4.75	0.00	0.00			4.18
Henderson		4.6	5.21	5.51	4.9	3.68	3.06	3.37	3.37	3.06				4.08
Tipton		1.6	4.66	4.26	4.53	4.53	4.13	4.4	4	3.73				3.98
Monroe		3.14	5.93	5.06	4.19	4.19	3.66	3.66	4.36	3.32	0.00			3.75

Appendix A. Continued

County	Weeks of Summer 2018													Availability Score
	5/20-5/26	5/28-6/1	6/4-6/8	6/11-6/15	6/18-6/22	6/25-6/29	7/2-7/6	7/9-7/13	7/16-7/20	7/23-7/27	7/30-8/3	8/5-8/11	8/12-8/18	
Coffee			3.39	3.39	3.39	3.39	4.31	4.31	4	2.31				3.56
Dyer		3.48	3.67	3.67	3.67	3.67	3.48	3.3	3.3					3.53
Putnam		3.63	4.19	4.47	4.05	4.05	3.21	3.21	3.07	1.68				3.51
Hardeman		2.18	6	4.91	4.09	3.28	2.73	2.73	3.28	2.73	2.73			3.47
Green		1.93	3.21	3.21	3.21	2.83	2.83	2.83	2.83	2.83				2.86
Decatur		1.07	4.26	5.33	5.33	4.26	1.07	1.07	2.13	1.07				2.84
McNairy		1.86	4.51	3.98	3.98	2.65	1.86	1.86	1.86	1.86				2.71
Gibson		2.21	3.17	3.03	3.03	3.03	2.48	2.34	2.34					2.70
Crockett		2.85	3.2	3.56	2.85	3.2	2.85	2.85	2.85	0.00				2.69
Blount		1.63	2.9	3.25	2.9	2.79	2.56	2.67	1.74					2.56
Franklin		0.00	3.17	3.17	3.44	3.44	2.38	2.64	2.11	1.85				2.47
Madison		1.89	2.87	3.15	2.66	2.31	2.1	2.45	1.61	1.68				2.30
Cannon		0.00	3.02	3.02	3.02	3.02	2.26	2.26	2.26	1.51				2.26
Sullivan		2.13	2.92	2.76	2.84	2.76	2.53	2.53	2.53	1.03	0.08			2.21
Henry		2.09	2.35	2.09	2.09	2.09	2.09	2.09	2.35	2.09				2.15
Lewis		2.98	2.98	2.98	2.98	2.38	2.38	2.38	0.00	0.00				2.12
Overton		1.36	3.63	3.18	3.63	2.72	0.45	0.91	1.36	0.91				2.02
Weakley		3.01	3.91	3.61	2.41	1.5	1.5	1.81	0.9	0.9	0.6			2.02
Bradley		0.07	2.5	2.65	2.79	2.72	2.28	2.2	2.42	2.06	0.22			1.99
Van Buren		0.00	4.42	4.42	4.42	4.42	0.00	0.00	0.00	0.00				1.96
Loudon		1.68	2.31	2.31	2.52	2.1	1.68	1.68	1.68	1.26				1.91
Perry		1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88	1.88			1.88
Rhea		0.68	2.45	2.31	2.45	2.31	1.9	2.17	2.04	1.77	0.68			1.88

Appendix A. Continued

County	Weeks of Summer 2018													Availability Score
	5/20-5/26	5/28-6/1	6/4-6/8	6/11-6/15	6/18-6/22	6/25-6/29	7/2-7/6	7/9-7/13	7/16-7/20	7/23-7/27	7/30-8/3	8/5-8/11	8/12-8/18	
Polk		0.83	2.07	2.90	2.90	2.90	2.07	2.07	1.24	1.24	0.41			1.86
Roane		1.09	2.55	2.55	2.37	2.37	2.00	2.37	1.82	1.27	0.18			1.86
McMinn		0.93	2.38	2.59	2.38	2.48	2.17	2.38	2.07	0.62	0.52			1.85
Shelby		0.99	2.04	2.44	2.49	2.42	2.25	2.18	1.81	1.59	0.05			1.83
Hamilton		0.91	2.24	2.34	2.36	2.34	1.66	1.66	1.66	1.47	1.27			1.79
Carroll		2.11	2.63	2.63	2.63	2.37	1.58	1.58	0.26	0.00				1.75
Knox		0.94	1.88	1.93	1.9	1.93	1.58	1.58	1.51	1.31	0.67			1.52
Carter		0.33	1.47	1.63	1.95	1.79	1.63	2.12	1.95	1.63	0.65			1.52
Campbell			2.58	2.43	2.29	2.43	0.86	1.00	1.00	1.00	0.00			1.51
Scott		0.60	2.41	2.61	2.41	1.80	1.20	0.80	0.80	0.60				1.47
Sequatchie		0.00	3.89	3.46	3.46	3.89	0.00	0.00	0.00	0.00	0.00			1.47
Lake		1.61	1.61	1.61	1.61	1.61	1.61	1.61	1.61	0.00				1.43
Lauderdale		0.00	2.26	2.88	1.65	1.65	1.03	1.03	0.82	0.62				1.33
Anderson		0.00	1.89	1.89	1.89	1.75	0.94	0.94	0.81	0.40				1.31
Sevier			1.34	1.65	1.65	1.65	1.26	1.26	1.18	1.18	1.02	0.63		1.28
Rutherford		0.7	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24				1.18
Williamson		1.24	1.39	1.39	1.39	1.24	1.24	1.24	1.24	1.24	0.00			1.16
Hardin		0.40	2.41	2.01	2.21	1.00	0.80	1.00	0.8	0.6	0.20			1.14
Wilson		0.00	1.47	1.47	1.47	1.47	1.34	1.22	1.22	0.12				1.09
Fentress		0.00	1.20	2.00	1.20	1.60	1.20	1.20	1.20	0.00				1.07
Macon		0.95	0.95	1.19	0.95	0.95	0.95	1.19	1.19	1.19				1.06
Houston		0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98					0.98
Clay		1.75	1.75	1.75	1.75	1.75	0.00	0.00	0.00	0.00				0.97

Appendix A. Continued

County	Weeks of Summer 2018													Availability Score
	5/20-5/26	5/28-6/1	6/4-6/8	6/11-6/15	6/18-6/22	6/25-6/29	7/2-7/6	7/9-7/13	7/16-7/20	7/23-7/27	7/30-8/3	8/5-8/11	8/12-8/18	
Dickson			1.08	1.08	1.08	1.08	1.08	1.08	1.08	0.00	0.00			0.95
Grainger		1.4	1.68	1.68	1.68	1.68	0.28	0.28	0.28	0.28	0.00			0.92
DeKalb		1.64	2.3	1.97	0.98	0.98	0.00	0.00	0.00	0.00				0.87
Benton		0.46	0.46	0.92	0.92	0.92	0.92	0.92	0.92	0.92				0.82
Lawrence			1.77	1.77	1.77	1.77	0.00	0.00	0.00	0.00	0.00			0.79
Grundy		0.00	0.76	1.15	0.76	1.15	0.76	0.76	0.76	1.15	0.38			0.76
Montgomery		0.42	0.76	0.8	0.8	0.8	0.8	0.8	0.8	0.76	0.76			0.75
Marion		0.7	0.98	0.84	0.84	0.84	0.84	0.84	0.84	0.00				0.75
Maury		0.63	1.41	1.18	0.94	0.86	0.24	0.24	0.24	0.00				0.64
Jefferson		0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.78	0.59			0.61
Cocke			0.95	0.81	0.95	0.95	0.27	0.27	0.27	0.14				0.58
Meigs		0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56				0.56
Smith		0.74	1.11	1.11	1.11	1.11	0.00	0.00	0.00	0.00	0.00			0.52
Warren		0.53	1.05	0.88	0.53	0.53	0.35	0.35	0.35	0.35	0.18			0.51
Hamblen		0.54	0.54	0.54	0.54	0.54	0.43	0.43	0.43	0.21				0.47
Davidson		0.33	0.46	0.5	0.51	0.5	0.43	0.4	0.38	0.36	0.27			0.41
Robertson		0.00	1.17	1.17	1.17	0.35	0.12	0.00	0.00	0.00	0.00			0.40
White		0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27				0.27
Jackson		0.60	0.60	0.60	0.00	0.00	0.00	0.00	0.00	0.00				0.20
Sumner		0	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15				0.13

Appendix B. Interview Guide

Script:

Hello, thank you so much for taking the time to meet with me. I know you are busy with summer wrapping up, so I appreciate your time. I'd like to begin by reviewing the project again to see if you have any questions. This is my thesis project for my Masters of Public Health Nutrition. I am beginning my second year in the program at UT. My goal of the project is to describe examples of exceptional SNPs in Tennessee and to identify components of the program that help it succeed. I will be asking you questions today about the SNP that you work with/in your area to specifically capture your perceptions and experiences with the program. There are no right or wrong answers, so please feel free to be honest. Also, if there is something important that you think I should know about your program that doesn't come up in one of my questions, please feel free to tell me. Your SNP was chosen because it stood out as an exceptional program, so please know that the goal of this report is to highlight the positive aspects of the program. You can stop me at any time or let me know if you are not the best person to answer a question. I will be meeting with multiple people on your team, so if another person is better suited to answer certain questions, please let me know. Thank you again for agreeing to participate. Your insight is an important part of this project.

*Interviewer can adapt the script to be more conversational and to build rapport with the participant. Also, slight alterations of the script can be made based on the participant.

1. SNP Description
    a. Tell me about your SNP
        i. How many sites does this SNP have?
        ii. What type of sites does this SNP have (mobile, traditional, etc.)?

iii. Do you operate SFSP, SSO, or a combination?
iv. How long has this program existed in this county?

b. Tell me about your population
i. The need
ii. The people
iii. The community
iv. Other programs in the area

2. SNP Staff and Personnel
a. Tell me about your role with SNP.
i. How long have you worked with SNP?
b. Tell me about the others on the SNP team
i. How many other staff or volunteers work with the program?
ii. What role do these additional individuals play in the program?
iii. How important is program personnel (staff and volunteers) to the success of this program?
c. What are the biggest challenges related to personnel you have faced?
d. What strategies have you used to overcome these challenges?

3. Program Development and Growth
a. Tell me about the process you use to establish a site
i. Do you lead this process or do the sites/community partners?
ii. How does need in the area influence these decisions?
iii. How do gaps in coverage impact these decisions?
iv. How do policies or regulations impact these decisions?

4. Administrative Requirements of SNP
a. Tell me about the administration of SNP
i. Paperwork
ii. Eligibility
iii. DoE, DHS, USDA requirements

   b. What challenges have you experienced related to the administrative requirements of the program (eligibility criteria, funding, reimbursements, paperwork, planning, etc.)
      i. Research has identified administrative burden as the number one complaint or barrier of SNP, specifically SFSP. Do you agree with this statement? Why or why not?
   c. What tactics have you used to manage the paperwork and administrative requirements?
   d. How do you manage the large administration tasks?
      i. How much time is spent on the administrative paperwork?
      ii. Do you have a team to support you with this?
5. Participation
   a. Tell me about how you encourage participation in the program
      i. What has been the most effective method?
      ii. Have you tried something that was not helpful?
6. Food Procurement Processes
   a. Tell me about the food procurement process
      i. Where do you get your foods?
      ii. How are the foods funded initially?
      iii. Does the reimbursement rate cover the food costs completely?
      iv. If not, what funds cover the difference?
   b. Tell me about your experience with following nutritional standards.
   c. What were the biggest challenges related to food procurement?
   d. What strategies have you used to overcome these challenges?
7. Food Preparation Processes
   a. Tell me about food preparation for SNP
   b. Where are the meals prepared (on-site, centralized kitchen then transported, prepackaged meals, etc.)?

        i. What are those facilities like (industrial kitchens, school cafeterias, etc.)?
    c. If transported is involved, please describe the process of transporting the foods to sites.
    d. What are the biggest challenges related to food preparation?
    e. What strategies have you used to overcome these challenges?
8. Community Support
    a. Tell me about the community support for this program
    b. Who or what organization is a big support of the program?
    c. In what ways do those organizations/people support the program?
    d. Tell me about the challenges related to community support.
    e. What would you tell someone who was new to SNP work about community support?
    f. How do you get community support?
    g. Describe the importance of having community support/community partners.
    h. Describe how you use community support to support your program.
9. Participant Experiences
    a. Tell me about children's experiences with this program
        i. Do they like the food/sites/staff/method used/overall experience?
        ii. Do they think the program is easy to use?
    b. Tell me about parents and families' experiences with the program
        i. Do they think the program is appropriately meeting their needs?
    c. What barriers do you think keeps more children from participating?
    d. Have you seen any trends in participation over the years?
    e. Have you experienced challenges finding the way best serve children?
    f. How have you overcome those challenges?

10. Questions for Champions
    3. Can you describe the reasons you support the SNP?
    4. What benefits have you seen from the program (for your role and for the community)?
    5. What about the program has made you want to continue supporting it/partnering with it?
    6. Did you have any reservations or concerns about officially supporting the program? Can you describe that experience and how those concerns were addressed?
    7. How does the SNP interact with or compliment other initiatives or priorities of your school system/organization?
11. In your opinion, what has made your SNP so successful? What is essential for an SNP to be successful?
12. Within your program, who or what would you say is an example of excellence that I should include in my project to understand how your program is successful. This could be a site that does exceptionally well, a team member who is essential to the program, a community partner who is a valuable supporter of the program, a community member that is knowledgeable of the need in the area and how this program is meeting it, or anyone else that supports this program's goals.
13. Is there anything else that you think I should know about SNP?

Closing Remarks:

That is all of my questions. Thank you so much! I learned a lot about your program today. I think I gathered a lot of very useful information, but if I think of another question, may I contact you again? If you have any questions after today, please feel free to email me at arider2@vols.utk.edu or call me at 423-612-6744. Thank you again for your time. It was a pleasure talking with you today.

VITA

Abigail Grace Rider graduated from the University of Tennessee, Knoxville in May 2018 with a Bachelor of Science in Nutrition and a minor in Communication Studies. She continued her education at the University of Tennessee where she is pursuing a Master of Science in Public Health Nutrition. Abigail worked in the Healthy Eating and Active Living Through Healthy Environments (HEALTHE) lab and served as a Graduate Research Assistant on the GetFruved project during her graduate school career. She is interested in child nutrition programs that aim to reduce childhood food insecurity. After graduation, she hopes to work as a Registered Dietitian Nutritionist to address childhood food insecurities and other health disparities in underserved populations.