ASSESSING FOOD SECURITY AND NEEDS OF OKLAHOMA STATE UNIVERSITY STUDENTS USING A MOBILE FOOD PANTRY

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ASSESSING FOOD SECURITY AND NEEDS OF OKLAHOMA STATE UNIVERSITY STUDENTS USING A MOBILE FOOD PANTRY

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Abstract: Food insecurity is a prevalent issue throughout the United States, the state of Oklahoma, and on Oklahoma State University's (OSU) Stillwater campus. Previous research has shown that food insecurity rates among college and university students tend to be higher than the national average. Studies done on OSU's food insecurity levels have been even higher. Students who experience food insecurity also face adversities to their mental and physical health and academic performance. Mobile food pantries (MFP) are a relatively new innovation that have been shown to be effective in addressing food insecurity, particularly the issue of accessibility. There are limited published studies about using mobile food pantries to address food insecurity among college students. Our Daily Bread Food and Resource Center (ODB) in Stillwater, Oklahoma has implemented a MFP on OSU's campus. This study surveyed student clients of the MFP to assess the food security status of the population and their needs and perceptions of the MFP. The voluntary survey questionnaire was administered at the MFP sites via a Quick Response (QR) code that students scanned to access the survey. It contained questions from the USDA Food Security Survey as well as response items developed by the researcher based on Thomas' and Penchasky's (1981) five dimensions of access. The sample size of the population ranged from 125 to 141, depending on the specific question. From 134 students who answered the food security questions, more than 83% were considered food insecure. The respondents agreed that the MFP provided sufficient foods and produce regarding nutritional value, variety, diversity, and acceptability. Although students were open to the opportunity of using ODB's food assistance programs, they were mostly unaware of the services offered. While many students rode bikes or walked as their main form of transportation, several mentioned that no grocery store or market was within walking distance. Overall, the findings of this study showed that a need existed for a MFP on OSU's Stillwater campus. Students would prefer that the MFP operate at later times in the day and be located near central campus.

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CHAPTER I

INTRODUCTION

Food insecurity is a worldwide problem and is prevalent in Oklahoma and on the campus of Oklahoma State University (OSU) in Stillwater. Food is one of the most basic needs for human survival (Maslow, 1943). In 2018, 14.3 million United States (U.S.) households were food insecure, meaning they had unreliable access to sufficient foods to maintain an active and healthy lifestyle (Coleman-Jensen et al., 2020). Oklahoma's food insecurity rates are higher than the average, in comparison to other states in the United States. Fifteen percent of the population is food insecure in both the state of Oklahoma and in Payne County (Feeding America, 2021). Increases in the cost of tuition and ineligibility for specific governmental support systems make college students vulnerable to food insecurity (Bruening et al., 2016; El Zein et al., 2018). The U.S. Government Accountability Office (GAO) estimates food insecurity rates of more than 30% among U.S. college students (GAO, 2018). The COVID-19 pandemic has increased the risk of food insecurity among all demographic groups due to a general decrease in livelihoods.

Food insecurity causes many issues, physical and psychological. Some consequences of food insecurity included: hunger, malnutrition, increased risk of obesity and chronic diseases, lower academic performance, and increased issues with mental health (Bruening et al., 2016; Goldrick-Rab, Schneider, et al., 2018). Such risks hinder college students from reaching their full potential academically, socially, and personally.

A common response to the issue of addressing food insecurity is the use of food pantries. Food pantries are typically non-governmental operations dedicated to reducing food insecurity within communities. Our Daily Bread Food and Resource Center of Stillwater, Oklahoma, often referred to as "Our Daily Bread" (ODB) serves the citizens of Payne County as a supplemental food assistance program by providing free groceries to individuals and households in need. However, lack of accessibility is a contributing factor to food insecurity (Penchansky & Thomas, 1981). Mobile food pantries (MFP) are used as a way to provide greater access to foods in a convenient manner for their clients. ODB implemented a MFP on OSU's campus to address the food needs of university students.

In addition to non-governmental food assistance programs, federally-funded assistance programs offered by the U.S. government to its citizens are also a way to mitigate food insecurity. These include programs such as the Supplemental Nutrition Assistance Program (SNAP), Women, Infants, and Children (WIC) program, and the Food Distribution Program on Indian Reservations (FDPIR) [USDA, 2021]. Although governmental food assistance programs are technically inclusive of all U.S. citizens who are in need, college students face distinct barriers to receiving these benefits. Strict work and financial requirements make it more difficult for college students to apply for and less likely to qualify for such programs (Blagg et al., 2017; Broton & Goldrick-Rab, 2017). In addition, a negative social stigma exists around college students using these types of assistance programs. Most students who are eligible to receive the governmental benefits or have open access to non-governmental programs do not use these resources (Bailey-Davis et al., 2013; Bedore et al., 2016; Kaiser et al., 2007)

Problem Statement

Research surrounding the topic of food insecurity on college campuses has recently increased but is still not plentiful. Studies regarding the role of MFPs in reducing food insecurity are extremely limited. To my knowledge, there is no research on the development of mobile food pantries to address the needs of food insecure college students. Leaders or the providers of food assistance programs such as food pantries and MFPs need to understand the status, needs, and perceptions of their populations to achieve their goals and best serve their potential clients.

Objectives

This study aimed to 1) estimate the prevalence of food insecurity among students at OSU and 2) identify perceptions, interests, and needs of OSU students using the ODB MFP regarding the five dimensions of access (Penchasky & Thomas, 1981). The results of this study will help the staff and MFP managers at ODB to better address the issues of food access and food insecurity among college students, specifically at OSU.

Assumptions

The assumption was made that the students completing the confidential questionnaire would answer the survey questions honestly. Because the data were self-reported, it was subject to individual bias, including recall problems (Rogers, 2003). Survey questions are also open to misinterpretation by the participants. The survey questionnaire results do not reflect the food security status of the university as a whole.

CHAPTER II

REVIEW OF LITERATURE

Theoretical Framework

This study was guided and conducted by the five dimensions of access (Penchansky & Thomas, 1981) and Maslow's (1943) initial hierarchical needs theories. Each theory supported the understanding of basic human needs and the factors contributing to OSU students' food access in relation to food insecurity.

Five Dimensions of Access

Penchansky and Thomas (1981) introduced the concept of five dimensions of access as a measurement tool for health care systems. The five dimensions of access are 1) acceptability, 2) accessibility, 3) accommodating, 4) affordability, and 5) availability (Penchansky & Thomas, 1981). Caspi et al. (2012) modified the theory to use as a guide in measuring access to foods and it has since been used by other scholars for the same purpose (Andress & Fitch, 2016; Flint et al., 2013). Hsiao et al. (2018) used the Caspi et al. (2012) adaptation of Penchansky's and Thomas' (1981) framework to evaluate a food intervention.

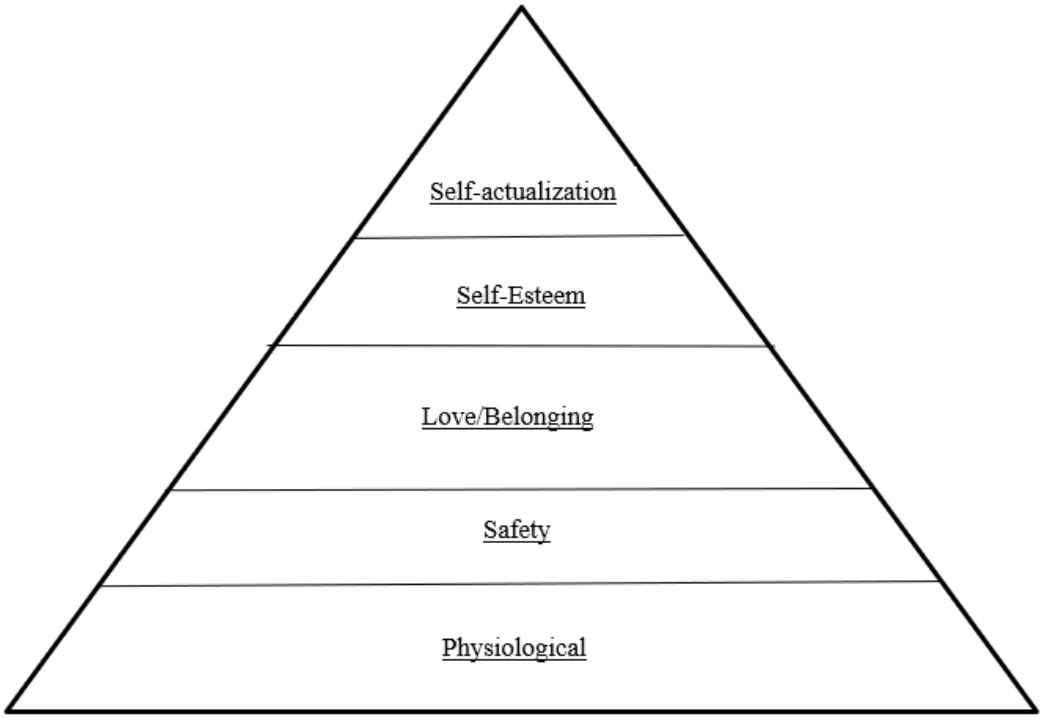
Caspi et al. (2012) described the five dimensions of access in relation to food. *Acceptability* are "people's attitudes about attributes of their local food environment, and whether or not the given supply of products meets their personal standards" (p. 1173) [Caspi et al., 2012]. *Accessibility* builds on the dimension of availability with the addition of geographic location. Caspi et al. (2012) said "[accessibility] refers to the location of the food supply and ease of getting to that location. Travel time and distance are key measures of accessibility" (p. 1173). *Accommodating* is the convenience of the food sources and its products to its customers. This could include factors such as hours of operation, types of payments accepted, and safety and comfort of the infrastructure (Caspi et al., 2012). *Affordability* measures the prices of food and the local consumer's ability to pay for it. And *availability* is the "adequacy of the supply of healthy food" (p.1173). It points to the number of markets or stores available for people to obtain food and how many nutritious foods are in stock and available to purchase at those locations.

Maslow's Hierarchical Needs

Maslow (1943) suggested that a hierarchy of basic needs existed for human survival: 1) physiological, 2) safety, 3) love and belonging, 4) esteem, and 5) self-actualization. The theory states that these needs exist in an ascendant hierarchal form (Figure 1) and the upper tiers only can be achieved by first fulfilling the needs below. Food is a physiological need, and therefore is a basic need that precedes all other needs in the hierarchy. Without first satisfying every human's requirement for food, the needs of safety, esteem, and self-actualization cannot be met (Maslow, 1943).

Figure 1

Maslow's Pyramid of Hierarchy of Needs



Food Insecurity

The United States Department of Agriculture (USDA) Economic Research Service (ERS) (2020) defines food insecurity as "a lack of consistent access to enough food for an active, healthy life" (para. 4). In 2019, 10.5% of U.S. households were classified as food insecure at some point during the year (ERS, 2020).

Various "ranges of severity of food insecurity" (para. 1) are defined by the USDA: *high*, *marginal*, *low*, and *very low* (ERS, 2020). High and marginal levels are related to being food secure, whereas low and very low levels indicate food insecurity. Households with *low food security* "obtained enough food to avoid substantially disrupting their eating patterns or reducing food intake by using a variety of coping strategies, such as eating less varied diets, participating in Federal food assistance programs, or getting food from community food pantries" (para. 3) (ERS, 2020). Six percent of U.S. households experienced low food security in 2019 (ERS, 2020). *Very low food security* status means that "normal eating patterns of one or more household members were disrupted and food intake was reduced at times during the year because they had insufficient money or other resources for food" (para. 3). Four percent, or 5.3 million households, had very low food security in the United States in 2019 (ERS, 2020).

Food insecurity and hunger are different. According to the ERS (2020), food insecurity is an "economic and social condition of limited or uncertain access to adequate food" (para. 10), whereas "hunger is an individual-level physiological condition that may result from food insecurity" (para. 10). An individual can experience very low food security "with or without hunger" (Borre et al., 2010, p. 444). However, a lack of availability of food does not necessarily indicate hunger. Someone may have very low food security levels and have no hunger, but the

available foods they are consuming lack the nutritional value necessary for a healthy body and lifestyle (Borre et al., 2010). Hunger is a consequence, not a cause, of food insecurity.

Food Insecurity and the COVID-19 Pandemic

The COVID-19 pandemic has had an unkind and disruptive impact on the entire world. The disruption in the food supply chain and the increase of unemployed persons has particularly affected food security. Studies have shown a correlation between unemployment and food insecurity (Huang et al., 2016; Nord et al., 2014). In April of 2020, the unemployment rate in the United States was 14.8% (Congressional Research Service, 2021).

A study in Vermont was completed during the first month of the state's stay-at-home order and assessed the early impacts of COVID-19 on food insecurity (Niles et al., 2020). The researchers found a 32% increase in household food insecurity since the beginning of the stay-at-home order, and two-thirds of the households reported eating less since the COVID-19 pandemic began (Niles et al., 2020). In March of 2020, the national food insecurity rates had more than tripled (38%) what they had been prior to COVID-19 infecting the U.S. population (Fitzpatrick et al., 2020).

In relation to the five dimensions of access (Penchansky & Thomas, 1981), the availability and accessibility of foods decreased with the onset of COVID-19. When international trade halted at the beginning of the pandemic, it reduced the availability of certain foods. In addition, many stores temporarily or, in worst cases, permanently closed due to restrictive policies or lack of revenue. These closings were a debilitating factor in accessing healthy foods. In contrast, many food markets improved their accommodation while enforcing restrictions and specific CDC-recommended safety requirements for the protection and wellbeing of their customers.

Food Insecurity Among College Students

The Nature of Food Insecurity Among College Students

Food insecurity is a major issue for college students throughout the United States. In a review of studies done by the United States Government Accountability Office (GAO, 2018), 22 of the 31 investigations reviewed estimated food insecurity rates of more than 30.0% among U.S. college students. Bruening et al. (2017) completed a systematic review of literature regarding food insecurity among college students. Of the 59 studies reviewed, the researchers found the average food insecurity rate among college students was 42.0% (Bruening et al., 2017). This was consistent with the findings of Balsiger (2018), which showed that 42.0% of OSU's students involved in his study were food insecure. In support, another recent study at OSU completed by Weaver (2020) found that nearly one-half of the students who participated in her survey had experienced food insecurity. A study conducted at a rural university in Oregon found that 59.0% of the respondents had experienced food insecurity with or without hunger at some point during the previous year (Patton-López et al., 2014). A research study completed at the University of Hawaii at Manao found that 21.0% of the 441 non-freshman students surveyed were food insecure and 24.0% were at risk of food insecurity. Students who lived on-campus or off-campus with roommates had a higher risk of being food insecure in comparison to all other students. The study identified a need for further research regarding food insecurity on university campuses (Chaparro et al., 2009).

Several studies found a relationship existed between students' food security status and their ethnicity. At the University of Hawaii at Manao, the students who identified as Hawaiian/Pacific Islander, Filipino, and/or mixed ethnicity were at a higher risk of food insecurity than those who identified as other ethnicities (Chaparro et al., 2009). Black and multiethnic students were more

likely to experience food insecurity than other groups (Blagg et al., 2017; Maroto et al., 2014; Martinez et al., 2018; Wood & Harris, 2018). The University of Wisconsin HOPE Lab's national survey found that black students were an average of 17 percentage points more likely than non-Hispanic white students to experience food insecurity (Goldrick-Rab, Schneider, et al., 2018). A series of student interviews done at Virginia Tech University found that multiracial respondents were 1.7 times more likely to experience food insecurity than White/Caucasian students, with Hispanic/Latino students 2.6 times more likely to have low or very low food security (Hall et al., 2019). Balsiger's (2018) demographics of food insecure students at OSU showed that 63% of the 30 Black students in his study were food insecure.

Bruening et al. (2017) reviewed 52 studies regarding food insecurity among students at postsecondary institutions. A majority of the studies examined relationships between food insecurity and sociodemographic characteristics. They found that "students of color, younger students, students with children, and students who were financially independent were more likely to report food insecurity" (p. 1780).

Researchers have found that lack of money and the high costs of college contribute to the high rates of food insecurity among students in postsecondary institutions (Goldrick-Rab, Richardson, et al., 2018; Martinez et al., 2017; Weaver, 2020). Goldrick-Rab et al. (2018) results from a study at the University of Wisconsin HOPE Lab found that 22.0% of the respondents who were university students stated they had skipped or cut the size of their meals due to a lack of money at least 3 days in the 30 days preceding their survey. Six percent of the same respondents indicated they had gone at least one whole day without eating due to a lack of money (Goldrick-Rab, Richardson, et al., 2018). A study at the University of California found that "students described the high cost of attendance (tuition and fees, books and supplies, housing and food,

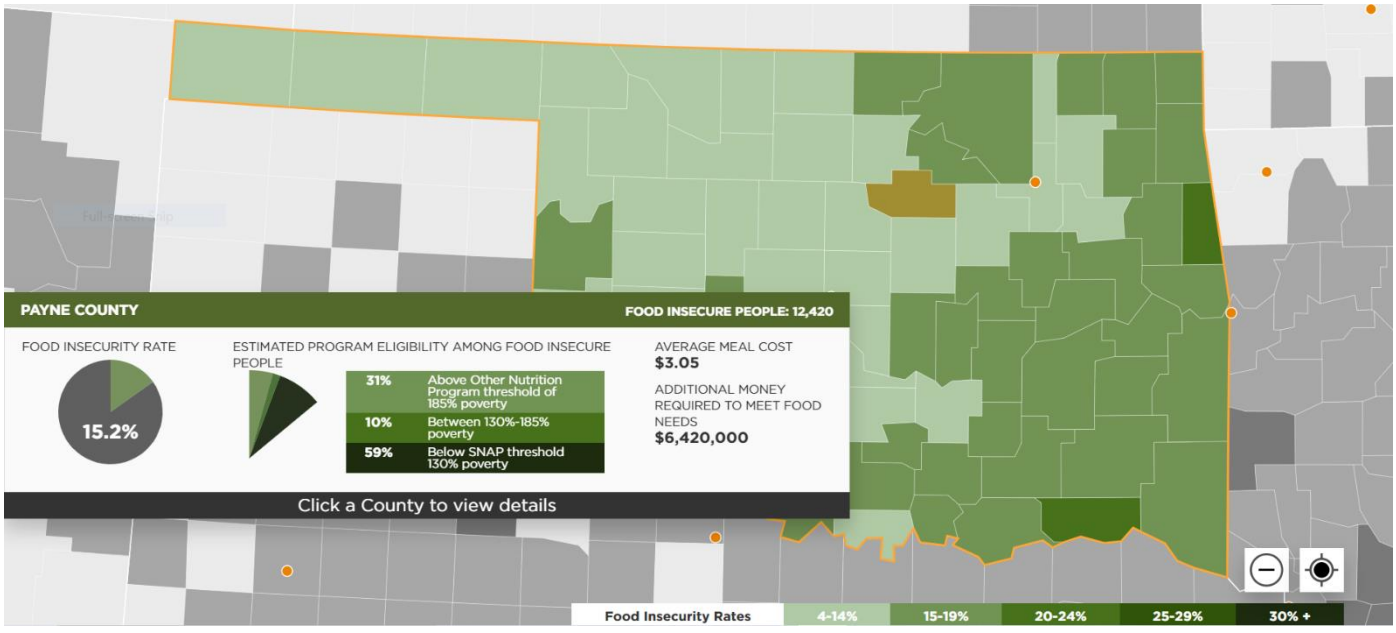
transportation, and personal expenses) as the primary cause of food insecurity either personally or among their peers" (p.p. 133-134) (Martinez et al., 2017).

Food Insecurity at OSU

Food deserts are areas with limited access to affordable foods that contribute to healthy eating due to their physical unavailability and/or related economic burdens (USDA, 2009). According to a study by LaVarnWay and Craven (2017), "59% of Payne County's population has low access to food and 31.9% lives in a food desert" (p. 8). Figure 2 shows the food insecurity rate and eligibility for governmental assistance programs for Payne County, Oklahoma in comparison to all other counties throughout the state. Payne is highlighted in yellow in Figure 2 and is the county in which OSU's Stillwater campus resides.

Figure 2

Food Insecurity and Estimated Program Eligibility in Payne County, OK, 2018



Note. Adapted from 2020 *Map the Meal Gap*, by Feeding America, 2020. (https://map.feedingamerica.org/county/2018/overall/oklahoma). In the public domain.

Moreover, according to Feeding America (2020), 18 of 28 majority Native American populated counties in the United States were considered "high food insecurity counties" in 2020, and in the top 10% of county food insecurity rates. The state of Oklahoma has the second-highest Native American population of all U.S. states at a level of 13.36% (World Population Review, 2021). In Stillwater alone, almost 4.5% of the population is Native American (DATA USA, 2020). OSU's Stillwater campus has 4.5% Native American students (University Stats, 2019). Native American populations also have higher rates of unemployment and poverty, high risk-health conditions, lack of clean water access, and overall poorer health (Feeding America, 2020). Persons with these types of conditions are more susceptible to higher food insecurity.

Weaver (2020) recently completed a study on "students' perspectives of strategies to combat food insecurity on campus" (p. 4) which had major implications on food insecurity among students attending OSU's Stillwater campus. She found that of 276 respondents, 51.8% of those students had low or very low food security based on the USDA Food Insecurity Questionnaire (Weaver, 2020). Weaver's findings supported a similar 2018 assessment of food security on OSU's campus. In that study, Balsiger (2018) found that 42.0% of his participants were food insecure. Balsiger (2018) concluded his research thesis by saying that "[t]here is hope for combating food insecurity among college students with a mixture of focused research, postsecondary institution support, and food assistance program availability" (p. 79).

Consequences of Food Insecurity

Experiencing food insecurity has a range of harmful impacts on a person's physical, mental, and socioeconomic status and opens the door to other disparities. Campbell (1991) said that "[p]otential consequences of food insecurity include hunger, malnutrition and (either directly or indirectly) negative effects on health and quality of life" (p. 408). When the human body is

not properly nourished, our organs cannot function adequately, leading to damage and the likelihood of diseases and other ill-health conditions to be prominent. Dietz (1995) found that food insecurity can lead to obesity, eating disorders, and unhealthy relationships with food. Food insecurity, particularly if experienced beginning at a young age, deters proper development of the human brain and body (Ke & Ford-Jones, 2015). Kleinman et al. (1998) study showed that hunger and food insecurity have a relationship to the child's mental well-being and emotional ranges. Individuals who experience food insecurity beginning at a young age are also more prone to continue to be food insecure later in life (Ke & Ford-Jones, 2015).

In addition to negatively affecting a person's overall health, food insecurity negatively impacts academic success and can be detrimental to mental and physical health (Blagg et al., 2017; Broton & Goldrick-Rab, 2017; Bruening et al., 2017; Cady, 2014; Maroto et al., 2014; Martinez et al., 2018; Patton-López et al., 2014; Wood & Harris, 2018). Typical college students are at an age of range where they are transitioning to adulthood and face significant life milestones (Settersten & Ray, 2010). Experiencing food insecurity during these transformative years can potentially affect their cognitive, academic, and social development in negative ways (Patton-López et al., 2014).

A review done by Bruening et al. (2018) found that food insecurity was associated with students having lower grade point averages, more difficulty concentrating in classes, and higher prevalence of withdrawing from courses or their institutions. In a study done at California State University Chico (CSU- Chico), 7.0% of respondents who reported very low food security also self-reported a GPA between 1.51 and 2.00 (Bedore et al., 2016). Bruening et al. (2016) found that freshmen students experiencing food insecurity were at nearly three times higher risk for depression and anxiety when compared to food secure freshmen. Wattick et al. (2018) researched

a collegiate, young adult population and discovered that food insecurity and low fruit and vegetable intake were significant predictors of depression in both male and female students.

Addressing Food Insecurity

Many college campuses offer free food pantries to assist in reducing food insecurity among their students. According to research analyst Heather Fernandez (2020), "[i]n 2007, the College and University Food Bank Alliance knew of only one food pantry operating on a college campus. As of October 2019, the [GAO] estimated that this number had grown to more than 700" (para. 1). In fact, all students who had experienced food insecurity in a study across all campuses in the University of California system reported that they often relied on campus free food resources for assistance (Martinez et al., 2017).

Food Pantries

Non-governmental food assistance programs, such as food pantries and food banks, are a common way to fight food insecurity in communities in the United States. Food pantries are typically non-profit organizations that provide local people with food and other basic needs free of charge. They vary in capacities and logistics but strive toward the goal of easing the lives of their clients by supplementing their needs. Feeding America is the largest U.S. food and hunger non-profit organization, providing resources and connections to other non-profits and food insecure individuals. According to Feeding America (2021), 60,000 food pantries were operating in the United States In 2017, more than one-quarter of food-insecure households in the United States received food from food pantries (Coleman-Jensen, 2018). A study focused on the appropriateness of food banks in relation to the diets of diabetics and their dietary self-management support found that food banks were successful in improving the individuals' food security, food stability, and fruit and vegetable intake (Seligman et al., 2018). However, no

differences were found in improving depressive symptoms, distress, self-care, hypoglycemia, or self-efficacy (Seligman et al., 2018).

ODB is a certified 501(c)3 nonprofit organization working to reduce food insecurity in the Payne County region through its free food pantry services. ODB has partnerships with multiple organizations from whom they receive a variety of resources. It is part of the Feeding America network of food banks as well as the Regional Food Bank of Oklahoma, and it benefits by having access to resources provided by this network. "Feeding America secures donations from national food and grocery manufacturers, retailers, shippers, packers, and growers and from government agencies and other organizations" (ODB, 2020, para. 3). According to ODB's 2020 Impact Letter, it served an average of 3,080 individuals each month, (ODB, 2021).

Food Pantry Practices

Researchers have studied the best practice operations that make food pantries successful in their endeavors. Studies have emphasized the importance of data collection, volunteers and partnerships, client choice models, diversity, and promotion and awareness (Cooksey-Stowers et al., 2019; Goldrick-Rab, Richardson, et al., 2018; Hoisington et al., 2002; Martin et al., 2016; Reppond et al., 2018; Ullevig et al., 2019; Wilson, 2016).

The success of a food pantry relies heavily on volunteers and partnerships. Several studies noted the crucial importance of these factors while implementing or operating a food pantry (Goldrick-Rab, Richardson, et al., 2018; Hoisington et al., 2002; Reppond et al., 2018). In the 2020 report, ODB reported that 6,890 volunteer hours were recorded (Our Daily Bread, 2021). Ullevig et al. (2019) noted the importance of partnerships in providing guidance in the implementation of a campus garden when they said "the campus garden did not have the benefit of a partner agency, so the [reparations of the campus garden and food pantry] lacked a clear

understanding of the knowledge needed in specific areas" (p. 3). The same study found that offering a wide variety of ways for volunteers to be involved in the food pantry and garden was positively related to the volunteer experience and to volunteer retention (Ullevig et al., 2019). In addition, the study stressed that proper training of volunteers and staff was a critical component to a smoothly run food pantry (Ullevig et al., 2019). Howe and Sindorf (2020) mentioned the importance of recruiting volunteers that speak multiple languages to ensure that all clients have the ability to communicate and ask questions, if needed.

Food pantry researchers have found that offering a variety of foods for clients to choose from, instead of limiting their options and not allowing personal choices, is better for the overall client experience and leads to clients having greater self-efficacy (Cooksey-Stowers et al., 2019; Martin et al., 2016; Pruden et al., 2020). One operation style that has gained popularity in the food pantry industry is the 'client choice model.' The client choice model allows clients at food pantries to choose their own foods to take home and assemble their own produce boxes, similar to an experience they would have at a food market or grocery store (Arnold, 1996). Not only does the client choice model give a sense of empowerment to food pantry clients, it also allows them to prioritize the goods that they need, in turn reducing food waste (Pruden et al., 2020). A study across four food pantries in Baltimore, Maryland observed the food waste of pantries that used the client choice model in comparison to the others who used a prepackaged box system (traditional pantries). They found that "clients from client-choice food pantries had 22.6% of their bag leftover at follow-up and clients from traditional pantries had 34.1% of their bag leftover" (Pruden et al., 2020, p. 266). The client choice model has shown great preference in the food pantry world. However, a case study at an urban university campus found that a key challenge of operating an on-campus food pantry was ensuring that a variety of food options

were available to the clients at all times. Foods that could be prepared with minimal preparation or equipment were especially important (Ullevig et al., 2019).

One study addressed this question: "How do campus food pantries currently and ideally serve students to foster their success?" (Reppond et al., 2018, p. 381). The study's participants were people from any college campus in Michigan who played an active role in the campus food pantry on some level. Themes that emerged from its cluster maps included 1) accessibility, 2) available items, 3) student success, 4) support, 5) partnerships, and 6) awareness. Statements about accessibility included topics such as anonymity, having the pantry in a discrete location on campus, creating a welcoming environment, and providing a seamless intake process. Responses varied regarding a limitation on the number of times that students could use the campus food pantry services. They ranged from allowing students to use once per month to unlimited times. Many responses about available items were related to offering foods that may not be affordable to students in addition to basic, healthy foods and providing resources other than food. The student success construct "contained statements related to holistic student support, including academic support, student retention, and academic success, easing stress, and reducing anxiety." (Reppond et al., 2018, p. 390). The participants agreed that to ensure student success, the pantries needed to provide proper support to students as they apply for governmental food programs, offer nutrition education and financial literacy programs, and refer them to external assistance services. The respondents also spoke of the importance of partnerships and awareness in operating a successful student food pantry. This included general awareness knowledge of the food pantry's existence on the campus and awareness of the issue of food insecurity and the stigma that often comes with it (Reppond et al., 2018).

Promotion and awareness play a key role in the success of food pantries. Cornell University and Feeding America (2016) produced a report promoting "the power of nudges" (p. 1), which included the importance of signage, colors, attractive displays, and pictures to lead people to more nutritious food intake. Howe and Sindorf (2020) suggested that any documents and promotional items should be offered in multiple languages that are commonly spoken by clients and volunteers in the pantries' regions.

Constraints of Food Assistance Programs

One way to address food insecurity is through governmental assistance programs such as the Supplemental Nutrition Assistance Program (SNAP). However, many college students find it difficult to apply and gain eligibility for such programs (Blagg et al., 2017; Broton & Goldrick-Rab, 2017). SNAP eligibility is largely based on a household's income. Until very recently, the program excluded college students from eligibility if they were enrolled at least half-time at a higher education institution (GAO, 2018). Due to the COVID-19 pandemic and its negative toll on students and their employment, 2020 and 2021 revisions to SNAP's policy temporarily favor college students more than they had before. "The Consolidated Appropriations Act 2021" has temporarily expanded the SNAP eligibility. Students enrolled for a minimum of half-time credit hours at a post-secondary education institution now may be eligible for SNAP if they 1) are eligible for work-study programs or 2) have an expected family contribution of $0 (USDA ERS, 2021).

Researchers from California State University, Chico identified food insecure students and constraints for food assistance programs, such as the USDA's SNAP and California's state SNAP, 'CalFresh'. Despite their finding that 46.0% of respondents were food insecure, fewer than three-in-ten of the 46.0% were eligible for CalFresh. Furthermore, only 19.0% of those

eligible respondents were actually enrolled in the program, thus 80.0% of CalFresh eligible respondents were not enrolled in the nutrition assistance program (Bedore et al., 2016). Weaver's (2020) research on OSU's campus revealed that less than one-half of the respondents in her study were even aware that college students could potentially receive SNAP benefits.

Food interventions such as pantries and SNAP provide greater accessibility and affordability to food (Penchansky & Thomas, 1981). However, such assistance programs are not always used as widely or as often for them to be effective because of the social stigma attached with such reliance (Bailey-Davis et al., 2013; Kaiser et al., 2007; Vahabi & Damba, 2013). A research team at the University of Florida investigated the predictors of and barriers to using an on-campus food pantry (El Zein et al., 2018). After evaluating the awareness and determinants of use for the on-campus food pantry, their results showed that 32.0% of the population was considered food insecure. More than 15.0% reported using the pantry for food acquisition, and of those students, 36.4% stated that the pantry was their sole source of food. The students who did not use the on-campus food pantry indicated that their key barriers to usage were social stigma, lack of information, self-identity, and hours of operation. The researchers concluded that college campuses should implement food assistance programs in ways that reduce social stigma (El Zein et al., 2018).

A recent analysis of food insecurity on college campuses and the beliefs of university administrators found that three themes emerged from interviews regarding the topic: 1) students are not forthcoming about food insecurity issues, 2) students come unprepared to care for themselves, and 3) resources available to students (Moore & Roberts, 2021). "The administrators viewed strategies such as establishing a food pantry as trendy and not needed… (p. 4)." Moore and Roberts (2021) recommended that "future research explore ways to reduce the stigma and

increase the visibility of food insecurity on university campuses" (Moore & Roberts, 2021, p. 4). They suggested that research should explore whether university students at university campuses have access to adequate and nutritious foods (Moore and Roberts, 2021). Bringing it 'closer to home', 90.81% of Balsiger's (2018) respondents at OSU did not use any type of food assistance program even though he found 42.0% of the population to be food insecure. In additional, 53.0% of students in his study reported that "they would be embarrassed by going to a food pantry" (p. 78) and 45.0% of the respondents "said people would think less of them for visiting a food pantry" (p. 78) (Balsiger, 2018).

Mobile Food Pantries

Mobile food pantries (MFP) are used to provide greater access to foods in a convenient manner for their clients. However, a lack of consistency in verbiage exists throughout the literature on these transportable food assistance programs. Various studies refer to them as "mobile food pantries", "mobile markets", "mobile produce markets", "mobile vendors", and "mobile pantries". For the sake of continuity, I referred to them as mobile food pantries or mobile pantries in this study.

Feeding America (2021) defined mobile food pantries in the following way:

> The Mobile Pantry Program directly serves clients in areas of high need in an effort to supplement other hunger-relief agencies in that area. Through a mobile pantry, a truckload of food is distributed to clients in pre-packed boxes or through a farmers market-style distribution where clients choose to take what they need. [They] make food more accessible in underserved communities where people with limited financial resources may not be able to access food through traditional grocery stores or food pantries. This allows food banks to provide rescued food and grocery products – including meat, produce, and baked goods – to people more quickly and flexibly. (para. 1)

A study by Hsiao et al. (2018) assessed the influence of a mobile pantry on fruit and vegetable access, especially in low-income urban neighborhoods. The researchers found that

mobile pantries were typically used to fill gaps in areas where "stable food pantry" locations could not meet the demand. They concluded that mobile markets "may influence fruit and vegetable access in low-income urban neighborhoods by facilitating the five dimensions of access and may especially benefit older adults and individuals living alone" (Hsiao et al., 2018, p. 1332).

A significant hindrance to accessing sufficient foods is frequently location. A study by Twill et al. (2016) followed the implementation of a food pantry on a college campus and they stated, "The location of a community pantry relative to the college campus may be [a] barrier to service" (Twill et al., 2016, p. 342).

In addition to providing basic food resources, some mobile pantries also offer nutrition education to their clients. A mobile pantry in Washington, DC provided nutrition education to middle school students and tested them on subjects surrounding agriculture and nutrition both before and after the lessons. The overall average scores increased from 51.0% to 58.0% (Ellsworth et al., 2015). A news article from Tennessee highlighted the use of old school buses as "mobile cafeterias used to provide free meals to students during the summer months" (Bendici, 2018, p. 20). This type of innovation repurposed old equipment that could no longer be used safely, providing a way to reduce waste of unused busses while offering food insecure individuals with an outlet to food.

Mobile food pantries provide food insecure individuals with greater access to fresh produce that they may not otherwise have (Hsiao, 2016; Tester et al., 2012; Zepeda et al., 2014). A study in Florida focused on the relationship between food insecurity and healthcare decisions among mobile food pantry clients. The researchers found that the clients were able to better manage their health conditions as well as alleviate some of the extensive costs of healthcare

because of the fruits and vegetables offered at the mobile food pantry (Bradley et al., 2018). Wasson (2019) in Fayetteville, Arkansas did a similar study where she surveyed participants of a mobile food pantry to determine if the mobile pantry increased access to fresh fruits and vegetables. After comparing the results of her survey to the USDA's Food Patterns for fruit and vegetable consumption, she found that the likelihood of participants to consume fruits and vegetables increased with the number of times they received such foods from the mobile pantry. The researcher recommended that future mobile pantries use the same model of Seeds for Thought, the mobile pantry she evaluated (Wasson, 2019).

ODB has implemented a MFP in towns surrounding Stillwater and on OSU's Stillwater campus. Research has shown that giving food pantry clients a personal choice of foods can increase food security, client self-efficacy, and improve their diets (Martin et al., 2016; Martin et al., 2013). ODB's MFP was developed to offer a variety of food choices to its clients.

CHAPTER III

METHODOLOGY

Survey Development

The survey questionnaire was an adaptation of questions from several resources (See Appendix A). The USDA *Adult Food Security Survey Module* six-item short form food security survey was used to create questions to evaluate the food security status of students. This six-item food security questionnaire has been used in multiple studies involving food security on college campuses (Martinez et al., 2017; Patton-Lopez et al., 2014). The questions were modified to specifically address the students' experience "since being in college," rather than addressing the "past 12 months." This decision was made keeping freshman students in mind, as many of them would not have been in college during the entirety of the prior 12 months. The questions in relation to the students' perceptions of the ODB MFP were developed based on Caspi et al. (2012) adaptation of Penchansky's and Thomas' (1981) theory of the five dimensions of food access, i.e., acceptability, accessibility, accommodating, affordability, and availability. This portion of the instrument included 11 items. The questionnaire also asked questions about the students' personal characteristics. The instrument was reviewed by a panel of four experts. The experts included the Executive Director of Our Daily Bread Food and Resource Center, as well as OSU faculty in the Department of Nutritional Sciences, and the Department of Agricultural

Economics. The survey questionnaire was edited and revised based on recommendations from the panel of experts.

Participants

The participants in the study were obtained in a purposive (Patton, 2002) manner based on specific characteristics. Participants in this study were OSU undergraduate and graduate students of 18 years or older who utilized the ODB MFP during the fall semester of 2020.

Oklahoma State University Institutional Review Board Approval

The final questionnaire, including the survey questions and participant informed consent form was approved by the OSU Institutional Review Board for Human Subjects (see Appendix B). The application number is IRB-20-345.

Data Collection

The survey questionnaire was entered into Qualtrics, an online design, distribution, analysis, and reporting software. The questionnaire was then generated into a quick response (QR) code that students were able to scan using their smartphones. This code took the students to a link to the questionnaire. Although this method of data collection restricted students without cell phones or smart phones from being able to respond, it ensured proper COVID-19 protocols were followed and it was a convenient and effective way to collect data.

The QR codes were dispersed personally at each ODB MFP event on the OSU Stillwater campus. The times and locations where data collection occurred included:

- Friday, September 18 9:00 a.m. – 11:00 a.m. at the Student Union Parking Garage
- Wednesday, September 30 3:00 p.m. – 5:00 p.m. at the Student Union Upper Plaza
- Friday, October 9 11:00 a.m. – 1:00 p.m. at the Student Union Upper Plaza
- Wednesday, October 21 2:00 p.m. – 4:00 p.m. at the Kerr-Drummond Dining Services
- Wednesday, November 25 2:00 p.m. – 4:00 p.m. at the Family and Graduate Student Housing
- Monday, December 7 2:00 p.m. – 4:00 p.m. at the Family and Graduate Student Housing

These data collection stations were chosen because of their differing locations on the OSU, Stillwater campus. At the end of the line for food and produce, a table was set up with the QR code papers. I stood at the table and asked each client if they were an OSU student and if they had a smart phone in their possession. If their answers were yes, I kindly prompted them to complete the survey questionnaire to improve ODB's MFP. Photographs of data collection in the Student Union Upper Plaza are included in Appendix C.

Data Analysis

The survey data were analyzed using Statistical Package for Social Sciences (SPSS) version 25. Statistical analysis included descriptive statistics such as frequencies and percentages. Each student's food security status was determined using the coding and scoring procedures as indicated by the USDA ERS (USDA ERS, 2021). The number of affirmatives indicated by the participants' responses to the food security questionnaire led to their assignment to a food security category High food security status meant the respondent had zero responses affirming food insecurity. Similarly, one affirmation of food insecurity led to the respondent being categorized as marginal food security status. Two, three, or four affirmatives classified the individual as having a low food security status and five or six answers implying food insecurity

was considered a very low food security status. Further, the respondents were divided into groups of either “food secure” (high or marginal food security) or “food insecure” (low or very low food security). Students who did not answer all of the USDA Food Security Survey questions were excluded from the analyses.

CHAPTER IV

FINDINGS

The following tables, 1 – 4.4, display the frequencies and percentages from the results of the survey questionnaire.

As shown in Table 1, majority of students were 18 to 23 years of age (70.9%), female (60.9%), and of White Non-Hispanic descent (47.2%). The colleges at OSU were represented somewhat evenly by the respondents, with the College of Arts and Sciences having the highest amount of representation (24.0%). The largest portion of students who completed the questionnaire were graduate students (28.0%), with freshman students next at 26.4%. Fifty-six percent of the respondents resided on-campus and 41.6% lived off-campus in some capacity. The main mode of transportation to and from campus for the respondents was walking or riding a bicycle (56.0%). Most of the respondents were not international students nor came from out-of-state. Regarding employment, 66.4% of the respondents were employed either part-time or full-time (See Table 1).

Table 1

Selected Characteristics of OSU Students Who Completed Questionnaires at the ODB MFP Sites (n = 125)

	f	%
Age		
18 to 23	83	70.9
24 to 29	21	17.9
≥30	13	11.2
Race/Ethnicity		
White Non-Hispanic	59	47.2
American Indian or Alaska Native	7	5.6
Hispanic	16	12.8
African American or Black	9	7.2
Multi-Racial	5	4.0
Asian	3	2.4
Other	20	16.0
Did not respond	6	4.8
Gender		
Male	47	37.6
Female	76	60.8
Did not respond	2	1.6
Student Classification		
Freshman	33	26.4
Sophomore	16	12.8
Junior	29	23.2
Senior	11	8.8
Graduate	35	28.0
Did not respond	1	0.8
International Student Status		
Yes	33	26.4
No	89	71.2
Did not respond	3	2.4
Out-of-State Student		
Yes	47	37.6
No	78	62.4
Oklahoma State University College Affiliation		
Ferguson College of Agriculture	18	14.4
Arts and Sciences	30	24.0

Engineering, Architecture, and Technology	28	22.4
Human Sciences, Education, Health, and Aviation	21	16.8
Business	18	14.4
University College	2	1.6
Did not respond	8	6.4
Housing		
On campus in residence hall or housing	70	56.0
Off campus alone	16	12.8
Off campus with roommates	29	23.2
Off campus with parents/relatives	2	1.6
Off campus with spouse/partner and children	5	4.0
Did not respond	3	2.4
Employment		
Not employed	34	27.2
< 20 hours/week	44	35.2
20 to 39 hours/week	34	27.2
40 or more hours/week	5	4.0
Did not respond	8	6.4
Mode of Transportation		
Walking or riding a bicycle	70	56.0
Driving	40	32.0
Bus system	15	12.0

Tables 2 indicates the results from the data collected from the USDA Food Security Survey questionnaire. Eighty percent of students responded that it was *sometimes* or o*ften* true that their food did not last and they did not have money to buy more while attending college (see Table 2). Similarly, 81.5% of respondents reported that they could not afford to eat balanced meals while attending college, either *often* or *sometimes*. A high number of students (60.7%) responded that they had cut the size of or skipped meals since being at college because they did not have enough money for food. Of the students who had cut meal size or skipped meals, 44.5% indicated that they cut their meals almost every month, 37.0% said they cut their meals some months, and 13.6% said they cut their meals only during 1 or 2 months. Most students responded

yes to eating less than they felt they should (59.7%) and having been hungry but did not eat (48.5%) because they did not have enough money for food. In addition, 32.0% of respondents indicated that they had lost weight because of lacking enough money for food.

Table 2

USDA Food Security Survey Question Responses of OSU Students Completed a Survey Questionnaire at the ODB MFP Sites (n = 141)

	f	*%*
"The food that I bought just didn't last and I didn't have enough money to get more." While attending college, is that often, sometimes, or never true for you?		
Often true	43	30.4
Sometimes true	70	49.6
Never true	20	14.2
Did not respond	8	5.6
"I couldn't afford to eat balanced meals." While attending college, was that often, sometimes, or never true?	*f*	*%*
Often true	57	40.4
Sometimes true	58	41.1
Never true	20	14.2
Did not respond	6	4.3
Since being at college, did you ever cut the size of your meals or skip meals because there wasn't enough money for food?	*f*	*%*
Yes	85	60.7
No	39	27.9
Did not respond	16	11.4
How often did you cut your meals- almost every month, some months, not every month, or in only 1 or 2 months? [b]	*f*	*%*
Almost every month	36	44.5
Some months but not every month	30	37.0
Only 1 or 2 months	11	13.6
Did not respond	4	4.9
Since being at college did you ever eat less than you felt you should because there wasn't enough money for food?	*f*	*%*
Yes	80	59.7

No	44	32.8
Did not respond	10	7.5

Since being at college were you ever hungry but didn't eat because there wasn't enough money for food?	*f*	%
Yes	65	48.5
No	60	44.8
Did not respond	9	

While at college, did you ever lose weight because there wasn't enough money for food?	*f*	%
Yes	43	32.0
No	77	57.5
Did not respond	14	10.4

Note b: This question was displayed if the student answered "Yes" to question 3.

While at college, did you ever lose weight because there wasn't enough money for food?	*f*	*%*
Yes	43	32.0
No	77	57.5
Did not respond	14	10.4

The responses to the USDA Food Security Survey reported in Table 2 were scored according to the guidelines provided by the USDA to determine food insecurity status of students. The results showed that 83.84% of the OSU student respondents who answered all of the food security questions were food insecure compared to 16.16% who were food secure.

Table 3

USDA Food Security Survey Scored Responses for OSU Students who Completed Survey Questionnaires at the ODB MFP Sites (n = 130)

Number of Affirmative Responses	Food Security Status	Determined Food Security Status	*f*
Zero	High food Security	Food Secure	13
One	Marginal food security	Food Secure	8
Two	Low food security	Food Insecure	23
Three	Low food security	Food Insecure	9
Four	Low food security	Food Insecure	17
Five	Very low food security	Food Insecure	13
Six	Very low food security	Food Insecure	47

Note: The scored responses were determined using the USDA Food Security Survey Scoring Guidelines (USDA ERS, 2021). The student respondents were categorized according to their level of food security. A student who responded to the survey with zero questions that indicated food insecurity, was categorized as having "High Food Security." One affirmation of food insecurity mandated a "Marginal Food Security" status. Students who had two, three, or four affirmatives were classified as "Low Food Security." "Very Low Food Security" meant students responded to the questionnaire with five or six answers that implied food insecurity. Students who did not answer all the USDA Food Security Survey questions were excluded from the categories.

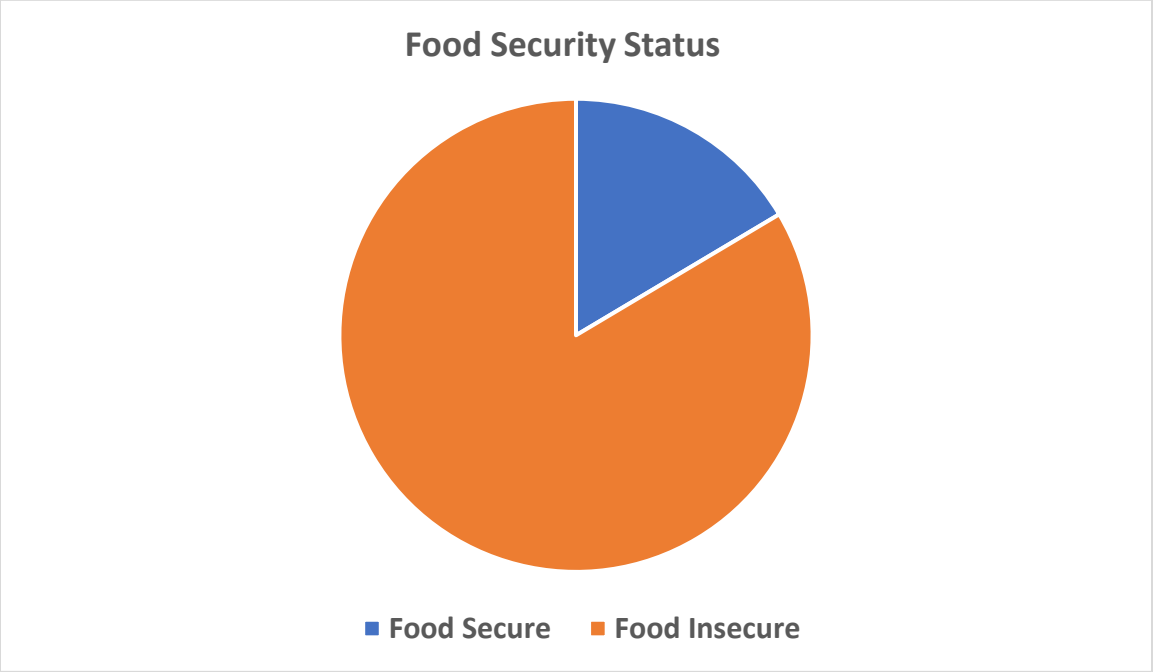
Table 4

USDA Food Security Survey Food Security Status Percentages of OSU Students who Completed Survey Questionnaires at the ODB MFP Sites

Status	***%***
Food Secure	16.51
Food Insecure	83.84

Figure 3

USDA Food Security Survey Food Security Status Percentages of OSU Students who Completed Survey Questionnaires at the ODB MFP Sites



Tables 5 – 5.2 report students' responses regarding food security and the COVID-19 pandemic. The questions were a modification of the USDA Food Security Survey. Item 1 of the COVID-19 related food security questions was asked to assess any changes in food security before the beginning of the COVID-19 pandemic. As shown in Table 5, 47.0% of the respondents reported that they had enough to enough to eat, but not always the kinds of food they wanted. Furthermore, 32.6% of respondents said they had enough of the kinds of food they wanted to eat and 20.4% indicated they sometimes or often did not have enough to eat (see Table 5).

Table 5

Food Security During COVID-19 Question 1 of OSU Students who Completed Survey Questionnaires at the ODB MFP Sites (n = 132)

Which of these statements best describes the food you ate as a college student before March 13, 2020 (before the beginning of the COVID-19 pandemic)?	*f*	*%*
Enough of the kinds of food I wanted to eat	43	32.6
Enough, but not always the kinds of food I wanted to eat	62	47.0
Sometimes not enough to eat	23	17.4
Often not enough to eat	4	3.0

Students' answers to the second question related to COVID-19 are presented in Table 5.1. The question prompted students to choose an answer with which they most identified regarding foods they had eaten since being at college during the Fall 2020 semester. Fall 2020 was the first full semester in which COVID-19 was prevalent and classes were held in-person at OSU for the entirety of the semester. Similar to the results shown in Table 5, 54.5% of the respondents indicated that they had enough, but not always the kinds of food they wanted to eat. Nearly one-fourth (23.9%) of the students said they had enough of the kinds of food they wanted to eat and a total of 21.6% of the respondents indicated that they sometimes or often did not have enough to eat.

Table 5.1

COVID-19 Food Security Question 2 Responses of OSU Students Completed Surveys at the ODB MFP Site (n = 134)

Since being at college this semester, which of these statements best describes the food eaten by you? Select only one answer.	*f*	%
Enough of the kinds of food I wanted to eat	32	23.9
Enough, but not always the kinds of food I wanted to eat	73	54.5
Sometimes not enough to eat	21	15.7
Often not enough to eat	8	5.9

Table 5.2 shows student responses regarding their confidence in affording food during the four weeks after completing the questionnaire. Most respondents (70.2%) were either *somewhat* or *moderately confident*, 18.3% were very confident, and 7.6% were not at all confident that they would be able to afford the food they needed for the next four weeks (see Table 5.2).

Table 5.2

Confidence in Affording Food over the Next Four Weeks of OSU Students who Completed the Survey Questionnaires at the ODB MFP Sites (n = 131)

How confident are you that you will be able to afford the food you need for the next four weeks?	*f*	*%*
Not at all confident	10	7.6
Somewhat confident	43	32.8
Moderately confident	49	37.4
Very confident	24	18.3
Did not respond	5	3.8

The following results pertain to the questions asked of students regarding Our Daily Bread (ODB) and the trial mobile market it provided on the OSU Stillwater campus during the Fall 2020 semester.

Table 6

OSU Students' Awareness of the ODB Mobile Food Pantry (n = 131)

How did you become aware of the Our Daily Bread mobile food pantry?	*f*	*%*
Another student or person at OSU	73	55.7
From advertisements/promotional pieces	34	25.9
At the ODB food pantry	10	7.63

From seeing the truck and stumbling upon it	12	9.16
Other	2	1.52

Table 6 shows that more than half of the students (55.7%) who utilized the Our Daily Bread (ODB) mobile food pantry (MFP) became aware of it from another student or person at OSU. One-quarter of respondents became aware via advertisements and promotional pieces. Regarding the general services offered by ODB at their stable location in Stillwater, 44.3% of students were not aware of their services and 74.0% of the students had never used the food pantry services. When asked how likely they were to use the ODB mobile food pantry in the future, 71.8% indicated that they were *extremely likely*, 25.2% said *somewhat likely*, and 3.0% indicated *somewhat unlikely*.

Table 6.1

OSU Students' Awareness and Use of the ODB Food and Resource Center Food Pantry Services (n = 131)

Are you aware of the food pantry services offered at Our Daily Bread?	*f*	*%*
Yes	73	55.7
No	58	44.3
Have you ever used the food pantry services offered at Our Daily Bread?		
Yes	30	22.9
No	97	74.0
Did not respond	4	3.0
How likely are you to use the ODB mobile food pantry in the future?		
Extremely likely	94	71.8
Somewhat likely	33	25.2

Somewhat unlikely	4	3.0

Table 6.2 shows the students' perceptions of the foods and produce offered at the ODB MFP. Almost all student clients of the MFP (96.9%) agreed that MFP provided a variety of produce and food product options. More than 9-in-10 (95.3%) agreed that the MFP provided food options that otherwise would not be easily available to them. More than 9-in-10 students also agreed that the food products they received were without spots or bruises (91.3%), nutritious (97.6%), and would be sufficient for filling their hunger for the next two weeks (90.6%).

Table 6.2

OSU Students' Perceptions of the Mobile Food Pantry Foods and Produce (n = 127)

	f	*%*
This mobile food pantry provided a variety of produce and food product options		
Strongly agree	80	63.0
Agree	43	33.9
Disagree	3	2.4
Strongly disagree	1	0.7
This mobile food pantry provided me with options of food that otherwise would not be easily available to me.		
Strongly agree	56	44.1
Agree	65	51.2
Disagree	5	3.9
Strongly disagree	1	0.7
The food products I have been given are without bruises or spots.		
Strongly agree	64	50.4
Agree	52	40.9
Disagree	10	7.8
Strongly disagree	1	0.7
The food products I received from this mobile food pantry are nutritious.		
Strongly agree	66	51.9
Agree	58	45.7
Disagree	2	1.6
Strongly disagree	1	0.7

The food products I received from the mobile food pantry will be sufficient for filling my hunger for the next two weeks.		
Strongly agree	58	45.7
Agree	57	44.9
Disagree	12	9.4

Table 6.3 shows the results of students' perceptions of the MFP operations, including accessibility and accommodation (Penchansky & Thomas, 1981). Nearly all (96.8%) of the MFP clients who responded to the questionnaire *agreed* or *strongly agreed* that the MFP was in a location that was easily accessible to them. When asked which on-campus location would be the most convenient, the most respondents indicated Central Campus (30.7%), with North Campus being the second most popular with 24.4% of respondents. South Campus and East Campus were indicated by 3.1% and 9.4% of students, respectively. Students were also allowed to write in other locations. The Family Resource Center was an important location suggested by students, as seven students mentioned that it would be a convenient location for ODB to offer the MFP. Afternoon (1pm-4pm) and Evening (4pm-7pm) were the most popular choices of respondents when asked what the most convenient time for them would be as a client of the MFP. Lastly, 96.0% of clients agreed that it was easy to figure out how the MFP worked.

Table 6.3

OSU Students' Perceptions of the Mobile Food Pantry's Operations (n = 127)

	f	*%*
This mobile food pantry is in a location that is easily accessible to me.		
Strongly agree	68	53.5
Agree	55	43.3
Disagree	3	2.4
Strongly disagree	1	0.7
Which location on campus would be the most convenient for you as a customer of this mobile food pantry?		

North campus (near North Classroom building, Noble Research Center)	31	24.4
South campus (near Social Sciences and Humanities Building)	4	3.1
East campus (near the Spears School of Business, Morrill Hall)	12	9.4
West campus (near the College of Human Sciences, Agricultural Hall, Kerr and Drummond Hall)	28	22.0
Central campus (Library Lawn, Classroom Building, and surrounding areas)	39	30.7
Other responses	13	10.2 -Family Resource Center (7) -Off campus (1) -Outside of 20 something (1) -Parker Hall (1) -Student Union (3)
Of the following times, which would be most convenient for you as a customer of the mobile food pantry?		
Early morning 7am – 9am	11	8.7
Mid morning 10 am – 12pm	22	17.3
Afternoon 1pm – 4pm	60	47.2
Evening 4pm – 7pm	34	26.8
As a customer, this mobile food pantry was easy to figure out how it works.		
Strongly agree	77	60.6
Agree	45	35.4
Disagree	4	3.1

Table 6.4

Students' Distance from Grocery Stores and Food Markets (n = 126)

There is a grocery store or food market within reasonable walking distance from my residence.	*f*	*%*

Strongly agree	37	29.4
Agree	50	39.7
Disagree	37	29.4
Strongly disagree	2	1.6

Table 6.4 shows the students' levels of agreement about whether a grocery store or food market was within reasonable walking distance from their residences. Although a large majority (69.1%) of students *agreed* or *strongly agreed*, almost one-third of the students (31.0%) either *disagreed* or *strongly disagreed* that there was a grocery store or food market within reasonable walking distance from where they resided.

CHAPTER V

CONCLUSION

Summary of the Study and Its Findings

This study assessed food security among OSU students who used the ODB MFP in Stillwater, Oklahoma along with identifying their perceptions and needs regarding the MFP and related food assistance issues. Based on the USDA Food Security questionnaire and the Survey Scoring Guidelines, 84.8% of the study's participants were food insecure with 20.0% of the total sample experiencing low food security and 46.2% having very low food security. This rate is much higher than that reported by several other studies conducted prior to the Fall 2020 survey, including 1) the national average food insecurity rate of U.S. households (10.5%); 2) the state food insecurity average for Oklahoma (15.2%); 3) the average food insecurity rate among postsecondary studies (30.0%); and 4) the rates of previous food insecurity studies targeting college students at OSU (42 to 52%) (Balsiger, 2018; ERS, 2020; Feeding America, 2020; Weaver, 2020).

Of the respondents who completed the confidential survey, most students (70.9%) were 18 to 23 years of age, female (60.9%), and of White Non-Hispanic descent (47.2%). These results are comparable to other studies at postsecondary institutions. Studies by Chaparro et al. (2009), Bruening et al. (2016), and Goldrick-Rab et al. (2018) all found that Non-Hispanic,

White/Caucasians were the largest numbers of their participants. Goldrick-Rab et al. (2018), Patton-López et al. (2014), Chaparro et al. (2009), and Bruening et al. (2016) also found females were the largest gender in their studies. As of Fall 2020, OSU's student population was made up of 51.8% female and 67% White Non-Hispanic. The OSU college affiliation percentages of the study group likewise were consistent with the OSU enrollment overall. The College of Arts and Sciences had the largest numbers (24%) of students represented. However, it is notable that 12.8% of the study's participants were Hispanic while Stillwater's overall Hispanic population is 4.87% (Data USA, 2020).

Graduate students made up the largest percentage of the population at 28.0%. This was higher than expected, as OSU's graduate student population in the Fall of 2020 was 15.0% (OSU, 2020). Students 18 to 23 years old (70.9%) made up the largest age demographic of the participants. The typical age of an undergraduate student in the U.S. in 2018 was from 18 to 24 years old and the typical age of a graduate student was 25 and older, which was reinforced by this study's data showing that 28.0% of the respondents were graduate students and 71.2% were undergraduate students (NCES, 2020).

Although unemployment is typically a predicting factor of food insecurity in the United States, studies among college students have shown the opposite (Feeding America, 2020). Many food security studies on college campuses found that most of their samples were employed at some level (Hall et al., 2019; Hughes et al., 2011; Payne-Sturges et al., 2018; Wood & Harris, 2018). The employment rate of the study's participants was 66.4%, and higher than the employment rate that Balsiger (2016) found in his OSU-based study (57%) but similar to the 69% employment that Hughes et al. (2011) reported in their review of studies. The employment rate found in this study was also consistent with the Blagg et al. (2017) finding that students who

worked full-time were more likely to be food insecure than full-time workers who do not attend school.

The questionnaire for this study also included several questions regarding food insecurity in relation to the COVID-19 pandemic. The percentage of people who had enough of the kinds of food they wanted to eat dropped from 32.6% before the beginning of the COVID-19 pandemic to 23.9% while attending college during the pandemic. The number of students who had enough to eat, but not always the kinds of food they wanted increased during the pandemic.

One key objective of this study was to find the student clients' perceptions of the ODB MFP on the OSU, Stillwater campus, particularly relevant to the five dimensions of access: acceptability, accessibility, accommodation, affordability, and availability (Penchansky & Thomas, 1981). Previous research noted that a client choice model with a wide variety of options was important to having a successful food pantry (Martin et al., 2016; Pruden et al., 2020; Reppond et al., 2018).

The students' responses related to the questions were consistently *agree* or *strongly agree* that the food products were sufficient. At least 90% of them *agreed* or *strongly agreed* to every prompt related to the acceptability of foods they received. These included being offered foods that 1) were a variety of options, 2) would not otherwise be easily available to them, 3) were without bruises or spots, 4) were nutritious, and 5) would be sufficient to fill their hunger for the next two weeks. As supported by Penchansky and Thomas (1981), these results indicated the acceptability of the foods offered at the ODB MFP as viewed by the student participants.

Most students (96.8%) *agreed* or *strongly agreed* that the MFP was in an easily accessible location to them. Of the location options offered, about one-third (30.7%) of the

respondents stated that Central campus (Library Lawn, Classroom Building, and surrounding areas) would be the most convenient location as a client of the MFP. Overall, the findings implied that all locations were easily accessible, but some are more convenient. The respondents choosing Central Campus as the most convenient location was consistent with the total number of customers at each location. The MFP located on Central Campus at the Upper Student Union Plaza had the most total clients (109) in comparison to all other sites. When given the option to write in another location, several respondents (7) indicated that the "Family Resource Center" (FRC) would be the most convenient. This additional response was not surprising knowing that a majority of the respondents were graduate students and the FRC is located in the middle of the graduate student housing area. No evidence showed that an increase of clients was linked to an increased awareness of the MFP's existence as the semester progressed. The number of total clients at each location on the days of data collection included:

Location on OSU campus	Date	Time	Number of Clients
Student Union parking garage	September 18	9 a.m. – 11 a.m.	42
Upper Student Union plaza	September 30	3 p.m. – 5 p.m.	109
Upper Student Union plaza	October 9	11 a.m. – 1 p.m.	25
Kerr/Drummond Dining area	October 21	2 p.m. – 4 p.m.	57
Family Resource Center lot	November 25	2 p.m. – 4 p.m.	72
Family Resource Center lot	December 7	2 p.m. – 4 p.m.	58

Conclusions and Implications

The results of this study articulate and confirm the persistence of food insecurity among OSU students and the need for a mobile food pantry on OSU's Stillwater campus. Caspi et al.

(2012) mentioned that part of accessibility and accommodation were ease of use. Ninety-six percent of the study's participants either *strongly agreed* or *agreed* that it was easy to understand how the MFP operated. Almost one-half of the students (47.2%) indicated that the afternoon time from 1 p.m. to 4 p.m. would be the most convenient time for ODB to provide the MFP. The second most popular response was evening time from 4 p.m. to 7 p.m. These times are nearer to the end of the typical workday or class schedule where students might have more free time to stop by the MFP on the OSU Stillwater campus. Of note, the MFPs offered at the earlier times had fewer total clients. About one-third of students (31.0%) either *disagreed* or *strongly disagreed* that a grocery store or food market was within reasonable walking distance from their residences. This is a relevant consideration because most of the students either walked or rode a bicycle (56%) as their main mode of transportation.

The importance of both promotion and partnerships found in the literature was reinforced by the finding that 55.7% of the students became aware of the ODB MFP from another person at OSU and 25.9% from advertisements or promotional pieces. The results revealed the important discovery that while food insecurity is high throughout OSU student population, many were not aware (44.3%) or did not use (74.0%) the ODB food pantry services. Moreover, although 74.0% of the sample mentioned that they have never used ODB's services, 71.8% said they would be *extremely likely* to use them in the future.

Limitations of the Study

The survey questionnaire results do not reflect the food security status of the university as a whole or of all the people who have used the ODB MFP services on OSU's Stillwater campus. In other words, the generalizability of the study's findings are limited to the respondents. In fact, a majority of the ODB MFP clients did not participate in the survey (~64.0%). Of the students who

agreed to participate in the study, 22 of the respondents did not fully complete the questionnaire. These students' partially completed questionnaires were removed from the data analysis. It is important to note that the nature of the environment in which the questionnaires were distributed was more attractive to students who were in need of assistance for food. The survey questionnaire was entirely self-reported and not all of its verbiage was explicitly defined or operationalized, therefore some questions may have been interpreted differently by the respondents.

Recommendations for Future Research

Future research should focus on food insecurity among specific demographic groups on college campuses such as graduate students, Black, Hispanic, and Native American students, as well as students with spouses and/or children. More specifically, future research on OSU's campus also should investigate what kinds of foods students want to eat. Many students have experienced hunger at some point because they did not have enough money to purchase food. Studies regarding student budgets and financial priorities may be beneficial in investigating this issue.

Recommendations for Practice

Some students were not aware of the services that ODB offered, but most were open to using their services. ODB should continue offering a wide variety of produce and foods for clients to choose from, as well as directing clients to resources external to the food pantry services. ODB's services should include assistance with applying for governmental programs such as SNAP. ODB should offer the MFP in multiple locations across the Stillwater campus, with Central Campus as the most frequent location.

Conclusion

The need for a food assistance program that travels to be closer to the student population was shown by the 31.0% of students who reported no grocery store or food market within walking distance from their place of residence and by the 56.0% of the population who either walked or rode a bicycle as their main mode of transportation. Mobile pantries may vary in logistics, but they all have the same purpose of providing people with access to foods by bringing the goods closer to them. A mobile food pantry on OSU's Stillwater campus could better and more efficiently serve the food insecure students to achieve the five dimensions of access (Penchasky & Thomas, 1981), especially accessibility, accommodation, and availability, and supporting improved food security among the students in need.

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APPENDICES

APPENDIX A

Survey Questionnaire

Background Information You are invited to be in a research study regarding **mobile food pantries on Oklahoma State University's campus**. We ask that you read this form and ask any questions you may have before agreeing to be in the study. Your participation in this research is voluntary. There is no penalty for refusal to participate, and you are free to withdraw your consent and participation in this project at any time. You can stop the survey at any time. **This study is being conducted by:** Madison Lapke, Graduate Student in International Agriculture, Oklahoma State University under the direction of Barbara Stoecker, Professor, Department of Nutritional Sciences, Oklahoma State University.

Procedures **If you agree to be in this study, we would ask you to do the following things:** We will ask you to complete a questionnaire on a tablet computer. **Participation in the study involves the following time commitment:** 5-10 minutes

Confidentiality The information you give will be anonymous. This means that your name will not be collected or linked to the data in any way. The researchers will not be able to remove your data from the dataset once your participation is complete. We will collect your information through a Qualtrics online questionnaire. This data will be stored on a password protected computer. The research team works to ensure confidentiality to the degree permitted by technology. It is possible, although unlikely, that unauthorized individuals could gain access to your responses because you are responding online. However, your participation in this online survey involves risks similar to a person's everyday use of the internet. If you have concerns, you should consult the survey provider privacy policy at https://www.qualtrics.com/privacy-statement.

Contacts and Questions The Institutional Review Board (IRB) for the protection of human research participants at Oklahoma State University has reviewed and approved this study. If you have questions about the research study itself, please contact the Principal Investigator at 563-542-4288, Madison Lapke. If you have questions about your rights as a research volunteer or would simply like to speak with someone other than the research team about concerns regarding

this study, please contact the IRB at (405) 744-3377 or irb@okstate.edu. All reports or correspondence will be kept confidential.

Precautions toward COVID-19 The following steps are being taken to address the risk of coronavirus infection:

Screening: Researchers and participants who show potential symptoms of COVID-19 (fever, cough, shortness of breath, etc.) will NOT participate in this study at this time.

Physical distancing: Whenever possible, we will maintain at least 6 feet of distance between persons while conducting the study.

Mask/Covering: Researchers and participants will shield their mouth and nose with a cloth face cover or mask during the study, even when maintaining at least 6 feet of distance. Tissues will be available to cover coughs and sneezes.

Handwashing: Researchers and participants will wash hands before/during (activity) or use a hand sanitizer containing at least 60% alcohol.

Disinfecting materials: When feasible, researchers will clean and disinfect surfaces between participants, using an EPA-registered disinfectant or a bleach solution (5 tablespoons of regular bleach per gallon of water) for hard materials and by laundering soft materials. Disinfected materials will be handled using gloves, paper towel, plastic wrap or storage bags to reduce the chance of re-contamination of materials.

Q1 Statement of Consent If you agree to participate, please click "I Agree" to continue and complete the questionnaire.

I agree (1)

I do not agree (2)

Q1 "The food that I bought just didn't last, and I didn't have enough money to get more." While attending college, is that often, sometimes, or never true for you?

Often true (1)

Sometimes true (2)

Never true (3)

Prefer not to respond (4)

Q2 "I couldn't afford to eat balanced meals." While attending college was that often, sometimes, or never true for you?

Often true (1)

Sometimes true (2)

Never true (3)

Prefer not to respond (4)

Q3 Since being at college, did you ever cut the size of your meals or skip meals because there wasn't enough money for food?

Yes (1)

No (2)

Prefer not to respond (3)

Display This Question:

If Q3 = 1

Q3A How often did you cut your meals – almost every month, some months but not every month, or in only 1 or 2 months?

Almost every month (1)

Some months but not every month (2)

Only 1 or 2 months (3)

Prefer not to respond (4)

Q4 Since being at college did you ever eat less than you felt you should because there wasn't enough money for food?

Yes (1)

No (2)

Prefer not to respond (3)

Q5 Since being at college, were you ever hungry but didn't eat because there wasn't enough money for food?

Yes (1)

No (2)

Prefer not to respond (3)

Q6 While at college, did you ever lose weight because there wasn't enough money for food?

Yes (1)

No (2)

Prefer not to respond (3)

Q7 Which of these statements best describes the food you ate as a college student before March 13, 2020 (before the beginning of the COVID-19 pandemic)? Select only one answer.

Enough of the kinds of food I wanted to eat (1)

Enough, but not always the kinds of food I wanted to eat (2)

Sometimes not enough to eat (3)

Often not enough to eat (4)

Q8 Since being at college this semester, which of these statements best describes the food eaten by you? Select only one answer.

Enough of the kinds of food I wanted to eat (1)

Enough, but not always the kinds of food I wanted to eat (2)

Sometimes not enough to eat (3)

Often not enough to eat (4)

If Q7 or Q8 answer 2, 3, or 4:

Q8A Why did you not have enough to eat? Select all that apply.

□Couldn't afford to buy more food (1)

□Couldn't get out to buy food (for example, didn't have transportation, or had mobility or health problems that prevented you from getting out) (2)

□Afraid to go or didn't want to go out to buy food (3)

□Couldn't get groceries or meals delivered to me (4)

□The stores didn't have the food I wanted (5)

Q9 How confident are you that you will be able to afford the food you need for the next four weeks? Select only one answer.

Not at all confident (1)

Somewhat confident (2)

Moderately confident (3)

Very confident (4)

Prefer not to respond (5)

Q10 How did you become aware of the Our Daily Bread mobile food pantry?

Another student or person at OSU

From advertisements/ promotional pieces

At the Our Daily Bread food pantry

From seeing the truck and stumbling upon it

Other

Q11 Are you aware of the food pantry services offered at the Our Daily Bread?

Yes (1)

No (2)

Q12 Have you ever used the food pantry services at Our Daily Bread?

Yes (1)

No (2)

Prefer not to say (3)

Q13 Is this your first time using the Our Daily Bread mobile food pantry?

Yes (1)

No (1)

Q14 How likely are you to use the Our Daily Bread mobile food pantry in the future?

Extremely likely (1)

Somewhat likely (2)

Somewhat unlikely (3)

Extremely unlikely (4)

Questions pertaining to 5 dimensions of Food Access

Q15 This mobile food pantry provided a variety of produce and food product options.

Strongly agree (1)

Agree (2)

Disagree (3)

Strongly disagree (4)

Q16 This mobile food pantry provided me with options of food that otherwise would not be easily available to me.

Strongly agree (1)

Agree (2)

Disagree (3)

Strongly disagree (4)

Q17 There is a grocery store or food market within reasonable walking distance from my residence.

Strongly agree (1)

Agree (2)

Disagree (3)

Strongly disagree (4)

Q18 This mobile food pantry is in a location that is easily accessible to me.

Strongly agree (1)

Agree (2)

Disagree (3)

Strongly disagree (4)

Q19 Which location on campus would be the most convenient for you as a customer of this mobile food pantry?

North campus (near North Classroom building, Noble Research Center)

South campus (near Social Sciences and Humanities Building)

East campus (near the Spears School of Business, Morrill Hall)

West campus (near the College of Human Sciences, Agricultural Hall, Kerr and Drummond)

Central campus (Library Lawn, Classroom Building, and surrounding areas)

Other _____

Q20 Of the following times, which would be most convenient for you as a customer of the mobile food pantry?

Early morning 7 am-9am

Mid morning 10 am – 12 noon

Afternoon 1pm – 4pm

Evening 4 pm – 7 pm

Q21 The food products I have been given are without bruises or spots.

Strongly agree (1)

Agree (2)

Disagree (3)

Strongly disagree (4)

Q22 The food products I received from this mobile food pantry are nutritious.

Strongly agree (1)

Agree (2)

Disagree (3)

Strongly disagree (4)

Q23 The food products I received from the mobile food pantry will be sufficient foods for filling my hunger for the next two weeks.

Strongly Agree (1)

Agree (2)

Disagree (3)

Strongly disagree (4)

Q24 This mobile food pantry operates during a convenient time for me.

Strongly agree (1)

Agree (2)

Disagree (3)

Strongly disagree (4)

Q25 As a customer, this mobile food pantry was easy to figure out how it works.

Strongly agree (1)

Agree (2)

Disagree (3)

Strongly disagree (4)

Demographics Lastly, some questions about you.

Q26 What is your age?

Q27 What is your gender?

Male (1)

Female (2)

Prefer not to respond (3)

Other (4)

Q28 What is your ethnicity?

White Non-Hispanic (1)

American Indian or Alsaka Native (2)

Hispanic (3)

Black or African American (4)

Asian American (5)

Native-Hawaiian or Pacific Islander (6)

Multiracial (7)

Other (8)

Prefer not to respond (9)

Q29 What is your classification?

Freshman (1)

Sophomore (2)

Junior (3)

Senior (4)

Graduate Student (5)

Prefer not to respond (6)

Q30 Are you an international student?

Yes (1)

No (2)

Prefer not to respond (3)

Q31 Are you an out-of-state student?

Yes (1)

No (2)

Q32 How many credit hours are you enrolled in this semester?

11 hours or fewer (1)

12 hours or more (2)

Prefer not to respond (3)

Q33 Your primary degree is in which OSU College?

Agricultural Sciences and Natural Resources (1)

Arts and Sciences (2)

Education, Health, and Aviation (3)

Engineering, Architecture, and Technology (4)

Human Sciences (5)

Business (6)

University College (7)

Prefer not to respond (8)

Q34 Where do you currently live?

On campus in a residence hall (1)

On campus in a fraternity or sorority house (2)

Off campus alone (3)

Off campus with roommates (4)

Off campus with parents/relatives (5)

Off campus with spouse/partner (6)

Off campus with spouse/partner and child(ren) (7)

No stable or regular housing (8)

Prefer not to answer (9)

Q35 What is your main mode of transportation to and from campus?

Walking (1)

Riding a bicycle (2)

Driving (3)

Take a bus system (4)

Q36 Are you employed this semester?

I do not work (1)

Less than 20 hours a week (2)

20-39 hours a week (3)

40+ hours a week (4)

Prefer not to respond (5)

APPENDIX B

Institutional Review Board Exempt Form

Oklahoma State University Institutional Review Board

Date:	07/27/2020
Application Number:	IRB-20-345
Proposal Title:	Our Daily Bread/OSU Mobile Food Pantry Research
Principal Investigator:	Madison Lapke
Co-Investigator(s):	
Faculty Adviser:	Barbara Stoecker
Project Coordinator:	
Research Assistant(s):	
Processed as:	Exempt
Exempt Category:	

Status Recommended by Reviewer(s): Approved

The IRB application referenced above has been approved. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in 45CFR46.

This study meets criteria in the Revised Common Rule, as well as, one or more of the circumstances for which continuing review is not required. As Principal Investigator of this research, you will be required to submit a status report to the IRB triennially.

The final versions of any recruitment, consent and assent documents bearing the IRB approval stamp are available for download from IRBManager. These are the versions that must be used during the study.

As Principal Investigator, it is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be approved by the IRB. Protocol modifications requiring approval may include changes to the title, PI, adviser, other research personnel, funding status or sponsor, subject population composition or size, recruitment, inclusion/exclusion criteria, research site, research procedures and consent/assent process or forms.
2. Submit a request for continuation if the study extends beyond the approval period. This continuation must receive IRB review and approval before the research can continue.
3. Report any unanticipated and/or adverse events to the IRB Office promptly.
4. Notify the IRB office when your research project is complete or when you are no longer affiliated with Oklahoma State University.

Please note that approved protocols are subject to monitoring by the IRB and that the IRB office has the authority to inspect research records associated with this protocol at any time. If you have questions about the IRB procedures or need any assistance from the Board, please contact the IRB Office at 405-744-3377 or irb@okstate.edu.

Sincerely,
Oklahoma State University IRB

APPENDIX C

Mobile Food Pantry Photographs

VITA

Madison Kay Lapke

Candidate for the Degree of

Master of Science

Thesis: ASSESSING FOOD SECURITY AND NEEDS OF OKLAHOMA STATE UNIVERSITY STUDENTS USING A MOBILE FOOD PANTRY

Major Field: International Agriculture

Biographical:

Education:

Completed the requirements for the Master of Science in International Agriculture at Oklahoma State University, Stillwater, Oklahoma in May, 2021.

Completed the requirements for the Bachelor of Science in Global Resource Systems and Agriculture and Society at Iowa State University, Ames, Iowa in 2019.

Experience:

Graduate Teaching Assistant – June 2019 – Present

Department of Agricultural Economics

Oklahoma State University, Stillwater, OK

Professional Memberships:

Association for International Agriculture and Rural Development