

The nutritional adequacy of vegetarian menu substitutions in urban Kansas childcare centers

by

Caitlin Jindrich

B.S., University of Idaho, 2011

A THESIS

submitted in partial fulfillment of the requirements for the degree

MASTER OF PUBLIC HEALTH

Department of Food, Nutrition, Dietetics, and Health  
College of Health and Human Sciences

KANSAS STATE UNIVERSITY  
Manhattan, Kansas

2021

Approved by:

Major Professor  
Dr. Jennifer Hanson

# Copyright

© Caitlin Jindrich 2021.

## Abstract

**Background:** Interest in plant-based eating and vegetarianism has increased in recent years. However, little is known of how this trend has impacted childcare foodservice operations. Although vegetarian meals can be nutrient dense, without proper planning, nutrient inadequacies may occur. The purpose of this study was to: (1) characterize vegetarian menu substitution practices within the childcare setting, and (2) compare the diet quality and nutrient content of standard childcare lunches with that of vegetarian alternative lunches.

**Methods:** This was a two-phase cross-sectional study. In phase one, an online survey was used to characterize childcare foodservice operations as they relate to vegetarian menu substitutions and to identify centers currently providing vegetarian alternative lunches. The survey was sent to 155 urban Kansas childcare centers participating in the Child and Adult Care Food Program (CACFP). In phase two, menu data were obtained from the centers that regularly provided a vegetarian meal alternative. Student's t-tests ( $P \leq .05$ ) were used to detect differences in Healthy Eating Index (HEI)-2015 scores and nutrient content based on meal type.

**Results:** Representatives from ( $N = 85$ ) centers answered the online survey, yielding a response rate of 54.8%. When asked how frequently a vegetarian alternative was offered in lieu of the main meat-containing meal, only 18.5% of centers answered, "three or more times per week", and 41.2% indicated they "never provide a vegetarian alternative". In phase two, seven childcare centers provided detailed information for a total of 54 meals. The most common vegetarian meal substitution was cheese, which was used to fulfill all or part of the meat/meat-alternative requirement in 74.1% of the meals ( $n = 20$ ). Compared to the vegetarian alternative meals, HEI-2015 scores were higher for the standard meals,  $t(44.7) = 2.14$ ,  $p = 0.038$ . The

vegetarian alternative meals were higher in calories, fat, saturated fat, calcium, and sodium. The standard meals were higher in protein and choline.

**Conclusions:** Important differences in nutrient content were observed between the standard and vegetarian alternative meals. In addition, the vegetarian alternative meals were found to be of lower diet quality. Additional research is needed to better understand how vegetarianism and the plant-based eating trend has impacted childcare foodservice operations on a national level.

**Funding Sources:**

Master's Thesis Research Award from the College of Health and Human Sciences and Dr. Carol Shanklin Graduate Research Enhancement Fund, Kansas State University

**Key Words:**

Vegetarian diet, child day care centers, Child and Adult Care Food Program, menu planning, healthy diet

# Table of Contents

List of Figures .....	vii
List of Tables .....	viii
Acknowledgements .....	ix
Dedication .....	x
Chapter 1 - Introduction and Literature Review .....	1
Childcare centers and childcare-related food policies .....	2
Vegetarian childcare meals .....	3
Evaluating childcare menus .....	6
Adequacy of vegetarian menu substitutions .....	8
Purpose .....	9
Justification .....	9
Chapter 2 - Methods .....	11
Participants and recruitment .....	11
Online survey (phase one) .....	12
Menu data collection (phase two) .....	13
Nutrient content .....	14
Nutrient benchmarks .....	15
Diet quality .....	16
Statistics .....	16
Chapter 3 - Results .....	17
Online survey responses .....	18
COVID-19 impact .....	21
Food frequencies .....	21
Healthy Eating Index-2015 .....	25
Nutrient analysis .....	26
Chapter 4 - Discussion .....	33
References .....	39
Appendix A - IRB Approvals .....	44
Appendix B - Survey .....	47

Appendix C - HEI-2015 <sup>1</sup> Components & Scoring Standards .....	54
Appendix D - Kansas: 2010 Census .....	56
Appendix E - KDHE – Laws and Regulations for Licensing Preschools and Child Care Centers (March 2019) .....	57
Appendix F - Non-CACFP Compliant Menu .....	58
Appendix G -Micro-nutrient Substitution Methods.....	60

## **List of Figures**

Figure 3.1. Potential Participants and Responding Centers by Urban Area .....	17
---	----

## List of Tables

Table 3.1. Credentialed Health and/or Nutrition Expert Involved in Menu Process and/or Foodservice Operations .....	19
Table 3.2. Role of Credentialed Health and/or Nutrition Expert in Childcare Center Foodservice Operations .....	20
Table 3.3. Occupational Category of Who Writes the Childcare Center’s Menu .....	20
Table 3.4. Open-ended Responses to COVID-19 Impact on Foodservice Operations and Menu Choices.....	22
Table 3.5. Frequency of Foods Served within Each CACFP Component.....	24
Table 3.6. Frequency of Daily Maximum HEI-2015 Component Scores among Standard Meal and Vegetarian Alternative HEI-2015 Component Scores.....	27
Table 3.7. Comparison of Standard and Vegetarian Alternative HEI-2015 Component Scores.	28
Table 3.8. Comparison of Standard and Vegetarian Alternative Micronutrient Value .....	29
Table 3.9. Nutritional Adequacy of Standard Menus .....	31
Table 3.10. Nutritional Adequacy of Vegetarian Alternative Menus .....	32



## **Acknowledgements**

First and foremost, I would like to thank my major professor, Dr. Jennifer Hanson. Her support, encouragement, and guidance has been instrumental throughout my graduate studies. I would also like to extend my thanks to my committee members, Dr. Sandy Procter and Dr. Kevin Sauer, for their guidance and time.

A special thanks to Lizz Daniels and Cindy Logan for your support and assistance throughout this research.

To my husband, Dan, and my parents, Ken and Karla, thank you. I am eternally grateful for your love and support.

## **Dedication**

I would like to dedicate this to my sons Cooper and David.

## **Chapter 1 - Introduction and Literature Review**

Early childhood, defined as zero to eight years of age by the World Health Organization (World Health Organization [WHO], 2019), is a lifecycle stage characterized by nutritional vulnerability. It is a time in which the groundwork for an individual's health and development is laid. An adequate diet is a healthful and balanced diet that contains nutrient dense foods (Ogata & Hayes, 2014; Academy of Nutrition and Dietetics Evidence Analysis Library [AND EAL], 2011). An adequate diet during early childhood is essential for normal mental and physical growth, development, and the prevention of consequences that result from nutrition inadequacies (Ogata & Hayes, 2014).

During early childhood, rapid growth and development result in high micronutrient needs, despite relatively low total energy requirements (Fox et al., 2010), highlighting the importance of a nutrient dense eating pattern during this life-cycle stage. A nutrient dense diet can ensure adequate consumption of nutrients essential to supporting proper growth and development. Iron and zinc are two examples of nutrients that are critical for health and development. A diet resulting in iron deficiency can have negative effects on neurodevelopment (Rosales et al., 2009), including development delay and cognitive impairment (Institute of Medicine [IOM], 2001). Due to the rapid growth that occurs during early childhood, the human body has high demands for zinc. The body utilizes zinc in the immune system and for cellular functions. Consequently, a diet pattern with inadequate zinc could negatively impact cellular growth and increase the risk for illness (WHO, 2014).

## **Childcare centers and childcare-related food policies**

Childcare centers play an important role in providing meals and fostering healthful habits in young children. The magnitude of this responsibility is evident given that an estimated 73% of US children between the ages of three and five participate in non-parental childcare, with the majority in childcare centers (Corcoran & Steinley, 2019). With a significant portion of young children participating in childcare, ensuring childcare centers provide healthy and balanced meals is of the utmost importance. Consequently, federal food and nutrition programs exist to ensure the sustenance children receive is nutritionally adequate, and federal level meal standards exist for facilities participating in these programs. However, childcare centers are not required to follow the standards if they do not qualify for, or choose not to participate in the federal childcare food program known as the Child and Adult Care Food Program (CACFP). Within Kansas, facilities that do not qualify or choose not to participate are guided by policy and regulation under the Kansas Department of Health and Education's (KDHE) jurisdiction. KDHE's policy and regulation stipulates the number of meals and/or snacks provided based on the facilities' hours of operation and provides meal component regulations (Appendix E).

Administered by the United States Department of Agriculture (USDA) Food and Nutrition Service (FNS), CACFP aims to assure the provision of "nutritious foods that contribute to the wellness, healthy growth, and development of young children" (U.S. Department of Agriculture, Food and Nutrition Service [USDA, FNS], (2016) by providing reimbursement for eligible meals and snacks. Kansas has seen a 34% increase in CACFP participating childcare centers from FY1997 to FY2017 (Rosso & Henchy, 2018). This program's reimbursable meal guidelines are based on the Dietary Guidelines for Americans (DGA).

Despite the scope and importance of CACFP, there is limited research on the program's impact (Korenman et al., 2013). A study from 1999 evaluated menus from childcare centers participating in CACFP and non-participating facilities' menus. CACFP childcare menus were found to have provided children with more vitamins and minerals, and are associated with increased milk, milk alternatives, and vegetable intake (Bruening et al., 1999). In 2011, Korenman and colleagues (2013) found CACFP participation resulted in a moderate increase in milk and vegetable consumption in low-income children, with other outcomes being small or not statistically significant. A study comparing lower and higher reimbursement rates of 60 CACFP home based childcare providers showed that increased reimbursement resulted in increased nutritional quality of the foods provided (Monsivais et al., 2011), and research has shown kids eat healthier when at childcare than when at home (Robson et al., 2015; Sisson, et al., 2017). Updating the CACFP guidelines over the years has prompted menu changes in longstanding childcare menus to ensure continued compliance (Briley et al., 1994).

### **Vegetarian childcare meals**

A vegetarian diet can be a nutrient dense eating pattern, aligning with DGA recommendations (Farmer et al., 2011). KDHE includes meat alternative proteins as an acceptable meal component but does not indicate minimum serving sizes. Much like KDHE, CACFP includes meat alternative proteins as an acceptable meal component. However, unlike KDHE, CACFP does require minimum serving sizes.

In the 2017 CACFP policy update, additional plant-based sources of protein (such as soy product and tofu) were included as reimbursable meat/meat alternatives (USDA FNS, 2016). Under current CACFP rules, childcare centers may serve meat alternatives (i.e., cheese, beans,

eggs, tofu, and soy products) in lieu of meat at lunch. While CACFP rules specify a meat or meat alternative must be served, aside from establishing the minimum serving size, there are no rules governing the variety of, or pattern in which, meat or meat alternatives are served. As a result, allowable vegetarian meal substitutions range from the provision of the same meat alternative every day to the provision of a wide variety of meat alternatives such as beans, tofu, and soy products (USDA, 2020).

The DGA includes a lacto-ovo vegetarian diet as one of three examples of healthful eating patterns presented in both the 2015-2020 and 2020-2025 reports (U.S. Department of Agriculture & U.S. Department of Health and Human Services [USDA & HHS], 2015, 2020). However, vegetarian diets are thought to require careful planning, especially during early childhood, as there may be an increased opportunity for missed nutrients. Omega-3 fatty acids, iron, zinc, iodine, calcium, vitamin D and vitamin B-12 are potential nutrients of concern to consider in planning the vegetarian diet (Melina et al., 2016). The nutrient profiles of meat (e.g., beef, pork, and poultry) and of the meat alternatives allowed by CACFP (e.g., tofu, beans, etc.) are very different. In particular, meat has historically been viewed as a high-quality protein because it contains all of the essential amino acids in the proportions needed by humans. Therefore, meat alternatives may be viewed as lower quality proteins because they are lacking in one or more of the essential amino acids. However, a carefully planned vegetarian diet, with a variety of plant foods is widely accepted as being nutritionally adequate (Melina et al., 2016). The ability to meet protein requirements through a vegetarian diet is not a general concern, as inadequate protein intakes are relatively uncommon in the United States (Berryman et al., 2009) even among vegetarians (Melina et al., 2016). To assure an adequate intake of all

essential amino acids, it is recommended that vegetarians obtain protein from a variety of meat alternates (Melina et al., 2016).

The difference in observed plate-waste between vegetarian meals and meat-containing meals was found to be non-significant (De Keyzer et al., 2012). When comparing meat-containing and vegetarian lunch menus in South Carolina childcare centers, Turner-McGriery and colleagues (2014) found both menus met iron, zinc, and vitamin B12 requirements; however, both menus failed to meet vitamin D requirements. Vegetarian menus offered children higher amounts of vegetables and fiber, and lower levels of sodium, than the meat-containing menus. Adequate fiber intake is essential for maintaining regularity of bowel movements. An under-consumption of plant-based foods is correlated with increased constipation in children (Lee et al., 2008). Plant-based foods, especially beans and legumes (which may credit as a vegetable or meat-alternate under CACFP) provide higher amounts of fiber. These foods are often more affordable and nutrient dense than animal proteins (Katz et al., 2019). Specifically, dark-green vegetables, starchy vegetables, and beans have been found to provide the most nutrient density per cost (Drewnowski & Rehm, 2013). Turner-McGriery and colleagues (2014) also determined there was high parental support of meeting “improved nutrition standards” and showed this is attainable through the addition of vegetarian meals.

Those who follow vegetarian diets are more likely to reside in urban areas, be middle-aged, and live in the western region of the US (Mintel, August 2019; AND EAL, 2011). Consumer reports show increasing interest in vegetarian products (Forgrieve, 2018). From 2018 to 2019, U.S. retail experienced an 11% increase in plant-based food sales (Plant Based Foods Association, 2019). A 2016 Harris Poll survey found approximately 8 million US adults are vegetarian (including vegans), or approximately 3.3% of the population; furthermore, 2.3% of

adults in the Midwest are vegetarians (Vegetarian Research Group, n.d.). The 2018 follow-up Harris Poll survey found a 0.7% increase in those that follow a vegetarian diet (including vegans) in the U.S. – 4% of the U.S. population and 3% in the Midwest (Stahler, n.d.). Primary reasons individuals choose to follow a vegetarian diet include: “ethical and environmental concerns, religious concerns, and health reasons and gustatory reasons” (AND EAL, 2011). Parents are more likely to be vegetarians than non-parents (Mintel, May 2019) and parents are likely to impose their dietary beliefs on their children (Gubbles et al., 2009).

### **Evaluating childcare menus**

Menus can be evaluated in a number of ways including through the use of narrowly focused nutrient-based reference ranges as well as through a more broadly focused assessment of diet quality. The Healthy Eating Index (HEI) score is one such broadly focused assessment used to measure “how well a set of foods aligns with the key recommendations of the Dietary Guidelines for Americans (DGA)” (USDA, FNS, 2020). The USDA and U.S. Department of Health and Human Services (HHS) publish new DGA every five years based on Federal advisory committee recommendations, which are established using the most recent scientific evidence available. The DGA is developed to be the basis for food and nutrition policy and to serve as a guideline for healthy eating choices for all Americans ages two years and older (USDA & HHS, 2015).

The HEI-2015 score is comprised of 13 categories, nine categories are scored on the basis adequacy and four categories scored on basis of moderation (USDA, FNS, 2019). The components evaluated for adequacy and scored on a scale of 0-5 include total fruits, whole fruits, total vegetable, greens and beans, total protein foods, and seafood and plant proteins. Whole



grains, dairy, and fatty acids are also evaluated for adequacy, though scored on a scale of 0-10. Refined grains, sodium, added sugars, and saturated fats are all components evaluated for moderation and are scored on a scale of 0-10. For example, a minimal score of zero points are given for no fruit being served versus a maximum score of five points given for 0.8 cup or more equivalent per 1,000 kcal. Additionally, a minimum of zero points will be given if saturated fat is greater than or equal to 16% of energy, versus a maximum score of ten points given if saturated fat is less than or equal to 8% of energy (Kreb-Smith et al., 2018).

There is growing use of the HEI scoring system throughout scientific research where it has been used as an evaluation tool in a variety of settings (Schap et al., 2017). As of 2017, approximately 70 studies utilized the HEI to assess diet quality. Included in these studies were those with focuses that included the diet quality of child participants in federal nutrition programs and the quality of food children consumed away from the home (Schap et al., 2017). With the HEI, a researcher can negate the potential effects of varying energy requirements among members of a study population (i.e., differences in age groups and/or genders), as the scoring index focuses on nutrient density (Hiza et al., 2018).

CACFP guidelines are established using the DGA and the Dietary Reference Intakes (DRIs) (IOM, 2011). Therefore, when evaluating menus from CACFP childcare centers with the HEI-2015, one can assess how closely implementation of current CACFP regulation aligns with DGA recommendations. The Academy of Nutrition and Dietetics Position Paper on the Benchmarks for Nutrition in Child Care highlights that foods served in early childhood should align with the most current DGA, including limiting items such as saturated fat, sodium, and sugar (Benjamin-Neelon, 2018). These items are included in the moderation category of the HEI-2015.

## **Adequacy of vegetarian menu substitutions**

As interest in plant-based eating grows, the demand for vegetarian meals in the childcare settings will also likely grow. While a child's nutritional needs can be met through a well-planned vegetarian diet, a vegetarian diet that is not well planned could result in nutritional deficiencies, excesses, or imbalances. Only 6.8% of CACFP facilities have menus prepared by a health and/or nutrition professional (Chriqui et al., 2018). KDHE and CACFP require posting of menus in the childcare center (See appendix E), but do not require a nutrition professional to be involved in menu planning. Despite the existence of state policies, the lack of a nutrition professional's involvement in the menu planning process may result in an imbalance of nutrients in the meals served. Furthermore, these potential imbalances impact a significant number of children across the state of Kansas.

Although state and federal rules specify that a meat or meat alternate must be served at the lunch meal, there are no rules governing the variety of meats or meat alternates served. In addition, in Kansas, neither childcare menus nor menu substitutions require the approval of a nutrition professional. As such, determining the nutritional adequacy of vegetarian diets is of utmost importance in assuring that the nutritional needs of children are being met. The paucity of knowledge regarding the nutritional adequacy of vegetarian substitutions in childcare center presents as an important research question. Learning such information can lead to larger research questions and the identification of potential policy updates.

## **Purpose**

The purpose of this study is to answer the following research questions:

1. What is the status of CACFP childcare foodservice operations as they relate to vegetarian menu substitutions?
2. Is there a difference in nutritional content between the standard meals and the vegetarian alternative meals served at CACFP childcare centers in urban Kansas areas?
3. Is there a difference in diet quality between the standard meals and the vegetarian alternative meals served at CACFP childcare centers in urban Kansas areas?

## **Justification**

As the number of individuals practicing vegetarianism increases, requests for meatless options will likely become more common within the childcare setting. Several multi-location childcare organizations operating within Kansas currently offer vegetarian meal options upon request. Currently, there are no rules governing the variety of meat or meat alternatives served. Consequently, allowable vegetarian meal substitutions range from the provision of the same substitution such as cheese every day to the provision of a wide variety of meat alternatives (e.g., beans, tofu, and allowable soy products). Research has shown that kids eat healthier when at childcare than when at home (Robson et al., 2015; Sisson et al., 2017). However, an evaluation of the nutrient content of the healthfulness/adequacy of childcare center vegetarian meals has not been conducted, and allowable options such as a meal pattern relying heavily on cheese could result in nutritional consequences related to dietary intakes low in fiber and high in saturated fat and sodium. Continued evaluation and support of CACFP, state, and federal level policy is

important, ensuring that children are eating a healthful and balanced diet to establish proper growth and development and to decrease the risk of chronic disease.

## **Chapter 2 - Methods**

This was a two-phase, cross-sectional study. In phase one, an online survey was used to characterize childcare foodservice operations as they relate to vegetarian menu substitutions and to identify centers regularly providing such substitutions. In phase two, menu data were obtained from the centers that regularly provided a vegetarian meal alternative. Unannounced phone calls were used to gather details regarding both the standard meals and the vegetarian meal substitutions served.

### **Participants and recruitment**

A list of all childcare centers participating in CACFP was obtained from the Kansas Department of Education (KDE) from their public website (Kansas Department of Education, 2019). In 2019, Kansas had 812 facilities participating in CACFP, 180 of which were located in an urban Kansas area and served lunch daily (Kansas Department of Education, 2019). The U.S. Census Bureau defines an urban area as an area with a population over 50,000. Eight urban areas were identified within Kansas based on the 2010 Census. The eight urban areas with their number and proportion of childcare centers are as follows: Kansas City (25 facilities; 13.9%), Lawrence (19 facilities; 10.5%), Manhattan (9 facilities; 5%), Olathe (19 facilities; 10.5%), Overland Park (8 facilities; 4.4%), Shawnee (4 facilities; 2.2%), Topeka (30 facilities; 16.7%) and Wichita (66 facilities; 36.7%).

This study was approved by the Kansas State University Committee on Research Involving Human Subjects (see Appendix A) prior to implementation. An invitation to participate in the study along with the survey was electronically distributed to the email contact listed on KDE's 2019 CACFP roster. As a thank you for completing the survey, childcare

centers received a Comark PDT300 food thermometer. In order for centers to be included in phase two of the study, they must have completed the survey, serve vegetarian alternative entrees at least three times a week, and agree to four random, unannounced phone calls over the course of one month for menu data collection. For the purposes of this study, the definition of vegetarian is that of a lacto-ovo vegetarian dietary pattern. Facilities that participated in menu data collection were given CACFP-compliant recipes and offered a \$50 Amazon gift card to purchase foodservice equipment.

### **Online survey (phase one)**

A 33-item questionnaire that addressed multiple foodservice related topics was created and distributed through Qualtrics. Survey recipients were directed to have the staff member most knowledgeable of their center's alternative meal needs and requests complete the survey. Prior to implementation, a pilot survey was distributed to six childcare professionals for feedback regarding the readability and ease of completion of the survey. Four provided feedback on the electronic version and two on the paper version. Based on the results of the pilot survey, the questionnaire was deemed ready for distribution.

Initial survey distribution took place on March 7, 2020 and ended March 26, 2020 due to a statewide stay home order issued by Kansas's Governor (Exec. Order No. 20-16, 2020) and Kansas State University suspending all non-essential research activities. Ten responses were received in this time span. As it became clear the COVID-19 pandemic was impacting childcare centers and the food supply chain, a series of COVID-19 specific foodservice related questions were added to the survey prior to re-distribution on July 7, 2020. This revision was approved by

the Committee on Research Involving Human Subjects (see Appendix A) prior to implementation.

Facilities that did not respond to the re-distributed survey sent by email on July 7 received a second email two weeks later. The facilities who did not complete the online survey within four weeks of the initial email were contacted by phone, with a minimum of two attempts to reach each non-responding center. The majority of non-respondents reported the Qualtrics email was filtered out as spam. The facilities contacted by phone either requested a new email or located the original email, but one facility requested the paper version be mailed. As survey responses were received through Qualtrics, they were reviewed, tallied, and clarifying questions identified. The one paper survey was not returned to researchers. Data collection ended August 25, 2020. Reasonable attempts were made from August 25<sup>th</sup> to September 10<sup>th</sup> to contact childcare centers when survey responses needed clarification.

### **Menu data collection (phase two)**

Of the 85 centers that completed the survey, eight centers met criteria for inclusion and agreed to participate in phase two of the study. The eight participants represented the Kansas urban areas as follows: Lawrence (3), Topeka (2), Wichita (1), Overland Park (1), Olathe (1), Kansas City (0), Manhattan (0), and Shawnee (0). A ninth center met inclusion criteria, but did not complete menu collection, therefore was not included.

During unannounced phone calls, centers were asked to report what was served for each CACFP food component (i.e., food group) for the standard meal (i.e., the meat-containing meal) and for the vegetarian alternative(s) served for the day in question. Clarifying questions were asked as necessary. For example, if breaded nuggets were reported as the meat component, the

childcare provider was asked whether the nuggets were homemade or pre-made; whether the meat was white or dark meat; and whether the breadings was whole wheat. Fruit and vegetable reports were clarified as to whether the items were fresh, frozen, or canned; whether they were no added sugar or no added salt; and if seasonings, butter, or sauces were added. Due to challenges in reaching centers, three days' worth of menus were collected via email from two participating centers. The menus were collected for days in which the meal in question had already been served. Eight centers provided menu data; however, one center's reported menus did not meet CACFP guidelines and therefore meals from this center were not included in the analysis (see Appendix F). For one participating center, one day's vegetarian alternative menu was not collected, therefore only three days' worth of menus were evaluated from that center.

### **Nutrient content**

Once menu data collection was complete, nutrient analysis took place by entering each of the 54 reported meals (27 meat containing, 27 vegetarian alternative) into ESHA'S Food Processor® Nutrition Analysis software. Portion sizes were entered into Food Processor based on guidelines for CACFP's reimbursable lunch meal for 3–5-year-old children (Child and Adult Care Food Program, 2016). Reported non-creditable items such as sauces and condiments were included in the nutrient analysis. A pre-established codebook (Hanson et al., 2020) was utilized for reported foods that were comparable, otherwise the closest match was located in the database. When meals served contained mixed-component foods, CACFP-creditable recipes were used. In doing so, some meal components may have portion sizes larger than the minimum requirements for 3–5-year-olds. For example, a creditable cheese pizza recipe includes 1.5 oz of grain in order for the 1.5 ounces of melted cheese to safely and palatably be served. In one instance, the added



sugar content was manually reduced by half, as center reported serving no added sugar baked beans and a matching food product was not available in ESHA's database. For the purpose of this analysis, low-fat milk fulfilled the fluid milk component for all main and vegetarian meals.

In the instance of incomplete nutrient profiles of a food within Food Processor, missing nutrient values were located from product labels and USDA's FoodData Central (2019), using Standard Reference legacy or Survey (FNDDS) data types and manually entered. See appendix G for methods used to find missing micronutrients unavailable in Food Processor or FoodData Central. This analysis used total dietary fiber values of foods, as ESHA's Food Processor had complete data for fiber content of all foods entered.

### **Nutrient benchmarks**

Children receiving full-time childcare should be meeting one-half to two-thirds of their daily recommended intakes (DRI) from the meals and snacks provided during care hours (Benjamin-Neelon 2018). Therefore, as has been done in prior studies evaluating childcare lunch meals (Sisson et al., 2017; Hanson et al., 2020), one-third of the DRI was used as the benchmark for evaluating the lunch meals in this study. The CACFP age group of 3-5-year-olds includes two DRI age categories, therefore energy and nutrient benchmark values were determined separately for 3-year-olds and 4-5-year-olds. For energy, protein, carbohydrate, and total fiber, the benchmark values were one-third the DRI with physical activity levels ranging from sedentary to active (IOM, 2005). The Acceptable Macronutrient Distribution Range (AMDR) was used as the benchmark value for fat with the benchmark for saturated fat coming from the DGA recommendation of less than ten percent of total energy coming from saturated

fat. The mean nutrient values of the standard meals were compared to the mean nutrient values of the vegetarian alternative meals and then each to the benchmark values.

### **Diet quality**

The nutrient analysis was then utilized to score the menus using the Healthy Eating Index-2015 (HEI-2015). Menus can receive a HEI-2015 maximum score of 100, based on nine categories for adequacy (higher scores for higher intakes) and four categories for moderation (higher scores for lower intakes). The higher the score, the more aligned the menu is with the Dietary Guidelines for Americans. Total kilocalories and the fatty acid ratio, sodium, added sugars, saturated fats components were scored based off ESHA's output values for each menu. The remaining components (i.e., total fruits, whole fruits, total vegetables, green and beans, whole grains, dairy, total protein foods, seafood and plant proteins and refined grains) were scored by totaling items served. The sum of all components resulted in the total HEI-2015 score. The mean HEI-2015 score for the vegetarian meals was compared to that of the standard meals.

### **Statistics**

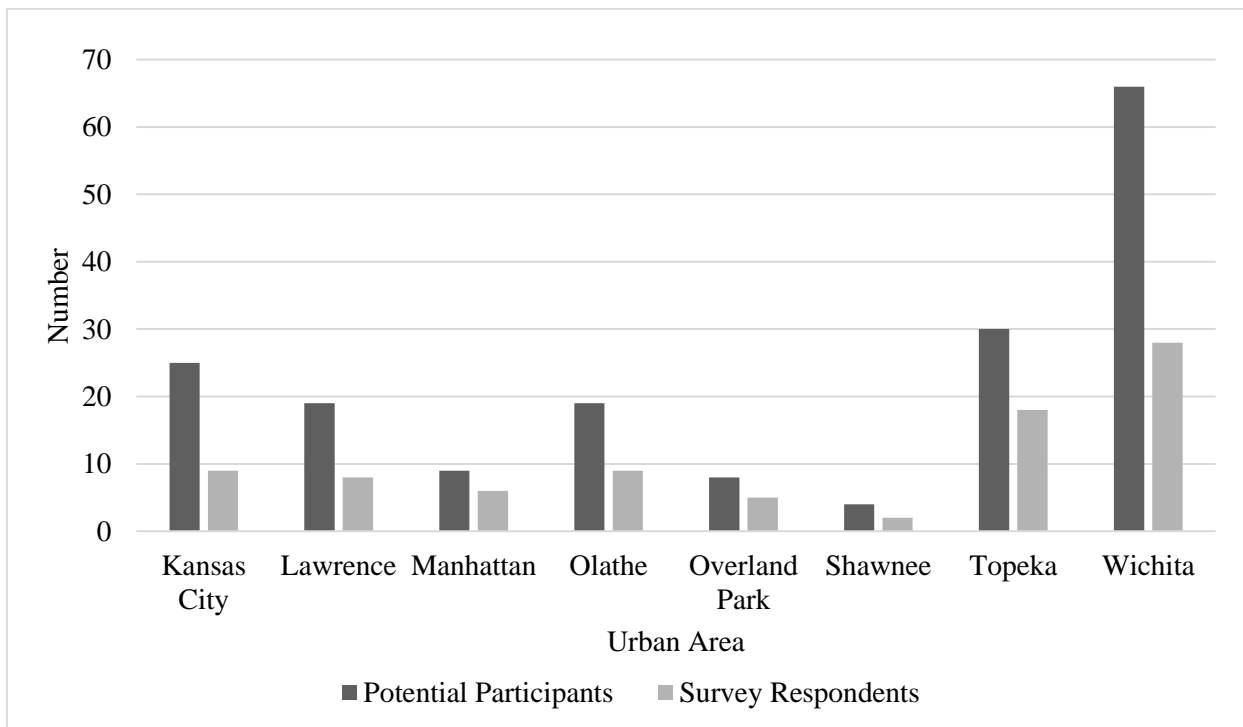
Descriptive statistics were used to quantify the impact of COVID-19 while thematic analysis of open-ended responses was used to identify commonly reported issues. Student's t-tests ( $P \leq .05$ ) were used to detect differences in Healthy Eating Index (HEI)-2015 scores and nutrient content based on meal type. Confidence intervals (95%) for each nutrient analyzed were compared to the benchmark values for both age ranges.

## Chapter 3 - Results

Representatives from (N = 85) centers answered the survey, yielding a response rate of 54.8%. All eight urban areas were represented among the collected responses. The breakdown of responses per each urban area is as follows: Kansas City 9 (10.6%); Lawrence 8 (9.4%); Manhattan 6 (7.1%); Olathe 9 (10.6%); Overland Park 5 (5.9%); Shawnee 2 (2.4%); Topeka 18 (21.2%); Wichita 28 (32.9%). For-profit childcare centers represented 31.8% (n = 27) of survey respondents, the remaining 68.2% (n = 58) were not-for-profit childcare centers. Surveys were most likely to be completed by center directors (71.8%, n = 61) versus center staff with other job titles.

**Figure 3.1.**

*Potential Participants and Responding Centers by Urban Area*



## Online survey responses

The majority of responding centers prepared their meals on-site (76.5%, n = 65). For those that have meals prepared off-site (n = 20), the most frequent response was the use of a catering company (n = 12), followed by a school/USD cafeteria (n = 6). When asked how frequently a vegetarian alternative was offered in lieu of the standard meal, 32.9% (n = 28) answered “1-2 times/week”, 3.5% (n = 3) answered “three times/week”, 15.3% answered “four-five times/week”, and 41.2% indicated they “never provide a vegetarian alternative”. Multiple centers reported routinely serving a vegetarian meal as the main meal center wide. This practice occurred at varying frequencies, but most often weekly. Respondents indicated that their centers provided (or would be willing to provide) vegetarian alternatives for medical reasons (95.3%; n = 81), for religious reasons (89.4%; n = 76), and per parent/guardian request (78.8%, n = 67). When asked why the center is not providing a vegetarian alternative, most respondents indicated no such request had been made (40%; n = 34). Additional reasons for not providing a vegetarian alternative included unable/unwilling to accommodate vegetarian alternative requests (n = 3); concern for added time and cost (n = 2); and currently discussing/considering (n = 2). Roughly one-half of the centers (n = 40) reported that they allow families to bring food from home in lieu of center provided meals.

One in four respondents (n = 21) were unsure if vegetarian meals could qualify for CACFP reimbursement. Furthermore, just over one-half of the respondents (56.5%) were confident that the menu substitutions meet CACFP guidelines.

Nearly 50% (n = 42) of centers report a credentialed health and/or nutrition expert having involvement in the center’s menu process and/or food service operations. The credentialed health and/or nutrition expert was most likely involved in writing or approving the menu and

reviewing for potential food allergens and identifying appropriate/acceptable alternatives (Table 3.2).

Sixty-three centers responded to the open-ended question, “What is the occupational title and/or credential of the individual(s) who writes your center’s menus?” The responses were categorized into six groups: CACFP coordinator, kitchen manager/food director/chef/cook, owner/operations team member, outside source, registered dietitian, and unsure/unknown. Nearly a third of the menus (31.7%, n = 27) are written by the owner or an operations team member. Only 7% (n = 6) reported menus being written by a registered dietitian

**Table 3.1.**

*Credentialed Health and/or Nutrition Expert Involved in Menu Process and/or Foodservice Operations*

<b>Credential</b>	<b>Number Involved in Foodservice Operations</b>
CACFP Child Nutrition Professional (CCNP)	12.9% (n = 11)
CACFP Management Professional (CMP)	8.2% (n = 7)
Dietetic Technician Registered (DTR)	2.4% (n = 2)
Registered Dietitian/Nutritionist (RD, RDN)	9.4% (n = 8)
School Nutrition Specialist (SNS)	5.9% (n = 5)
Unsure/unknown	7.0% (n = 6)
Other: RN, A.S. in Health/Community Health, CCNP in progress	3.5% (n = 3)

**Table 3.2.***Role of Credentialed Health and/or Nutrition Expert in Childcare Center Foodservice Operations*

<b>Role</b>	<b>Foodservice Operations</b>
Write or approve menu	31.8% (n = 27)
Write or approve recipes	14.1% (n = 12)
Complete food orders	14.1% (n = 12)
Conduct kitchen inspections	16.5% (n = 14)
Prepare and/or serve food	11.8% (n = 10)
Review food allergies and identify appropriate/acceptable alternatives	20% (n = 17)

**Table 3.3.***Occupational Category of Who Writes the Childcare Center's Menu*

<b>Occupational Category</b>	<b>Number</b>
CACFP Coordinator	4.7% (n = 4)
Kitchen manager/food director/chef/cook	14.1% (n = 12)
Owner/operations team member	31.7% (n = 27)
Outside source	8.2% (n = 7)
Registered Dietitian	7.0% (n = 6)
Unsure/unknown	8.2% (n = 7)

## **COVID-19 impact**

In Kansas, childcare centers were deemed essential and allowed to remain open during the state stay-home order issued in March 2020 (Exec. Order No. 20-16, 2020). One hundred thirty-eight childcare centers received the COVID-19 questions that were added to the re-distribution survey that was emailed on July 7. Of those that were sent the revised survey, 57.2% (n = 79) of the centers completed the COVID-19 specific questions. The majority of responding centers (70.1%; n = 56) experienced a decrease in enrollment, whereas 11.4% (n = 9) experienced an increase in enrollment. Nearly two-thirds of the centers (62%; n = 49) reported foodservice operation changes due to COVID-19 related challenges. Three overarching foodservice themes were discovered: a) procurement challenges including increased cost and decreased availability of foods, b) changes in meal service including ceasing family-style meal service and use of disposable tableware, and c) menu changes due to enrollment changes and product availability issues. See Table 3.4.

## **Food frequencies**

Thirty-two standard menus and thirty-one vegetarian-alternative menus were collected from eight centers. The most common meat protein components served were poultry (n = 14), followed by beef (n = 9). Cheese was the most frequent meat alternative served (n = 17) and vegetarian alternative products were the second most common (n = 4). Ten different fruits and 12 different vegetables were served across the 32 days of menus collected. The most common grain component served was baked wheat products (i.e., bun/bread/biscuit/pizza crust) (n = 14) followed by pasta (n = 6). See Table 3.5.

**Table 3.4.**

*Open-ended Responses to COVID-19 Impact on Foodservice Operations and Menu Choices*

COVID-19 Impact	
Procurement challenges including increased cost and decreased availability of foods	<p>“There is shortages of canned items and that did cause a bit of changes but overall still similar.”</p> <p>“Limited supplies at the stores.”</p> <p>“Higher cost of food has caused menu changes.”</p> <p>“It has become a lot harder to purchase foods.”</p> <p>“Our owner has to go to 4-5 stores to purchase what we need &amp; he has started buying non-perishables about 4 weeks ahead to have time to find the quantities we need.”</p> <p>“Finding foods and milk that meet the requirements. Our food budget has increased due to price increases.”</p>
Changes in meal service including ceasing family-style meal service and use of disposable tableware	<p>“No self-serve, paper products simpler meals.”</p> <p>“The teachers have to plate all the meals as to do before COVID-19, we did family style dining.”</p> <p>“We are no longer serving family style.”</p> <p>“We have had to change from family style to having all meals prepackaged.”</p> <p>“We are not serving family style right now and we are using a lot of disposable items. We are seating children and teachers 6 feet apart.”</p>
Menu changes due to enrollment changes and product availability issues	<p>“Temporarily, we followed a "rebound" menu after we reopened and have had to make adjustments as our food service distributor is out of things.”</p> <p>“Menus adjusted to accommodate for items we cannot find.”</p> <p>“Our menu has changed when there was a shortage on meats and other foods. Milk was also limited to a certain amount that could be purchased and we had to buy the types that was available.”</p>



---

	<p>“We are utilizing a limited menu based on the small number of children we have and due to many items not being available at time of order...”</p> <p>“As a result of COVID-19 our numbers did go down to about 10 with an average daily attendance of 8... We used to have lunch catered as some of the facilities do in Topeka. We did drop that...”</p> <p>“Some whole grain/whole wheat items have been unavailable, so we have had to adjust daily grain components.”</p>
--	--

---

**Table 3.5.***Frequency of Foods Served within Each CACFP Component*

<b>Food</b>	<b>Frequency</b>
<b>Main Menu Protein</b>	
- Beef	8
- Poultry	14
- Fish	4
- Hot dog + beans	1
<b>Meat Alt. Menu Protein</b>	
- Cheese	17
- Cheese & beans	3
- Vegetarian meat alt. product	4
- Sun butter	1
- Beans	1
- Tofu	1
<b>Fruit</b>	
- Pears	5
- Applesauce	2
- Mandarin Orange	6
- Peaches	5
- Apples	1
- Tropical fruit	1
- Kiwi	2
- Banana	1
- Melon	1
- Apricot	1
<b>Vegetable</b>	
- Broccoli	3
- Tossed salad	3
- Corn	8

- Mixed veg	3
- Peas	1
- Green beans & mashed potatoes	1
- Potato wedges	2
- Carrots	2
- Green beans	3
- Peas & carrots	2
- Cauliflower	2
- Carrots & broccoli	2
<b>Grain</b>	
- Pasta	6
- Bun/bread/biscuit/pizza crust	14
- Tortilla	4
- Breading	2
- Rice	1
- Tortilla chips	1

### Healthy Eating Index-2015

The standard meal HEI-2015 scores ranged 58.00-91.98, with a mean score of 71.77. The vegetarian alternative meals HEI-2015 scores ranged 48.94-89.40, with a mean score of 64.87. Compared to the vegetarian alternative meals, HEI-2015 scores were higher for the standard meals,  $t(44.7) = 2.14$ ,  $P = 0.038$  (Table 3.7). Seventeen vegetarian alternative meals received a score of zero for total protein component when cheese was served as the meat alternative. Both menu types received the maximum points for dairy for all meals. All but one meal received the maximum score for added sugar, and all but two meals received the maximum score for refined grains (Table 3.6). Across all menus evaluated, HEI-2015 component scores

were consistently low for greens and beans, seafood and plant proteins, and fatty acid ratio components.

### **Nutrient analysis**

The vegetarian alternative menus were higher in calories, fat, saturated fat, calcium, and sodium. Whereas the standard menus were higher in protein and choline. See Table 3.8.

**Table 3.6.**

*Frequency of Daily Maximum HEI-2015 Component Scores among Standard Meal and Vegetarian Alternative HEI-2015 Component Scores*

HEI-2015 Component	Maximum Score	Days Achieving Maximum Score		
		Standard (n = 27)	Vegetarian Alternative (n = 27)	All Menus Combined (n = 54)
Total Fruits	5	62.9% (n = 17)	37% (n = 10)	50% (n = 27)
Whole Fruits	5	88.9% (n = 24)	88.9% (n = 24)	88.9% (n = 48)
Total Vegetables	5	48.1% (n = 13)	59.3% (n = 16)	53.7% (n = 29)
Dark Greens and Legumes	5	40.7% (n = 11)	51.9% (n = 14)	46.3% (n = 25)
Whole Grains	10	85.2% (n = 23)	77.8% (n = 21)	81.5% (n = 44)
Dairy	10	100% (n = 27)	100% (n = 27)	100% (n = 54)
Total Protein Foods	5	96.3% (n = 26)	37% (n = 10)	66.7% (n = 36)
Seafood & Plant Proteins	5	29.6% (n = 8)	37% (n = 10)	33.3% (n = 18)
Fatty Acids	10	0% (n = 0)	7.4% (n = 2)	3.7% (n = 2)
Refined Grains	10	92.6% (n = 25)	96.3% (n = 26)	94.4% (n = 51)
Sodium	10	14.8% (n = 4)	3.7% (n = 1)	9.3% (n = 5)
Added Sugars	10	96.3% (n = 26)	100% (n = 27)	98.1% (n = 53)
Saturated Fats	10	14.8% (n = 4)	14.8% (n = 4)	14.8% (n = 8)

**Table 3.7.***Comparison of Standard and Vegetarian Alternative HEI-2015 Component Scores*

<b>HEI-2015 Component</b>	<b>Max Score</b>	<b>Mean Score (Range)</b>		<b>t-test Statistic</b>	<b>p</b>
		<b>Standard (n = 27)</b>	<b>Vegetarian Alternative (n = 27)</b>		
Total Fruit	5	4.35 (2.77-5.00)	4.15 (2.62-5.00)	.457	.650
Whole Fruit	5	4.44 (2.84-5.00)	4.44 (2.84-5.00)	.000	1.0
Total Vegetables	5	4.47 (3.85-5.00)	4.34 (3.48-5.00)	.612	.543
Dark Greens and Legumes	5	2.04 (0.00-4.54)	2.59 (0.04-5.00)	-.808	.423
Whole Grains	10	8.63 (5.25-10.00)	8.43 (4.83-10.00)	.211	.843
Dairy	10	10.0 (10.0-10.0)	10.0 (10.0-10.0)	-- <sup>a</sup>	-- <sup>a</sup>
Total Protein Foods	5	4.91 (4.47-5.0)	1.85 (0.00-4.31)	6.365	.000*
Seafood & Plant Proteins	5	1.48 (0.00-3.81)	1.85 (0.00-4.31)	-.568	.572
Fatty Acids	10	1.69 (0.00-4.15)	1.67 (0.00-5.06)	.017	.987
Refined Grains	10	9.93 (9.66-10.00)	9.96 (9.77-10.0)	-.585	.561
Sodium	10	3.89 (0.11-7.67)	2.33 (0.00-5.53)	1.633	.108
Added Sugars	10	9.89 (9.31-10.00)	10.0 (10.0-10.0)	-1.000	.0327*
Saturated Fats	10	6.06 (3.47-8.6)	3.24 (0.00-7.27)	3.061	.004*
<b>HEI-2015 Total Score (SD)</b>	100	71.77 (9.15)	64.87 (14.00)	2.14	.038*

<sup>a</sup> t could not be computed because the standard deviations of both groups are 0.

\* Statistical Significance; p &lt; 0.05.

**Table 3.8.**  
*Comparison of Standard and Vegetarian Alternative Micronutrient Value*

Nutrient	Mean Micronutrient Value (Range)		t-test Statistic	p
	Standard (n = 27)	Vegetarian Alternative (n = 27)		
Energy (kcal)	295.57 (260.36-330.78)	328.82 (271.12-386.52)	-2.556	.014*
Protein (g)	20.46 (17.58-23.34)	18.81 (16.22-21.4)	2.216	.031*
Carbohydrate (g)	34.80 (27.96-41.64)	36.83 (28.61-45.05)	-0.986	.329
Fat (g)	8.85 (6.39-11.26)	12.66 (6.9-18.42)	-3.154	.003*
Saturated fat (g)	3.50 (2.54-4.46)	5.86 (3.22-8.5)	-4.357	.000*
Monounsaturated fatty acids (g)	2.83 (1.58-4.08)	3.93 (0.59-7.27)	-1.605	.115
Polyunsaturated fatty acids (g)	1.44 (0.34-2.54)	1.72 (0.56-2.88)	-0.911	.366
Fiber (g)	3.63 (2.32-4.94)	4.35 (2.17-6.53)	-1.468	.148
Folate DFE (mcg)	57.26 (32.72-81.8)	70.19 (39.15-101.23)	-1.699	.095
Vitamin A RAE (mcg)	218.24 (117.6-318.88)	272.78 (172.32-373.24)	-1.993	.052
Calcium (mg)	333.11 (248.29-417.93)	555.66 (360.91-750.41)	-5.444	.000*
Vitamin B12 (mcg)	1.37 (0.99-1.75)	1.38 (1.03-1.73)	-0.060	.952
Zinc (mg)	2.63 (1.71-3.55)	2.66 (2.2-3.12)	-0.120	.905
Potassium (mg)	671.77 (582.65-760.89)	634.37 (504.5-764.24)	1.234	.223
Iron (mg)	1.80 (1.18-2.42)	1.72 (0.96-2.48)	.420	.676
Sodium (mg)	523.48 (323.86-723.10)	692.93 (470.61-915.25)	-2.947	.005*
Choline (mg)	82.88 (69.94-95.82)	65.9 (56.16-75.64)	5.446	.000*

\* Statistical Significance; p < 0.05.

Nutrients that exceeded the one-third DRI benchmark for both age groups in both menu types included vitamin A, calcium, vitamin B12, zinc, and sodium. See Tables 3.9 and 3.10. The vegetarian menu exceeded folate for 3-year-olds, and otherwise was met in the remaining categories. Nutrients that did not meet the one-third DRI benchmarks for both age groups and menus included iron, fiber, and potassium (Tables 3.9 and 3.10). Choline was low for 4-5-year-old in the vegetarian alternative menus and high for the 3-year-old meat-containing menus. Both the standard and the vegetarian alternative menus provided less than one-third of the day's calories and exceeded the benchmark for protein. The standard menus provided less than one-third of the day's fat and saturated fat content was less than ten percent of the meals.



**Table 3.9.**  
*Nutritional Adequacy of Standard Menus*

<b>Standard Menus</b>					
<b>Nutrient</b>	<b>Mean</b>	<b>SD</b>	<b>95% CI</b>	<b>3-year-olds' Benchmark*</b>	<b>4-5-year-olds' Benchmark**</b>
Calories (kcal)	295.57	35.21	281.64-309.50	373.66-480.00	401.00-521.33
Protein (g)	20.46	2.88	19.32-37.5	4.9	5.44
Carbohydrate (g)	34.80	6.85	32.09-37.51	43	43
Fat (g)	8.85	2.46	7.88-9.83	12.45-21.33	11.14-20.27
Saturated Fat (g)	3.50	0.96	3.12-3.88	4.15-5.33	4.46-5.76
Fiber (g)	3.63	1.31	3.11-4.15	5.23-6.72	5.62-7.3
Folate DFE (mcg)	57.26	24.54	47.55-66.96	50	66
Vitamin A RAE (mcg)	218.24	100.64	178.43-258.05	100	132
Calcium (mg)	333.11	84.82	299.56-366.66	165	264
Vitamin B12 (mcg)	1.37	0.38	1.22-1.52	0.3	0.4
Zinc (mg)	2.63	0.92	2.27-3.00	1	1.65
Potassium (mg)	671.77	89.12	636.5-707.03	1,000	1,254
Iron (mg)	1.80	0.62	1.55-2.04	2.31	3.3
Sodium (mg)	523.48	199.62	444.51-602.48	333	396
Choline (mg)	82.88	12.94	77.76-88.00	66	82.5

\* For energy, protein, carbohydrate and total fiber, benchmark is one-third the DRI with physical activity levels ranging from sedentary to active. The Acceptable Macronutrient Distribution Range (AMDR) was used as the benchmark for fat. Saturated fat benchmark of <10% based on DGA.

**Table 3.10.***Nutritional Adequacy of Vegetarian Alternative Menus*

<b>Vegetarian Alternative Menu</b>					
<b>Nutrient</b>	<b>Mean</b>	<b>SD</b>	<b>95% CI</b>	<b>3-year-olds' Benchmark*</b>	<b>4-5-year-olds' Benchmark*</b>
Calories (kcal)	328.82	57.70	305.99-351.64	373.66-480.00	401.00-521.33
Protein (g)	18.81	2.59	17.79-19.83	4.9	5.44
Carbohydrate (g)	36.83	8.22	33.58-40.08	43	43
Fat (g)	12.66	5.76	10.38-14.94	12.45-21.33	11.14-20.27
Saturated Fat (g)	5.86	2.64	4.81-6.90	4.15-5.33	4.46-5.76
Fiber (g)	4.35	2.18	3.49-5.21	5.23-6.72	5.62-7.3
Folate DFE (mcg)	70.19	31.04	57.91-82.47	50	66
Vitamin A RAE (mcg)	272.78	100.46	233.04-312.52	100	132
Calcium (mg)	555.660	194.75	478.62-632.70	165	264
Vitamin B12 (mcg)	1.38	0.35	1.24-1.52	0.3	0.4
Zinc (mg)	2.66	0.46	2.47-2.84	1	1.65
Potassium (mg)	634.37	129.87	583.00-685.74	1,000	1,254
Iron (mg)	1.72	0.76	1.42-2.02	2.31	3.3
Sodium (mg)	692.93	222.32	604.98-780.88	333	396
Choline (mg)	65.91	9.74	62.06-69.76	66	82.5

\* For energy, protein, carbohydrate and total fiber, benchmark is one-third the DRI with physical activity levels ranging from sedentary to active. The Acceptable Macronutrient Distribution Range (AMDR) was used as the benchmark for fat. Saturated fat benchmark of <10% based on DGA.

## Chapter 4 - Discussion

This two-phase cross-sectional study aimed to characterize vegetarian menu substitutions and compare the diet quality and nutrient content of standard childcare lunches with that of vegetarian alternative lunches. The results provide an improved understanding of how vegetarianism and the plant-based eating trend has impacted childcare foodservice operations while also bringing to light many important differences between the standard and vegetarian alternative meals.

Within urban Kansas childcare centers, center directors/administrators are most heavily involved with alternative menu needs and menu planning. Consistent with national trends in previously reported literature (Chriqui et al., 2018; Frampton et al., 2013), the majority of center's menus were written by center owners or administration team members, and only 7% of centers (n = 6) had menus written by registered dietitians. Because their inclusion in menu planning can help improve diet quality and nutrient content, increasing the involvement of registered dietitians offers an opportunity to enhance child health and wellbeing.

The food supply issues that plagued the U.S. in the height of the pandemic stay-home orders resulted in challenges for the childcare centers in this study to meet reimbursable meal requirements. The U.S. Bureau of Labor Statistics found that at-home food prices jumped 4.3% from March to June 2020 (Mead et al., 2020). While all grocery store food categories saw price increase, the rise was profound in meat, fish, dairy, and eggs (Mead et al., 2020). It is likely centers faced financial challenges as food cost increased, enrollment decreased, and increased CACFP reimbursement rates were not available during this time to offset the challenges of COVID-19 (Child and Adult Care Food Program, 2020; National CACFP Sponsors Association, 2021).

When compared to the national average of HEI-2015 component scores for 2-17-year-olds, the average for each of the menu types in this study had better scores for total fruit, total vegetables, green and beans, whole grains, dairy, seafood and plant protein, refined grains, sodium, and added sugars. Whole fruit scores were equal to the national average, and fatty acid scores were worse. Saturated fat scores were higher for the standard meals and lower for the vegetarian meals, meaning the vegetarian alternative meals contained higher levels of saturated fat than the meat-containing meals. Both the standard and vegetarian alternative meals had higher total HEI-2015 scores compared to the national average from NHANES data for 2-5-year-olds.

The vegetarian alternative menus had a wide range of HEI-2015 scores. Unlike CACFP, the DGA does not consider cheese a protein food, but rather a dairy food, thus 17 vegetarian alternative menus scored zero for the total protein component. Both the standard and vegetarian alternative meals consistently received the maximum dairy component scores based on the fluid milk component alone. Therefore, cheese did not improve the vegetarian alternative meals dairy component score. Overall, the vegetarian menus routinely scored lower moderation scores for saturated fatty acids and sodium content compared to the standard meals. On days when the meat alternative served was cheese, the meal score was relatively low. When vegetarian entrees such as beans or nut butter were served as the meat alternative component, the meal scored much higher. Though five of the six meat alternative options allowable were represented in the 27 days of vegetarian menus collected, cheese was used to fulfill all or a portion of the meat alternative in 74.1% (n = 20) of the qualifying CACFP vegetarian meals. Future research should explore barriers to serving a larger variety of meat alternative options in the child-care setting.

Like the Academy of Nutrition and Dietetics' stance on childcare centers limiting added sugars and refined grains (Benjamin-Neelon, 2018), the childcare menus evaluated in this study met this recommendation. Only one of the 54 meals evaluated did not receive the maximum score for limiting added sugars, notably barbecue sauce was served as a condiment on this day. Although non-creditable foods, such as condiments, can be served with meals, CACFP's *Optional Best Practices* (USDA, FNS, 2016) recommends limiting non-creditable foods that are sources of added sugars. The menus evaluated in this analysis meet this *Best Practice* recommendation.

The sodium content and fatty acid ratios of menus evaluated scored low on the HEI-2015 scale, thus indicating these components did not align well with the DGA, nor with the Academy of Nutrition and Dietetics' recommendation for benchmarks for nutrition in childcare (Benjamin-Neelon, 2018). This is confirmed in the micronutrient analysis. Means for both menu types exceeded one-third of the DRI for sodium for both age ranges. This is consistent with previous research that identified higher than recommended sodium levels in Oklahoma childcare settings (Frampton et al., 2013). Despite attempts to lower sodium targets in child nutrition programs, implementation of such targets has been delayed (Child Nutrition Programs, 2018) as programs reported difficulty finding products that comply (Child Nutrition Programs, 2017). It is important to note, that at this time, CACFP does not provide stipulations on sodium content for reimbursable meals, though such stipulations would be beneficial and warrant consideration. In addition to sodium, the Academy of Nutrition and Dietetics recommends limiting saturated fatty acids in childcare nutrition. Results show that the standard meals had lower levels of saturated fatty acids than the vegetarian alternative meals. Nearly two-thirds of the vegetarian alternative menus (n = 17) served cheese as the meat-alternative component. A creditable meat-alternate

serving of cheese for a reimbursable meal is one-and-a-half ounces. One-and-a-half ounces of reduced fat cheddar provides approximately 119.2 kcal, 4.92 g saturated fat and 308.3 mg sodium; thus, explaining why the vegetarian alternative menus provided statistically significant more of these nutrients.

Diets in the U.S. are low in potassium and fiber (USDA & HHS, 2020). This analysis of childcare menu found that both the meat and vegetarian menus provided less than one-third of the DRI for both nutrients. Both menus also failed to meet one-third of the DRI for iron in both age categories. Notably, the difference between the mean iron content in vegetarian alternative and meat-containing menus was non-significant. This lack of a significant difference is noteworthy because iron intake is often cited as a concern with following a vegetarian meal pattern (Melina et al., 2016; USDA & HHS 2020). Further exploration of iron content between omnivore and vegetarian meal patterns within federal child nutrition programs is warranted. Future evaluation of nutrient and diet quality analysis comparing menus utilizing cheese versus menus utilizing other allowable meat-alternative components is also warranted.

Overall, U.S. diets are also low in choline across all ages, and one-third of 2-3-year-olds and over half of 4-5-year-olds do not meet the Adequate Intake for this nutrient (Wallace & Fulgoni III, 2016). In this study, the standard meals were higher in choline compared to the vegetarian alternative meals. The standard meals also met the choline benchmark for both 3-year-olds and 4-5-year-olds. However, the vegetarian alternative menus met the choline benchmark for 3-year-olds but did not meet the benchmark for 4-5-year-olds. Including more foods rich in choline such as eggs could help improve the choline content of the vegetarian meals.

The strengths and limitations of this study are important to note. A strength of the online survey was the high response rate and the representation from all eight of Kansas's urban areas. However, phase two of this study contains a relatively small sample. The initial study design set forth to have two centers per urban area, for a total of 16 centers providing meal details. However, the number of qualifying centers did not allow for this. Although all qualifying centers were included in the menu analysis, not all urban areas were represented in this phase of the study. Furthermore, the exclusion of childcare centers from the rural areas of Kansas resulted in a sample that was not representative of all centers across the state. Similarly, because the Midwest has a lower vegetarian population than the Northeast and West coast (Vegetarian Research Group, n.d.), results may not be generalizable to areas outside of the Midwest. An analysis of menus from across all regions of the U.S. would greatly improve future studies.

Limitations of menu analysis includes unknown brand/manufacture of products, recipes, preparation and cooking methods, akin to Frampton et al. (2013). Additionally, only one meal of the day was analyzed, thus nutrients the menus provided in excess or inadequate amounts cannot be generalized to the entire day or weeks' worth of intake. Database limitations were present within ESHA Food Processor, with previously described methods used to compensate for such limitations (Hanson et al., 2020). Children's consumption of the lunch meals included in this analysis was not measured, and certainly is an opportunity for future research to explore. Furthermore, subsequent research should aim to evaluate the seemingly arbitrary goal of childcare center meeting two-thirds of children's nutritional needs.

In conclusion, many urban Kansas childcare centers are able or willing to accommodate vegetarian alternative meals, though parent/guardian request is the least likely reason to be accommodated. Notably, among the centers responding, there was limited confidence

surrounding CACFP and vegetarian meal alternatives. Moreover, there is limited use of the allowable meat-alternative components beyond cheese. Both menu options could be improved upon by the inclusion of more iron-dense foods, and the vegetarian meals could be improved upon by using less cheese and using more plant-based alternatives such as lentils, beans, and soy which are good sources of protein but are also low in saturated fat. Further evaluation, and consideration, of limiting sodium and the use of cheese as a meat-alternative component within CACFP should be evaluated. Such changes would better align CACFP childcare menus with the DGA recommendations. Increased involvement of credentialed health and nutrition professionals in the menu process can have a positive impact on diet quality and nutritional content of childcare menus.



## References

- Academy of Nutrition and Dietetics, Evidence Analysis Library. (2011). Vegetarian Nutrition: Major Recommendations. [https://www.andeal.org/template.cfm?template=guide\\_%20summary&key=3186](https://www.andeal.org/template.cfm?template=guide_%20summary&key=3186)
- Benjamin-Neelon, S. E. (2018). Position of the Academy of Nutrition and Dietetics: Benchmarks for nutrition in child care. *Journal of the Academy of Nutrition and Dietetics*, 118(7), 1291–1300. doi: 10.1016/j.jand.2018.05.001
- Berryman, C. E., Lieberman, H. R., Fulgoni, V. L., & Pasiakos, S. M. (2018). Protein intake trends and conformity with the Dietary Reference Intakes in the United States: Analysis of the National Health and Nutrition Examination Survey, 2001–2014. *The American Journal of Clinical Nutrition*, 108(2), 405–413. doi: 10.1093/ajcn/nqy088
- Briley, M. E., Roberts-Gray, C., & Simpson, D. (1994). Identification of factors that influence the menu at child care centers: A grounded theory approach. *Journal of the American Dietetic Association*, 94(3), 276–281. doi: 10.1016/0002-8223(94)90368-9
- Bruening, K. S., Gilbride, J. A., Passannante, M. R., & McClowry, S. (1999). Dietary intake and health outcomes among young children attending 2 urban day-care centers. *Journal of the American Dietetic Association*, 99(12), 1529-1535. doi: 10.1016/S0002-8223(99)00375-2
- Child and Adult Care Food Program: Meal Pattern Revisions Related the Healthy, Hunger-Free Kids Act of 2010; Final Rule, 7 C.F.R. 210, 215, & 220 (2016). <https://www.govinfo.gov/content/pkg/FR-2016-04-25/pdf/2016-09412.pdf>
- Child Nutrition Programs: Flexibilities for Milk, Whole Grains, and Sodium Requirements, 7 C.F.R. 210, 215, 220, & 226 (2017). <https://www.fns.usda.gov/cn/fr-112420>
- Child Nutrition Programs: Flexibilities for Milk, Whole Grains, and Sodium Requirements, 7 C.F.R. 210,215, 220, & 226 (2018). <https://www.federalregister.gov/documents/2017/11/30/2017-25799/child-nutrition-programs-flexibilities-for-milk-whole-grains-and-sodium-requirements>
- Chriqui, J. F., Schermbeck, R. M., & Leider, J. (2018). Food purchasing and preparation at child day care centers participating in the Child and Adult Care Food Program in the United States, 2017. *Childhood Obesity*, 14(6), 375–385. doi: 10.1089/chi.2018.0099
- Corcoran, L., & Steinley, K. (2019). Early childhood program participation, From the National Household Education Surveys Program of 2016 (NCES 2017-101.REV), National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. <https://nces.ed.gov/pubs2017/2017101REV.pdf>
- De Keyzer, W., Van Caneghem, S., Heath, A., Vanaelst, B., Verschraegan, M., De Henauw, S., & Huybrechts, I. (2012). Nutritional quality and acceptability of a weekly vegetarian

- lunch in primary-school canteens in Ghent, Belgium. ‘Thursday Veggie Day’. *Public Health Nutrition*, 15(12), 2326-2330. doi:10.1017/S136890012000870
- Drewnowski, A., & Rehm, C. D. (2013). Vegetable cost metrics show that potatoes and beans provide most nutrients per penny. *PLoS ONE*, 8(5). doi: 10.1371/journal.pone.0063277
- Farmer B., Larson B.T., Fulgnoi III V.L, Rainville A.J., & Liepa G.U. (2011). A vegetarian dietary pattern as a nutrient-dense approach to weight management: An analysis of the National Health and Nutrition Examination Survey 1999-2004. *Journal of American Dietetic Association*, 111(6), 819-827. doi: 10.1016/j.jada.2011.03.012
- Forgrieve, J. (2018). The growing acceptance of veganism.  
<https://www.forbes.com/sites/janetforgrieve/2018/11/02/picturing-a-kindler-gentler-world-vegan-month/#198004b62f2b>.
- Fox, M. K., Condon, E., Briefel, R. R., Reidy, K. C., & Deming, D. M. (2010). Food consumption patterns of young preschoolers: Are they starting off on the right path? *Journal of the American Dietetic Association*, 110(12). doi: 10.1016/j.jada.2010.09.002
- Frampton, A.M., Sisson, S.B., Horm, D. Campbell, J.E., Lora, K., & Ladner, J. (2013). What’s for lunch? An analysis of lunch menus in 83 urban and rural Oklahoma child-care centers providing all-day care to preschool children. *Journal of the Academy of Nutrition and Dietetics*, 114(9), 1367-1374. doi: 10.1016/j.jand.2013.09.025
- Exec. Order No. 20-16, State of Kansas (2020). <https://governor.kansas.gov/wp-content/uploads/2020/03/EO20-16.pdf>
- Gubbels, J. S., Kremers, S. P., Stafleu, A., Dagnelie, P. C., Goldbohm, R. A., Vries, N. K. D., & Thijs, C. (2009). Diet-related restrictive parenting practices. Impact on dietary intake of 2-year-old children and interactions with child characteristics. *Appetite*, 52(2), 423–429. doi: 10.1016/j.appet.2008.12.002
- Hanson, J., Joyce, J., Laursen, D., & Paez, P. (2020). A Model for Improving Diet Quality within Child Nutrition Programs: The U.S. Army’s Child and Youth Services Healthy Menu Initiative. *International Journal of Environmental Research and Public Health*, 17(8), 2746. <https://doi.org/10.3390/ijerph17082746>
- Hiza, H., A. B., Koegel, K. L., & Pannucci, T. R. E., (2018). Diet Quality: The Key to Healthy Eating. *Journal of the Academy of Nutrition and Dietetics*, 118(9), 1583-1585. doi: 10.1016/j.jand.2018.07.002
- Institute of Medicine. (2001). Dietary Reference Intakes for Vitamin A, Vitamin K, arsenic, boron, chromium, copper, iodine, iron, manganese, molybdenum, nickel, silicon, vanadium, and zinc. National Academies Press.  
<https://www.nap.edu/read/10026/chapter/1>

- Institute of Medicine. (2005). Dietary Reference Intakes for energy, carbohydrate, fiber, fat, fatty acids, cholesterol, protein, and amino acids. National Academies Press. doi: 10.17226/10490
- Institute of Medicine (2011). Child and Adult Care Food Program: Aligning dietary guidance for all. National Academies Press. <https://doi.org/10.17226/12959>
- Kansas Department of Education. (2019). CACFP Centers 2019 Program Year. [https://datacentral.ksde.org/nutrition\\_reports.aspx](https://datacentral.ksde.org/nutrition_reports.aspx)
- Katz, D. L., Doughty, K. N., Geagan, K., Jenkins, D. A., & Gardner, C. D. (2019). Perspective: The public health case for modernizing the definition of protein quality. *Advances in Nutrition*, 10(5), 755–764. doi: 10.1093/advances/nmz023
- Korenman, S., Abner, K., Kaestner, R., & Gordon, R. (2013). The Child and Adult Care Food Program and the nutrition of preschoolers. *Early Childhood Research Quarterly*, 28(2), 325-336. doi: 10.1016/j.ecresq.2012.07.007.
- Krebs-Smith, S.M., Pannucci, T.E., Subar, A.F., Kirkpatrick, S.I., Lerman, J.L., Tooze, J.A., Wilson, M.M., & Reedy, J. (2018). Update of the healthy eating index: HEI-2015. *Journal of the Academy of Nutrition and Dietetics*, 118(9):1591–1602. doi 10.1016/j.jand.2018.05.021
- Lee, W. T., Ip, K. S., Chan, J. S., Lui, N. W., & Young, B. W. (2008). Increased prevalence of constipation in pre-school children is attributable to under-consumption of plant foods: A community-based study. *Journal of Paediatrics and Child Health*, 44(4), 170–175. doi: 10.1111/j.1440-1754.2007.01212.x
- Mead, D., Ransom, K., Reed, S.B., & Sager, S. (2020). The impact of the COVID-19 pandemic on food price indexes and data collection. *Monthly Labor Review*. U.S. Bureau of Labor Statistics. <https://doi.org/10.21916/mlr.2020.18>
- Melina, V., Craig, W., & Levin, S. (2016). Position of the Academy of Nutrition and Dietetics: Vegetarian diets. *Journal of the Academy of Nutrition and Dietetics*, 116(12), 1970–1980. doi: 10.1016/j.jand.2016.09.025
- Mintel Group Ltd., Plant-based Proteins-US-May 2019
- Mintel Group Ltd., Vegetables – US – August 2019
- Monsivais, P., Kirkpatrick, S., & Johnson, D. B. (2011). More nutritious food is served in child-care homes receiving higher federal food subsidies. *Journal of the American Dietetic Association*, 111(5), 721–726. doi: 10.1016/j.jada.2011.02.007
- Ogata, B. N., & Hayes, D. (2014). Position of the Academy of Nutrition and Dietetics: Nutrition guidance for healthy children ages 2 to 11 years. *Journal of the Academy of Nutrition and Dietetics*, 114(8), 1257–1276. doi: 10.1016/j.jand.2014.06.001

- Plant Based Foods Association. (2019). U.S. plant-based retail market worth \$4.5 billion, growing at 5X total food sales. <https://www.plantbasedfoods.org/2019-data-plant-based-market/>
- Robson, S. M., Khoury, J. C., Kalkwarf, H. J., & Copeland, K. (2015). Dietary intake of children attending full-time child care: What are they eating away from the child-care center? *Journal of the Academy of Nutrition and Dietetics*, 115(9), 1472–1478. doi: 10.1016/j.jand.2015.02.029
- Rosales, F. J., Reznick, J. S., & Zeisel, S. H. (2009). Understanding the role of nutrition in the brain and behavioral development of toddlers and preschool children: Identifying and addressing methodological barriers. *Nutritional neuroscience*, 12(5), 190–202. doi:10.1179/147683009X423454
- Rosso, R., & Henchy, G. (2018). Child & Adult Care Food Program: Participation trends 2017. The Food Research and Actions Center (FRAC). <https://frac.org/wp-content/uploads/CACFP-participation-trends-2017.pdf>
- Schap, T. S., Kucynski, K., & Hiza, H. (2017). Healthy Eating Index – Beyond the score. *Journal of the Academy of Nutrition and Dietetics*, 117(4), 519-521. doi: 10.1016/j.jand.2017.02.002
- Sisson, S., Kiger, A., Anundson, K., Rasbold, A., Krampe, M., Campbell, J., ... Hoffman, L. (2017). Differences in preschool-age childrens dietary intake between meals consumed at childcare and at home. *Preventive Medicine Reports*, 6, 33–37. doi: 10.1016/j.pmedr.2017.02.003
- Stahler, C. (n.d.). How many adults in the U.S. are vegetarian and vegan. The Vegetarian Resource Group. [https://www.vrg.org/nutshell/Polls/2019\\_adults\\_veg.htm](https://www.vrg.org/nutshell/Polls/2019_adults_veg.htm)
- Turner-McGrievy, G. M., Hales, S. B., & Baum, A. C. (2014). Transitioning to new child-care nutrition policies: Nutrient content of preschool menus differs by presence of vegetarian main entrée. *Journal of the Academy of Nutrition and Dietetics*, 114(1), 117–123. doi: 10.1016/j.jand.2013.07.036
- U.S. Department of Agriculture, Agricultural Research Service. (2019). FoodData Central. <https://fdc.nal.usda.gov/>
- U.S. Department of Agriculture. (2020). Meat/Meat alternates. In Food buying guide for Child Nutrition Programs. [https://foodbuyingguide.fns.usda.gov/Content/TablesFBG/USDA\\_FBG\\_Section1\\_MeatsAndMeatAlternates.pdf](https://foodbuyingguide.fns.usda.gov/Content/TablesFBG/USDA_FBG_Section1_MeatsAndMeatAlternates.pdf)
- U.S. Department of Agriculture & U.S. Department of Health and Human Services. (2015). Dietary Guidelines for Americans 2015-2020 (8th ed.). <https://health.gov/our-work/food-nutrition/previous-dietary-guidelines/2015>

- U.S. Department of Agriculture & U.S. Department of Health and Human Services. (2020). Dietary Guidelines for Americans 2020-2025 (9th ed.). [https://www.dietaryguidelines.gov/sites/default/files/2020-12/Dietary\\_Guidelines\\_for\\_Americans\\_2020-2025.pdf](https://www.dietaryguidelines.gov/sites/default/files/2020-12/Dietary_Guidelines_for_Americans_2020-2025.pdf)
- U.S. Department of Agriculture, Food and Nutrition Service. (2016). Optional Best Practices to Further Improve Nutrition in the CACFP. <https://www.fns.usda.gov/cacfp/optional-best-practices-further-improve-nutrition-cacfp>
- U.S. Department of Agriculture, Food and Nutrition Service. (2019). HEI Scores for Americans. <https://www.fns.usda.gov/hei-scores-americans>
- U.S. Department of Agriculture, Food and Nutrition Service. (2020). Healthy Eating Index (HEI). <https://www.fns.usda.gov/resource/healthy-eating-index-hei>
- Vegetarian Research Group. (n.d.) How many adults in the U.S. are vegetarian and vegan? [https://www.vrg.org/nutshell/Polls/2016\\_adults\\_veg.htm](https://www.vrg.org/nutshell/Polls/2016_adults_veg.htm)
- Wallace, T.C. & Fulgoni III, V. L. (2016). Assessment of total choline intakes in the United States. *Journal of the American College of Nutrition*, 35(2), 108-112. doi: 10.1080/07315724.2015.1080127
- World Health Organization. (2014). Zinc supplementation and growth in children. e-Library of Evidence for Nutrition Actions. [https://www.who.int/elena/bbc/zinc\\_stunting/en/](https://www.who.int/elena/bbc/zinc_stunting/en/)
- World Health Organization. (2019). Early child development. <https://web.archive.org/web/20200217002515/https://www.who.int/topics/early-child-development/en/>

## Appendix A - IRB Approvals

**KANSAS STATE**  
**UNIVERSITY**

University Research  
Compliance Office

TO: Dr. Jennifer Hanson  
Food, Nutrition, Dietetics, and Health  
210 Justin Hall

Proposal Number: 10012

FROM: Rick Scheidt, Chair   
Committee on Research Involving Human Subjects

DATE: 01/07/2020

RE: Proposal Entitled, "The diet quality and nutritional adequacy of vegetarian menu substitutions in urban Kansas childcare centers."

The Committee on Research Involving Human Subjects / Institutional Review Board (IRB) for Kansas State University has reviewed the proposal identified above and has determined that it is EXEMPT from further IRB review. This exemption applies only to the proposal - as written — and currently on file with the RB. Any change potentially affecting human subjects must be approved by the IRB prior to implementation and may disqualify the proposal from exemption.

Based upon information provided to the IRB, this activity is exempt under the criteria set forth in the Federal Policy for the Protection of Human Subjects, **45 CFR 546.101, paragraph b, category: 2, subsection: ii.**

Certain research is exempt from the requirements of HHS/OHRP regulations. A determination that research is exempt does not imply that investigators have no ethical

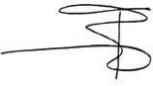
responsibilities to subjects in such research; it means only that the regulatory requirements related to IRB review, informed consent, and assurance of compliance do not apply to the research.

Any unanticipated problems involving risk to subjects or to others must be reported immediately to the Chair of the Committee on Research Involving Human Subjects, the University Research Compliance

Office, and if the subjects are KSU students, to the Director of the Student Health Center.

203 Fairchild Hall, Lower Mezzanine, 1601 Vattier st., Manhattan, KS 66506-1 103 | 785-532-3224 | fax: 785-532-3278 [comply@k-state.edu](mailto:comply@k-state.edu) [k-state.edu/comply](http://k-state.edu/comply)

TO: Dr. Jennifer Hanson  
Food, Nutrition, Dietetics, and Health  
Justin Hall

FROM: Rick Scheidt, Chair   
Committee on Research Involving Human Subjects

DATE: 06/30/2020

RE: Proposal #10012.1, entitled “The diet quality and nutritional adequacy of vegetarian menu substitutions in urban Kansas childcare centers..”

A MINOR MODIFICATION OF PREVIOUSLY APPROVED PROPOSAL #10012, ENTITLED, “The diet quality and nutritional adequacy of vegetarian menu substitutions in urban Kansas childcare centers.”

The Committee on Research Involving Human Subjects at Kansas State University has approved the proposal identified above as a minor modification of a previously approved proposal, and has determined that it is exempt from further review. This exemption applies only to the most recent proposal currently on file with the IRB. Any additional changes affecting human subjects must be approved by the IRB prior to implementation and may disqualify the proposal from exemption.

Unanticipated adverse events or problems involving risk to subjects or to others must be reported immediately to the IRB Chair, and / or the URCO.

It is important that your human subjects project is consistent with submissions to funding/contract entities. It is your responsibility to initiate notification procedures to any funding/contract entity of changes in your project that affects the use of human subjects.



## Appendix B - Survey

Email subject line: Kansas State University wants your feedback!

Instructions: Please have the Administrative Staff member or Director with the most food service knowledge complete the survey questions below.

- 1) Which of the following urban areas is your center located in:
  - a. Kansas City
  - b. Lawrence
  - c. Manhattan
  - d. Olathe
  - e. Overland Park
  - f. Shawnee
  - g. Topeka
  - h. Wichita
  
- 2) Please indicate the role(s) of the individual(s) completing this survey:
  - a. Director
  - b. Assistant Director
  - c. Administrative Staff or Support Staff
  - d. Other: \_\_\_\_\_
  
- 3) Is your center temporarily closed due to COVID-19?
  - a. Yes
  - b. No
  
- 4) Which describes your center:
  - a. For-profit

- b. Not-for-profit
- 5) Does your center participate in the Child and Adult Care Food Program (CACFP)?
- a. Yes
  - b. No
- 6) What is your center's maximum enrollment capacity?
- 7) How many children are currently enrolled at your center?
- 8) Has the number of children enrolled in your center changed due to COVID-19? (i.e. reduced classes sizes for precautions, parents dis-enrolled children, etc.)
- a. Yes, our enrollment has decreased.
  - b. Yes, our enrollment has increased.
  - c. No, our enrollment is about the same as pre-COVID-19.
- 9) Do you serve a lunch meal daily?
- a. Yes
  - b. No
- 10) Has your center's foodservice operations and/or menu options been altered as a result of COVID-19 precautions?
- a. Yes
  - b. No
- If yes, please explain. \_\_\_\_\_
- 11) On average, how many meals for children over 12 months of age are currently being served at the lunch meal?

12) Where is your center's lunch meal prepared?

- a. On-site
- b. Off-site

13) If prepared off-site, please indicate the type of facility/location below:

i.e. catering company, central kitchen, etc.

---

For the purpose of the remaining questions, a vegetarian meal/option is defined as one that does not include meat or fish, but can include eggs, cheese, and dairy.

14) Does your center provide vegetarian options for medical reasons?

- a. Yes
- b. No

15) If not, would your center provide vegetarian options if requested for medical reasons?

- a. Yes
- b. No

16) Does your center provide vegetarian options for religious reasons?

- a. Yes
- b. No

17) If not, would your center provide vegetarian options if requested for religious reasons?

- a. Yes
- b. No

18) Does your center provide vegetarian options in response to parent/guardian request?

- a. Yes
- b. No

19) If not, would your center provide vegetarian options if requested by a parent/guardian

- a. Yes
- b. No

20) If your center provides vegetarian options for any other reason(s) than previously addressed please list below:

21) Does your center have a policy for vegetarian meal requests for medical reasons?

- a. Yes
- b. No

22) Does your center have a policy for vegetarian meal requests for non-medical reasons?

- a. Yes
- b. No

23) Do you allow families to bring in vegetarian foods for their attending children to be served in lieu of the center provided foods?

- a. Yes
- b. No
- c. Comment: \_\_\_\_\_

24) During the course of a week, how frequently does your center serve a vegetarian alternative in lieu of the main (or meat containing) entree?

- a. Never
- b. 1-2 days

- c. 3 days
- d. 4-5 days

25) Vegetarian meals can qualify for reimbursement under CACFP.

- a. Agree
- b. Unsure
- c. Disagree

26) If your center does not provide vegetarian menu substitutions please indicate the reason(s) why:

- a. Our center has no need for one (i.e. no requests have been made)
- b. Not interested in tailoring menu to individuals needs or requests
- c. Concern for added time or cost for meal production with alternative menu options
- d. We are currently discussing or considering implementing vegetarian menu substitutions
- e. Other: \_\_\_\_\_

27) If your center does provide vegetarian menu substitutions, how confident are you that the menu substitutions meet CACFP guidelines?

- a. Very uncertain
- b. Uncertain
- c. Neutral
- d. Certain
- e. Very certain

28) Of the children currently receiving vegetarian meals at your center, how many receive them for each reason listed below? (please indicate the number)

- a. Medical reasons: \_\_\_\_\_
- b. Religious reasons: \_\_\_\_\_
- c. Parent/guardian request: \_\_\_\_\_
- d. Other (please indicate reason and number): \_\_\_\_\_

29) What is the occupational title and/or credential of the individual(s) who writes your center's menus?

30) If there is a credentialed health and/or nutrition expert involved in your center's menu process and/or food production, what is their credential(s)? Please select all that apply.

- a. Registered Dietitian/Nutritionist (RD, RDN)
- b. Dietitian Tech Registered (DTR)
- c. Certified Dietary Manager (CDM)
- d. CACFP Child Nutrition Professional (CCNP)
- e. CACFP Management Professional (CMP)
- f. School Nutrition Specialist (SNS)
- g. Other: \_\_\_\_\_
- h. Not Applicable

31) If there is a credentialed health and/or nutrition expert involved in your center's menu process and/or food production, please select all that apply:

- They write or approve the menu
- They write or approve recipes
- They complete food orders
- They conduct kitchen inspections
- They prepare and/or serve food
- They review food allergies and identify appropriate/acceptable alternatives
- Other: \_\_\_\_\_

32) As a thank you for participating in this step of our study, please provide your center's name and address in order to receive the Comark PDT300 food thermometer. You may enter N/A if you don't want to provide this information.

- a. Comment: \_\_\_\_\_

33) As an additional research step, we will be calling childcare centers on three random days to record the foods served at that day's lunch meal.

As a thank you for participating in this step of our study, your facility will receive complimentary CACFP-compliant recipes and a \$50 gift certificate from Amazon to purchase foodservice equipment. Do you:

- a. Agree to participate in this study through the activities specified above, if randomly selected
- b. Request more information before deciding
- c. Decline to participate in this study

## Appendix C - HEI–2015<sup>1</sup> Components & Scoring Standards

**Table C.1.**

*Components & Scoring Standards*

Component	Maximum Points	Standard for maximum Score	Standard for Minimum Score of Zero
<b>Adequacy:</b>			
<b>Total Fruits<sup>2</sup></b>	5	≥0.8 cup equiv. per 1,000 kcal	No Fruit
<b>Whole Fruits<sup>3</sup></b>	5	≥0.4 cup equiv. per 1,000 kcal	No Whole Fruit
<b>Total Vegetables<sup>4</sup></b>	5	≥1.1 cup equiv. per 1,000 kcal	No Vegetables
<b>Greens and Beans<sup>4</sup></b>	5	≥0.2 cup equiv. per 1,000 kcal	No Dark Green Vegetables or Legumes
<b>Whole Grains</b>	10	≥1.5 oz equiv. per 1,000 kcal	No Whole Grains
<b>Dairy<sup>5</sup></b>	10	≥1.3 cup equiv. per 1,000 kcal	No Dairy
<b>Total Protein Foods<sup>6</sup></b>	5	≥2.5 oz equiv. per 1,000 kcal	No Protein Foods
<b>Seafood and Plant Proteins<sup>6,7</sup></b>	5	≥0.8 oz equiv. per 1,000 kcal	No Seafood or Plant Proteins
<b>Fatty Acids<sup>8</sup></b>	10	(PUFAs + MUFAs)/SFAs ≥2.5	(PUFAs + MUFAs)/SFAs ≤1.2
<b>Moderation:</b>			
<b>Refined Grains</b>	10	≤1.8 oz equiv. per 1,000 kcal	≥4.3 oz equiv. per 1,000 kcal
<b>Sodium</b>	10	≤1.1 gram per 1,000 kcal	≥2.0 grams per 1,000 kcal
<b>Added Sugars</b>	10	≤6.5% of energy	≥26% of energy
<b>Saturated Fats</b>	10	≤8% of energy	≥16% of energy

1: Intakes between the minimum and maximum standards are scored proportionately.

2: Includes 100% fruit juice.



**3:** Includes all forms except juice.

**4:** Includes legumes (beans and peas).

**5:** Includes all milk products, such as fluid milk, yogurt, and cheese, and fortified soy beverages.

**6:** Includes legumes (beans and peas).

**7:** Includes seafood, nuts, seeds, soy products (other than beverages), and legumes (beans and peas).

**8:** Ratio of poly- and monounsaturated fatty acids (PUFAs and MUFAs) to saturated fatty acids (SFAs).

<https://epi.grants.cancer.gov/hei/developing.html>

## Appendix D - Kansas: 2010 Census

**Table D.1.**

*Definition of Urban Area: Population of Greater than 50,000*

- Wichita . . . . .	382,368
- Overland Park . . . . .	173,372
- Kansas City . . . . .	145,786
- Topeka . . . . .	127,473
- Olathe . . . . .	125,872
- Lawrence. . . . .	87,643
- Shawnee. . . . .	62,209
- Manhattan . . . . .	52,281

<https://www.census.gov/prod/cen2010/cph-2-18.pdf>

## Appendix E - KDHE – Laws and Regulations for Licensing

### Preschools and Child Care Centers (March 2019)

#### **K.A.R. 28-4-439. Child care centers: food service.**

(a) Single or multi-unit centers serving a meal prepared at the center to 13 or more children shall employ a staff person who:

- (1) Has knowledge of nutritional needs of children;
- (2) understands quantity food preparation and service;
- (3) practices sanitary methods of food handling and storage;
- (4) is sensitive to individual and cultural food tastes of children; and
- (5) is willing to work with the program director in planning learning experiences for children

relative to nutrition.

(b) Centers shall serve meals and snacks as follows:

Length of Time at	Center Food Served
2 1/2 to 4 hours	1 snack
4 to 8 hours	1 snack & 1 meal
8 to 10 hours	2 snacks & 1 meal or 1 snack & 2 meals
10 hours or more	2 meals & 2 or 3 snacks

(c) Meals and snacks.

(1) Breakfasts shall include:

(A) A fruit, vegetable, or full-strength fruit or vegetable juice;

(B) bread, a bread product or cereal; and

(C) milk.

(2) Noon or evening meals shall include one item from each of the following:

(A) Meat, poultry, fish, egg, cheese, cooked, dried peas or beans, or peanut butter;

(B) two vegetables, two fruits, or one vegetable and one fruit; 67

(C) bread, bread product or cereal; and

(D) milk.

(3) Mid-morning and mid-afternoon snacks shall include at least two of the following:

(A) Milk, milk product or food made with milk;

(B) fruit, vegetable, or full-strength fruit or vegetable juice;

(C) meat or a meat alternate; or

(D) bread, bread product or cereal.

(d) A sufficient quantity of food shall be prepared for each meal to allow the children second portions of vegetables or fruit, bread, and milk.

(e) Food allergies or special dietary needs of specific children shall be known to cooks, staff members, child care workers, and substitutes.

(f) Menus shall be posted where parents can see them. Copies of menus served the previous month shall be kept on file.

[http://www.kdheks.gov/bcclr/regs/cc/Preschools\\_and\\_Child\\_Care\\_Centers\\_all\\_sections.pdf](http://www.kdheks.gov/bcclr/regs/cc/Preschools_and_Child_Care_Centers_all_sections.pdf)

**Pages 66-68 on PDF**

## Appendix F - Non-CACFP Compliant Menu

**Table F.1.**

*Center 3 Standard Menu*

<b>Main Meal</b>	<b>Day 1</b>	<b>Day 2</b>	<b>Day 3</b>	<b>Day 4</b>
Fluid Milk	Skim Milk	Skim Milk	Skim Milk	Skim Milk
Meat/Meat Alt	Pre-cooked beef crumbles	Turkey wrap with diced turkey ham and succotash	Chicken fajitas – white meat	Southwest chicken bowl – white meat and black beans
Fruit	Mandarin oranges in light syrup	Tropical fruit canned in juice	Tropical fruit canned in juice	Tropical fruit canned in juice
Vegetable	Red and green bell peppers	Carrots and broccoli	Lettuce salad, fajita sliced peppers	Broccoli and Carrots
Grain	Brown rice	WW tortilla	Tortilla	Quinoa
Extra		Ranch made with Greek yogurt	Cheese Ranch made with oil	Teriyaki sauce Ranch dressing

**Table F.2.***Center 3 Vegetarian Alternative Menu*

<b>Veg Meal Alt.</b>	Day 1	Day 2	Day 3	Day 4
Fluid Milk	Skim Milk	Skim Milk	Skim Milk	Skim Milk
Meat/Meat Alt	“Brown rice”	“WW tortilla” Vegetable wrap with succotash	“Whole grain pasta”	Southwest bowl with beans
Fruit	Mandarin oranges in light syrup	Tropical fruit canned in juice	Tropical fruit canned in juice	Tropical fruit canned in juice
Vegetable	Red and green bell peppers	Carrots and broccoli	Lettuce salad	Broccoli and Carrots
Grain	Brown rice	WW tortilla	Whole grain pasta	Quinoa
Extra		Ranch made with Greek yogurt	Ranch made with oil	Teriyaki sauce Ranch dressing

## Appendix G -Micro-nutrient Substitution Methods

**Table G.1.**

*Micro-nutrient Substitution Methods*

<b>Food</b>	<b>Nutrient</b>	<b>Substitution</b>
Breadcrumbs, panko, plain	Vitamin B12, folate, choline, zinc	Wheat flour, white, all-purpose, enriched, bleached, energy match
Breadcrumbs, panko, whole wheat	Vitamin B12, folate, choline, zinc, potassium	Wheat flour, whole-grain, energy match
Potato wedges	Choline	Potato, baked
Potato wedges	Folate	Potato, steak fries
Ranch salad dressing, reduced fat	Choline	Ranch dressing (regular), energy matched
Sunflower seed butter	Choline	Sunflower seeds, energy matched
Tortilla chips, nacho, with enriched masa	Choline	Corn flour, masa, enriched, white, energy match
Whole wheat breadding on nuggets	Energy, protein, carbohydrate, fat, calcium, vitamin B12, folate, vitamin A, choline, zinc, potassium, iron, sodium	Crackers, saltine, whole wheat