ASSESSMENT OF FOOD SECURITY AMONG OKLAHOMA STATE UNIVERSITY STUDENTS

By

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Abstract: Food security is emerging as a serious problem in the United States and in particular, the state of Oklahoma. Food security research has shown students at postsecondary institutions are not immune to food insecurity. Research has shown rates of food insecurity at postsecondary institutions are higher than the national average. At Oklahoma State University, a survey was developed and distributed by e-mail to a random sample of 5,000 students. The survey contained questions concerning student's dietary, food security, food pantry, health status, and demographics. Five hundred and forty-four students completed the survey and were included in the data analysis. Food security status was determined using the USDA six-item short form. Results revealed 42.46% of students were food insecure (16.73% were low food secure and 25.74% were very low food secure). When they did not have enough food, students reported they "often" or sometimes" ate smaller meals (53.12%), stretched meals (53.67%), and skipped meals (46.51%). There was a significant difference by food security status in the distribution of students who reported "often" or "sometimes" engaging in these behaviors, with higher percentages among food insecure students. On "most days", 45.12% of students reported they ate breakfast and 34.50% had the food they needed to make healthy meals. A significant difference was found by food security status in the distribution of students engaging in these behaviors, with lower percentages among food insecure students. A significant difference was found by food security status in the distribution of students who were comfortable understanding food labels, planning menus, writing a shopping list, selecting health foods at the grocery store, and preparing meals, with lower percentages among food insecure students. Only 36.76% of students reported they were aware of the local food pantry and students reported barriers to using food pantries. Overall, findings from this study show there is a high prevalence rate of food insecurity among Oklahoma State University students and prevalence of many anticipated risk factors were significantly different by students' food security status. Nevertheless, there is an opportunity for a local food pantry to aid students who are suffering from food insecurity.

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CHAPTER I

INTRODUCTION

Food insecurity is defined as "limited or uncertain ability to acquire or consume an adequate quality or sufficient quantity of food in socially acceptable ways" (Boyle & Holben, 2013, p. 38). Food insecurity is emerging as a serious problem in the United States due to the high prevalence of food insecure households. As of 2016, 12.3% of households in the United States reported being food insecure (United States Department of Agriculture [USDA], 2017a). In Oklahoma, an average of 15.2% of households reported being food insecure from 2014-2016 (USDA, 2017b). Oklahoma currently ranks in the top ten most food insecure states (Nolen, McDurham, Ashenfelter, Rahman, & Gandy, 2016).

Recognizing food insecurity as an issue, many researchers have studied the risks and consequences of food insecurity. In general, a household is at risk for food insecurity due to lack of resources, financial hardship, and limited access to food. For adults and children, consequences of food insecurity may include the following: poor nutritional health, increased risk of obesity, chronic disease, higher stress levels, decreased psychosocial function, lower work productivity, and poorer academic results (Laraia, 2013; Seligman, Laraia, & Kushel, 2010).

Research regarding food insecurity issues encountered by college students is an emerging topic in nutrition literature (Blagg, Gundersen, & Schanzenbach, 2017; Morris, Smith, Davis, & Null, 2016; Smith et al., 2017). College students often encounter many unique situations that may lead to food insecurity such as financial independence, new environments, and social pressures (Bruening, Argo, Payne-Sturges, & Laska, 2017; Bruening, Brennhofer, Woerden, Todd, & Laska, 2016; Patton-Lopez, Lopez-Cevallos, Cancel-Tirado, & Vazquez, 2014). These situations can lead directly to food insecurity if a student does not have the required finances, resources, knowledge, and skill to combat this problem (Bruening et al., 2017; Patton-Lopez et al., 2014). A systematic review of food insecurity research with college students in the United States showed an average food insecurity rate of 32.9%, with all studies showing a percentage higher than the national household average of 12.3% (Bruening et al., 2017). Although the extent of food insecurity on each college campus varies, it is important to recognize that food insecurity does exist in this target population and interventions are needed to confront this issue.

Currently, various government programs and non-governmental organizations operate nationwide to combat food insecurity through food assistance and nutrition education. Federally funded programs include the Supplemental Nutrition Assistance Program (SNAP); Women, Infants, and Children (WIC); the Child Nutrition Program (CNP); the Summer Meals Program; the Food Distribution Program on Indian Reservations; and the Older Americans Act Nutrition Program (USDA, 2017d). Non-governmental organizations include food banks which are non-profit, charitable organizations that distribute food to hunger-relief organizations and directly to people in need (Feeding America, 2014). There are a reported 200 food banks in the United States,

two of which are located in Oklahoma (Feeding America, 2014). Another means for those in need to receive food assistance are food pantries. Food pantries generally operate on a smaller, more local scale than food banks, and may be supplied by food banks, charitable organizations, and public donations. However, it is common to see the terms "food bank" and "food pantry" used interchangeably in the United States. Locally in Stillwater, Oklahoma there are a number of organizations that fight food insecurity by providing food assistance directly to the general public including religious organizations and food pantries. Other resources present in Oklahoma for food insecure households are Meals on Wheels, Oklahoma State Cooperative Extension Services, and Oklahoma Nutrition Information and Education (ONIE) (Nolen et al., 2016). Food insecurity exists in a range of populations and environments, which necessitates unique programs to provide solutions. Even with all of the current resources available, food insecurity persists at a national, state, and local level; including college campuses (Bruening et al., 2017; USDA, 2017).

In September, 2017 three faith based food pantries in Stillwater, Oklahoma combined to form "Our Daily Bread," a Food and Resource Center for Payne County. Oklahoma State University is partnering with Our Daily Bread to provide food assistance to eligible Oklahoma State University (OSU) students (J. Hermann, personal communication, September 18, 2017). Our Daily Bread provides monthly food assistance for eligible individuals living in Payne County, which includes OSU students. Our Daily Bread is a client choice food pantry, which provides a household with enough food for about six to eight days (Our Daily Bread Food & Resource Center, 2017).

Moving forward, in order for food assistance programs to be successful they need to better understand the population they are aiming to serve. One way to understand and address the needs of a population is by using a survey. Survey data has proved to be valuable in assessing the needs of college students regarding food security (Lisnic, 2016; Smith et al., 2017). Surveys in this field can yield data about food insecurity prevalence, food insecurity details, reasons for food insecurity, barriers faced, resources used, resources wanted, and demographic data (USDA, 2017c).

Purpose

The purpose of this study was to:

a. Assess food security status of OSU students.
b. Assess factors related to the food security status of OSU students.
c. Compare survey results between food secure and food insecure OSU students.
d. Assess student awareness of the food pantry *Our Daily Bread*.
e. Assess food pantry attitudes and desires of OSU students.

Implications

This study can provide insight on the following:

a. Factors contributing to food insecurity of college students.
b. Techniques postsecondary institutions can use to support student food security.
c. Ways for food pantries to engage and aid college students.

Assumptions

It is assumed that students will answer the survey questions honestly.

Limitations

A limitation of this study was that the sample population was limited to 5,000 students. Oklahoma State University student participants do not represent the college students as a whole. Students who were food insecure may have been more motivated to complete the survey. All self-reported data is prone to biases. Survey questions are prone to misinterpretation.

CHAPTER II

REVIEW OF LITERATURE

Background of Food Security Status Measurement and Research

In the United States, hunger first became an issue of national concern in the 1960s as evidenced by governmental discussions and a television documentary called 'Hunger in America' (Eisinger, 1998). Arising from this concern has been a more conscious effort towards understanding hunger or food insecurity, and the evolution of food insecurity measures. Food security status research in the United States was first applied at a national level and has since been conducted on more targeted populations including postsecondary students. In the 1980s, food insecurity and hunger were studied in the Third National Health and Nutrition Examination Survey (NHANES III), although no consistent measurement was used (USDA, 1995). In 1984 the President's Task Force Report was released and included a mandate to develop a valid and reliable measure of hunger in the United States (USDA, 1995). In 1990, the Life Sciences Research Office (LSRO) of the Federation of American Societies for Experimental Biology published the first definition of food insecurity for U.S. households as "limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in socially acceptable ways" (USDA, 2017e). Conceptual definitions of food insecurity

and hunger by the LSRO helped standardize measurements for studies of these issues. Also in 1990, the U.S. Congress passed the National Nutrition Monitoring and Related Research Act, which outlined a national nutrition monitoring effort by the USDA and United States Department of Health and Human Services (DHHS) (USDA, 1995). In 1995, a supplement to the Current Population Survey called the Food Security Supplement contained a 70-item questionnaire covering food expenditures, food spending behavior, use of food programs, food sufficiency, food security, and coping strategies (USDA, 1995). The section on food security included the Household Food Security Survey Module (HFSSM), available as an 18-item food security scale (ERS 1995). The 18-item module included eight questions applicable to households with children. For households without children, these eight questions are skipped, making the module a 10-item adult food security scale. Subsequently, researchers developed a 6-item HFSSM and concluded it was an acceptable substitute to the longer modules for determining and classifying food security status (Blumberg, Bialostosky, Hamilton, & Briefel, 1999). The USDA lists several advantages to using the 6-item short form including less respondent burden for food-insecure households, minimal bias compared to the 10-item or 18-item modules in determining prevalence of food insecurity and very low food security, and the standardization in relation to the full module (USDA, 2017c).

The 1995-2005 Current Population Surveys included the HFSSM questionnaire to determine food security status as “food secure,” “food insecure with hunger,” and “food insecure with severe hunger” (USDA, 2017e). This was an important precursor to the current defined range of food security status. In 2006, the USDA introduced labels to describe the range of food security/food insecurity in which a household may be assessed

at following completion of the FSS section (USDA, 2017e). These four labels include "high food security," "marginal food security," "low food security," and "very low food security". A household with high food security reports no indications of food-access problems or limitations; a household with marginal food security reports one or two indications of food insufficiency or shortage of food although little or no indications of changes in diet or food intakes; a household with low food security reports reduced quality, variety, or desirability of diets although little or no indication of reduced food intake; and a household with very low food security reports multiple indications of disrupted eating patterns and reduced food intake (USDA, 2017e). These labels make important distinctions between quality and quantity of food available, as well as the frequency of behaviors and experiences. The evolution of food security status measurements helped to create a valid and reliable system to determine food insecurity and associated characteristics in a population.

In regards to studies conducted in college and university settings, typically one of the Household Food Security Survey Modules are used to determine food security status. Examples of this methodology and setting include studies by Blagg et al., 2017; Chaparro, Zahloul, Holck, & Dobbs, 2009; Gaines, Robb, Knol, & Sickler, 2014; Lisnic, 2016; Maroto, Snelling, & Linck, 2015; Morris et al., 2016; and Patton-Lopez et al., 2014. Other postsecondary studies have been published after using independently verified questionnaires or developed new food security measures (Bruening et al., 2017).

Prevalence of Food Insecurity at the National and State Levels

As the standardized food security status measurements became established in national surveys, food insecurity was seen as a growing public health issue. In 1995, the national prevalence rate of food insecure households was 11.94% (USDA, 2017f). In 2016, the national prevalence rate of food insecure households was 12.30% (USDA, 2017f). Although this appears relatively unchanged over the past 21 years, the lowest rate was seen in 1999 at 10.06% and the highest rate in 2011 at 14.94% (USDA, 2017f). Prevalence rates of 'very low food security' were 4.14% in 1995 compared to 4.86% in 2016 (USDA, 2017f). The lowest 'very low food security' rate was reported in 1999 at 2.97% and the highest rate was reported at 5.72% in 2008, 2011, and 2012 (USDA, 2017f).

At the state level, the USDA most recently gathered data for 3 years, from 2014 to 2016. The state level data showed household food insecurity above the U.S. average typically occurred in southern and mid-western states, which includes Oklahoma (USDA, 2017g). Average household food insecurity prevalence rates from 2014-16 showed Oklahoma at a 15.2% prevalence, which is in the top ten states in terms of highest food insecurity prevalence (Nolen et al., 2016). In Oklahoma, 'very low food security' prevalence averaged 6.3% from 2014-16 (USDA, 2017g).

Prevalence of Food Insecurity at the Postsecondary Level

Currently, there is no standardized surveillance system concerning the prevalence of food insecurity among postsecondary students. The independent studies completed in this area are typically conducted by researchers in a specific college or university. The

first study regarding food insecurity at the postsecondary level was conducted by Chaparro and colleagues at the University of Hawai'i at Manoa, and was published in 2009. Their study used the 10-item Adult Food Security Module to measure food insecurity among a random sample of sophomores, juniors, seniors, and graduate students. Results showed a 21% food insecurity rate and a 6% very low food security rate (Chaparro et al., 2009).

There have been a number of studies reporting on food security status in the years following this initial study. Two studies using the 6-item short form module at 4-year universities in Oregon and Texas reported respective student food insecurity prevalence rates of 59% and 31% (Biediger-Friedman, Sanchez, He, Guan, & Yin, 2016; Patton-Lopez et al., 2014). The difference in rates between these two studies may be attributable to the campus setting, participant demographics, and representative student classification groups.

Several studies at four-year institutions have used the 10-item U.S. Adult Food Security Survey Module (AFSSM) to assess food security status in students. These included studies at Southeast Missouri State University, the University of Arkansas, Arizona State University, the University of Alabama, and four universities in Illinois. Food insecurity prevalence among students in these studies were reported as 37.5%, 38%, 37%, 14.1%, and 35% respectively (Bruening et al., 2017; Gaines et al., 2014; Lisnic, 2016; Morris et al., 2016; Hillmer, Timlin, Tayie, & Faber, 2017). The University of Alabama study was limited to sampling select classes with populations of only sophomores, juniors, and seniors aged 19-25 years, excluding freshmen and graduate students, possibly accounting for variance in results (Gaines et al., 2014).

One study at two community colleges in Maryland reported a food insecurity prevalence rate of 56% using the 10-item AFSSM (Maroto et al., 2015). Food insecurity prevalence among households with two-year college students was reported as 20% in a study completed using Current Population Survey data from the U.S. Census Bureau from 2011 through 2015 (Blagg et al., 2017).

In 2016, a project by the College and University Food Bank Alliance (CUFBA), National Student Campaign Against Hunger and Homelessness, the Student Government Resource Center, and the Student Public Interest Research Groups was conducted on food insecurity among college students and published on the Students Against Hunger website in October 2016. The project included 3,765 student participants in 12 states attending eight community colleges and 26 four-year colleges and universities (Dubick, Mathews, & Cady, 2016). Among community college students, 50% were food insecure and 25% were very food insecure. Among four-year college students, 47% were food insecure and 20% were very food insecure.

In 2017, a systematic review compiling data from 17 peer-reviewed studies and 41 gray literature sources assessing food insecurity at postsecondary institutions found 42% and 35% of students were food insecure, respectively (Bruening et al., 2017).

In April 2018, a report focused on the basic needs of college students, mainly food and housing, was published by the Wisconsin HOPE Lab. This study surveyed 43,000 college students at 66 institutions across 20 states and the District of Columbia (Goldrick-Rab, Richardson, Schneider, Hernandez, & Cady, C, 2018). The survey used the USDA's 10-item module to assess food security status and found approximately 36% of postsecondary students were food insecure (Goldrick-Rab et al., 2018). Altogether,

food insecurity among college students is seen at very high rates in a number of different settings across the United States signaling a serious public health issue.

At-Risk Populations for Food Insecurity

Food insecurity affects a variety of populations throughout the United States, yet some characteristics have emerged that define an individual and household's increased risk of food insecurity. In 2016, the USDA's Economic Research Services found the prevalence of food insecurity to be higher than the national average in U.S. households with the following characteristics: Households with children, households with children under 6 years of age, households with children headed by a single woman or man, a woman or man living alone, Black (non-Hispanic) and Hispanic households, and low-income (below 185% of the poverty threshold) households (USDA, 2017a). Very low food security prevalence was higher than the national average in U.S. households with the following characteristics: Households with children headed by a single woman, a woman or man living alone, Black (non-Hispanic) and Hispanic households, low-income (below 185% of the poverty threshold) households, households located in principal cities and in nonmetropolitan areas, and households located in the South (USDA, 2017a). County-level food insecurity data trends show higher rates of food insecurity are linked to unemployment, poverty, African-American and American-Indian households (Coleman-Jensen, Gregory, & Singh, 2016). The American Dietetic Association published a position paper on food insecurity in the United States listing contributing factors to food insecurity as the following: "poverty, high housing and utility costs, unemployment, medical and health costs, mental health problems, lack of education,

transportation costs, and substance abuse" (Holben, 2010, p. 1370). Other determinants of food insecurity include low asset accumulation, limited access to food assistance programs, poor food accessibility, low educational attainment, tobacco and substance abuse, and high costs of healthcare (Nord & Prell, 2007; Rose, 1999).

Studies of postsecondary students have found similar attributes in food insecure populations. These findings have helped define food insecure populations in more specific settings. For instance, students at four Illinois universities were more likely to be food insecure if they had low incomes, lived off-campus without parents or guardians, and were African-American (Morris et al., 2016). In another study, a university in Oregon showed the strongest correlation to food insecurity was low income, and other factors such as fair or poor health, student employment, and food assistance program participation were also linked to higher rates of food insecurity (Patton-Lopez et al., 2014). At the University of Hawai'i-Manoa, food insecurity research indicated students who did not live with parents or relatives and Native Hawaiian or Pacific Islander students were more likely to be food insecure (Chaparro et al., 2009). Minority students were more likely to be food insecure than their white counterparts according to studies at a number of Maryland community colleges and at the University of Arkansas (Maroto et al., 2016; Lisnic, 2016). Black (non-Hispanic) students, students between the ages of 31 and 50, and students with children in the household were significantly more food insecure than the average population in a nationwide analysis of postsecondary students (Blagg et al., 2017). In Bruening and colleagues systematic review of food insecurity on college campuses, the profile of a student who was more likely to be food insecure included characteristics such as "students of color, younger students, students with children, and

students who were financially independent" (Bruening et al., 2017). The theme of independence "including living, financial, and food independence from parents" was found to be a strong determinant of food insecurity among postsecondary students (Bruening et al., 2017). The Wisconsin HOPE Lab's research found higher food insecurity prevalence rates (40% or greater) for mixed-race, black, and Hispanic students. Also, the researchers found food insecurity prevalence rates were higher among females (37%) than males (28%) (Goldrick-Rab et al., 2018).

Emerging from the research are certain characteristics that may put a college student at-risk for food insecurity. These factors include income status, independence, age, health status, living situation, having children, and race. Recognizing these factors is important, however, due to the limited scale and total number of studies, as well as the different setting of many colleges and universities, it would be unwarranted to assume food insecurity is prevalent among college students with certain characteristics based on these studies alone.

Consequences of Food Insecurity

Food insecurity can negatively affect the health and well-being of an individual throughout the lifespan. In children, the negative effects of food insecurity include poor academic outcomes, behavioral and attention issues, psychosocial dysfunction, absenteeism, tardiness, school suspension, and grade repetition (Alaimo, Olson, & Frongillo, 2001; Jyoti, Frongillo, & Jones, 2005; Kleinman et al., 1998; Murphy et al., 1998; Winicki & Jemison, 2003). In adults, food insecurity is associated with various health problems such as anxiety, depression, low cognitive function, malnutrition,

inflammation, and obesity (Gao, Scott, Falcon, Kirkpatrick & Tarasuk, 2008; Gowda, Hadley, & Aiello, 2012; Hadley & Patil, 2006; Parker, 2007; Whitaker, Philips, & Orzol, 2016; Wilde, & Tucker, 2009). A decline in work productivity has also been linked to food insecurity (Borre, Ertle, & Graff, 2010; Devine et al., 2006).

Research focused on food insecurity experienced by college students has shown a link between food insecurity and lower self-esteem, poorer conflict resolution, and poor self-image (Lin et al., 2013; Morris et al., 2016). College students also reported poor health status, poor dietary quality, depression, and anxiety associated with food insecurity (Farahbakhsh et al., 2017; Hughes, Serebryanikova, Donaldson, & Leveritt, 2011; Patton-Lopez et al., 2014). Furthermore, college students who experienced food insecurity reported education issues such as poorer academic performance, difficulty concentrating in class, and higher class withdrawal rates (Goldrick-Rab et al., 2018; Blagg et al., 2017; Farahbakhsh et al., 2017; Morris et al., 2016; Patton-Lopez et al., 2014; Silva et al., 2017). The consequences of food insecurity on an individual's development, health, well-being, academic and career success can be significant. In general, college students are at a transitional and crucial developmental period in life, and may be prone to experience most, if not all, of these consequences from food insecurity.

Programs Addressing Food Insecurity

Food assistance programs are a substantial contributor to decreasing hunger and food insecurity in the United States. The single, largest federal program to assist the public with these issues is known as the Supplemental Nutrition Assistance Program (SNAP), which used to be known as Food Stamps (USDA, 2017d). In fiscal year 2016,

SNAP served approximately 22 million households and 44 million individuals nationwide, and over 276,000 households and 612,000 individuals in Oklahoma (USDA, 2017h). In Oklahoma, there is an alternative to SNAP for Indian tribal organizations known as the Food Distribution Program on Indian Reservations, which 32,795 individuals used in 2017 (USDA, 2018a). Another assistance program is the Supplemental Nutrition Program for Women, Infants, and Children (WIC), which provides support to over 7 million families nationwide and over 100,000 families in Oklahoma alone as of November 2017 (USDA, 2018b). Other programs that serve specific populations are the Child Nutrition Program, the Summer Meals Program, and the Older Americans Act Nutrition Program (USDA, 2018d). At a state and local level in Oklahoma, there are numerous organizations that provide resources to food insecure individuals including food banks, local nonprofits and charities, Meals on Wheels, Oklahoma State Cooperative Extension Services, and Oklahoma Nutrition Information and Education (Nolen et al., 2016).

Although these national, state, and local programs exist to provide food security, college students are limited in their eligibility to receive benefits from these programs. For example, SNAP is available to college students, but only if they meet specific criteria such as participation in work-study programs, particular employment conditions, dependent care circumstances, and certain college program assignments (USDA, 2016). The USDA acknowledges a majority of postsecondary students do not meet these criteria (USDA, 2016). Additionally, there is no available research into the feasibility and possible use of SNAP if an expansion of eligibility for college students occurred.

Acknowledgement of food insecurity issues has led many postsecondary institutions to partner with the local community to provide food assistance to college students who may be facing food insecurity issues. One way postsecondary institutions have accomplished this is by joining the College and University Food Bank Alliance (CUFBA) (Buch, Langley, Johnson, & Coleman, 2016). The CUFBA mission statement is to "provide support, training, and resources to campus-based food banks/pantries and other food insecurity initiatives that primarily serve students" (College and University Food Bank Alliance, 2018). As of February 2018, the CUFBA had 591 postsecondary institution members, including three in Oklahoma (College and University Food Bank Alliance, 2018). Although the CUFBA has funded and reported research on student food security (Dubick, Mathews, & Cady, 2016), no research has been published in academic journals concerning the effectiveness of this intervention at member institutions. Another organization called Swipe Out Hunger has partnered with college campuses to allow students to donate unused meal plan points to food insecure individuals. As of January 2018, Swipe Out Hunger has 36 chapters across college campuses in 18 states (Swipe Out Hunger, 2018).

Locally in Stillwater, Oklahoma where the main campus of Oklahoma State University is located, Our Daily Bread Food and Resource Center provides food assistance as a client choice food pantry (Our Daily Bread Food & Resource Center, 2017). Traditional food pantries commonly offer only pre-packaged bags of food, whereas client choice food pantries allow clients to select the foods included in their food packages (Martin et al., 2013). Our Daily Bread is open to all residents of Payne County,

Oklahoma, including students who attend Oklahoma State University and Northern Oklahoma College (J. Hermann, personal communication, September 18, 2017).

A similar intervention called Freshplace was conducted in Hartford, Connecticut in order to serve the food insecure population (Martin, Wu, Wolff, Colantonio, & Grady, 2013). The Freshplace intervention used a client choice food pantry model to empower clients in hopes of improving food security, self-sufficiency, and diet-quality outcomes (Martin et al., 2013). The most significant result of the one year Freshplace intervention study was program participants being less than half as likely to experience food insecurity as those who used a traditional food pantry (Martin et al., 2013).

Another local food assistance intervention called the Fraser Harvest Food Box program aimed at providing fruits and vegetables to families in order to help alleviate food insecurity (Miewald, Holben, & Hall, 2012). Once a month, participants received about 45 to 50 servings of a variety of fruits and vegetables. The intervention resulted in a downward trend in food insecurity among program participants compared to nonparticipants (Miewald et al., 2012).

Recently, an evaluation of the Fresh Rx program at the Regional Food Bank of Oklahoma was conducted (Lauck, 2017). The Fresh Rx program was described as providing "access to healthy food options, nutrition and lifestyle education, and medical interventions with the goal of improving health outcomes for low-income, food-insecure populations" (Lauck, 2017). Food insecurity among participants was evaluated using a two question survey item pre-Fresh Rx and a four question survey item during the Fresh Rx program (Lauck, 2017). The participants' food insecurity prevalence rates were 93.4% pre-Fresh Rx and only 1.4% during the program (Lauck, 2017). This dramatic

decrease during the Fresh Rx program shows the impact food assistance may have on a regularly participating food insecure population.

Results from these local food assistance programs show encouraging evidence that client choice food pantries and healthy foods assistance programs may be effective sources of food supplementation for a food insecure population such as college students.

CHAPTER III

METHODOLOGY

Survey Development

The research team developed a student food security assessment survey that included sections labeled as dietary, food security, food pantry, health status, and demographics. To inform the survey development, the research team evaluated other food pantry and food security surveys (Bruening et al., 2017; Bruening et al., 2016; McAdams, 2016; Morris et al., 2016). In particular, the researchers modified and used several sections of a recent survey that assessed food security status by food pantry users in the Stillwater, Oklahoma area (Robinson, 2017).

The dietary section included questions on current dietary patterns and factors influencing dietary intake such as food access, storage, preparation skills and equipment. The food security section included the USDA Economic Research Service six-item food security short form (USDA, 2017c) and additional questions assessing student food security. The food pantry section included questions assessing students' potential use of a food pantry, types of food they would like to receive, and the best way to increase student awareness of food pantries. The health status section included questions on height, weight, recent food intake and weight changes, health status, and health conditions. The

demographics section included questions on age, gender, race, marital status, current academic level, living and dining situations, household size, finances, food assistance program use, and income.

Expert Face Validity and Indigenous Face Validity

Expert face validity of the student food security assessment survey was conducted using a panel of four experts. Experts were faculty in the Department of Nutritional Sciences and the Assistant Vice President of Student Affairs/Director of the Student Union at Oklahoma State University. The student food security assessment survey was revised based on the expert face validity input. Indigenous face validity of the revised student food security assessment survey was conducted to assess acceptance and comprehension using a panel of twelve college students. The final survey was at a 4th grade reading level (Appendix A). The survey was entered into Qualtrics, an online survey design, distribution, analysis, and reporting software (Qualtrics LLC, Provo, UT).

Participants

Participants in this study were Oklahoma State University undergraduate and graduate students. The researchers requested a stratified random sample of 5,000 student emails from the Oklahoma State University Office of Institutional Research and Information Management (IRIM). Students were excluded from the email list if they were 1) first semester freshmen, 2) high school students concurrently enrolled in college, 3) online-only students, 4) students under 18 years of age, and 5) special undergraduates. Students were included in the email list if they were concurrently enrolled at OSU and

Northern Oklahoma College (NOC). The distribution of the e-mail list was 4,000 undergraduate students (representing 19.7% of Oklahoma State University undergraduates and 80% of the sample) and 1,000 graduate students (representing 27.7% of Oklahoma State University graduate students and 20% of the sample) (Oklahoma State University, 2017). A response rate of 500 students or 10% of the student sample was desired by the researchers.

Oklahoma State University Institutional Review Board Approval

Prior to any data collection the final survey (Appendix A), student e-mail content (Appendix B), participant informed consent (Appendix C), reminder student e-mail content (Appendix D), final reminder student e-mail (Appendix E), and the study procedure were submitted to and approved by the Oklahoma State University Institutional Review Board for Human Subjects (Appendix F).

Survey Procedure

One week prior to sending out the link to the Qualtrics survey, an e-mail was sent to the 5,000 students who had been selected at random to participate in the study. The e-mail informed the students that they had been randomly selected to participate in the study and that they would be receiving an e-mail with a link to the Qualtrics survey in one week.

Subsequently, an e-mail was sent to the 5,000 OSU student e-mail addresses. The e-mail included the project purpose, survey completion deadline, incentive information, and a link to the Qualtrics survey (Appendix B). The first page of the Qualtrics survey

provided the participant information form (Appendix C). Students were informed that the survey would only advance after answering each question. At the end of the participant information form there was a statement “If you agree to participate, please click “I agree to participate in this survey” below. By clicking “I agree to participate in this survey” you are indicating that you freely and voluntarily agree to participate in this project and you also acknowledge that you are at least 18 years of age.” The survey questions only appeared if “I agree to participate in this survey” was clicked, at which time the students could complete the survey online. The last two Qualtrics questions asked for the student's name and e-mail address if they wished to enter the incentive drawing. Students were given two weeks to complete the survey. After one week from receiving the e-mail with a link to the Qualtrics surveys, students were sent a reminder email with the same information and link to the Qualtrics survey (Appendix D). During the last week of the survey’s open period, a final reminder e-mail was sent to the entire sample of students informing them of the survey’s closing date (Appendix E).

Incentives

Students who completed the Qualtrics survey and provided their name and e-mail address were entered into a drawing for one of 25 Oklahoma State University dining cards valued at $100 each. The OSU dining cards were provided by the Assistant VP of Student Affairs/Director of the Student Union. If all 5,000 students completed the survey and enter the drawing, the odds of winning an OSU dining card was 0.5%. If the expected number of students participated (500), the odds of winning an OSU dining card was 5%. The drawing occurred two weeks after the deadline for completing the survey. The last

two Qualtrics survey question answers (name and e-mail address) were stored separately from the survey data so that they could not be connected. The winners of the drawing were notified by e-mail and were instructed to collect their OSU dining card at the Assistant VP of Student Affairs/Director of the Student Union's office.

Data analysis

Students' food security status was determined using the coding and raw score cut offs developed for the USDA ERS six-item food security survey (USDA, 2017c). A total score of 0-1 was classified as high or marginal food security, a total score of 2-4 was classified as low food security, and a total score of 5-6 was classified as very low food security. Finally, food security status was divided into "food secure" being high or marginal food security, and "food insecure" being low or very low food security.

Students' Body Mass Index (BMI) was calculated using the students' self-reported height and weight. Body Mass Index (BMI) is defined as weight in kilograms divided by the square of height in meters (kg/m^2) (Centers for Disease Control and Prevention [CDC], 2017). A BMI less than 18.5 kg/m^2 is defined as underweight. A BMI between 18.5 kg/m^2 and less than 25 kg/m^2 is defined as normal weight. A BMI between 25 kg/m^2 and less than 30 kg/m^2 is defined as overweight. A BMI greater than or equal to 30kg/m^2 is defined as obese (CDC, 2017).

Data were analyzed using the frequency procedure with PC SAS for Windows, Version 9.4 (SAS institute, Cary, NC) for all survey responses. The food security status groups classified as "food secure" and "food insecure" were compared to each other in terms of response frequency for the following: age, gender, ethnicity, marital status,

academic status, living situation, use of university dining services meal plan, willingness to donate meal plan credits, number of adults and children in household, financial resources, friends/family support, annual income, dietary patterns, dietary intake influences, access to food preparation equipment and resources, school behaviors, coping strategies, health conditions, health status, food intake, weight change, body mass index, food pantry use, food pantry awareness, and food pantry attitudes and beliefs using the Chi-square procedure with PC SAS for Windows, Version 9.4 (SAS institute, Cary, NC).

CHAPTER IV

FINDINGS

The sample of 5,000 Oklahoma State University students randomly selected to participate in the study was narrowed to 4,994 students after six e-mails were undeliverable because they were found to longer exist in the initial e-mail stage. The sample was divided between 4,000 undergraduate students and 1,000 graduate students. It was not determinable whether the six undeliverable e-mails were for undergraduate or graduate students. There were 56 students of the 4,994 sample who partially completed surveys. The partially completed surveys were not included in data analysis due to incomplete data. Three students selected "I do not wish to participate in this survey" on the consent form. Of the 4,994 students in the sample, 544 (10.9%) completed the survey in full. Four hundred and five (10.1%) of the 4,000 undergraduate students completed the survey in full. One-hundred and thirty-nine (13.9%) of the 1,000 graduate students completed the survey in full. Of the 544 participants, 491 provided their name and e-mail addresses and were entered into the random drawing for an incentive.

Frequency Analysis

Demographic characteristics of students are presented in Table 1. The majority of

students were 18-23 years of age (73.16%), female (63.60%), and of Caucasian descent (77.39%). A vast majority of students had never been married (89.52%) and did not have children (92.46%). The majority of students lived in off-campus housing (74.26%) and lived with less than four adults (87.31%). Regarding financial resources, 56.07% of respondents said they had a job, and 1.10% specifically wrote-in "summer job". Of those who had a job, 51% reported the number of hours worked per week, and of those 52.86% reported they worked between 10.5-20 hours per week. The mean number of hours worked per week was 21.56.

Food assistance programs were not used by the majority of participants (90.81%). In addition, 84.56% of participants did not use a University Dining Services meal plan. Of the 15% who had a University Dining Services meal plan, 45.24% said they would be willing to donate money from their meal plan to students who were hungry.

Table 1. Demographic characteristics.

Demographic Characteristic	**n (%)**
Age	
18-23 Years	398 (73.16)
24-29 Years	87 (15.99)
30+ Years	59 (10.85)
Gender	
Male	198 (36.40)
Female	346 (63.60)
Hispanic	
Yes	42 (7.72)
No	490 (90.07)
Prefer not to answer	12 (2.21)
Race*	
African American (Black)	30 (5.51)
Asian American (includes Asian and Asian-Indian)	51 (9.38)
Caucasian (includes Middle-Eastern and Arabic)	421 (77.39)
Native American	53 (9.74)
Other	7 (1.29)
Prefer not to answer	29 (5.33)

Table 1. Demographic characteristics (continued).

Marital Status	
Never married	487 (89.52)
Married	48 (8.82)
Divorced, separated or widowed	9 (1.65)
Academic Level	
Freshman	2 (0.37)
Sophomore	105 (19.30)
Junior	116 (21.32)
Senior	182 (33.46)
Graduate student	139 (25.55)
College or university currently attending**	
Oklahoma State University	543 (99.82)
Northern Oklahoma College	6 (1.10)
Current Living Situation	
Campus dormitory	42 (7.72)
Campus apartment	38 (6.99)
Fraternity or sorority house	40 (7.35)
With parents	16 (2.94)
Off campus house, apartment, mobile home	404 (74.26)
Other	4 (0.74)
Family or friends nearby that can help	
Zero	110 (20.22)
One	166 (30.51)
Two	107 (19.67)
Three	92 (16.91)
Four	22 (4.04)
Five	10 (1.84)
Six or more***	37 (6.80)
Children that live with you	
Zero	503 (92.46)
One	25 (4.60)
Two	8 (1.47)
Three	7 (1.29)
Four	1 (0.18)
Food Assistance Programs	
Women, Infants, and Children (WIC)	6 (1.10)
SNAP (food stamps)	9 (1.65)
Food pantries	12 (2.21)
Community or church meals	21 (3.86)
Food Distribution Program on Indian Reservations	2 (0.37)
Other	7 (1.29)
I do not use food assistance programs	494 (90.81)

Table 1. Demographic characteristics (continued).

None	119 (21.88)
Very few	241 (44.30)
Many	184 (33.82)
Annual household income	
Less than $12,000	181 (33.27)
$12,000 - $16,000	53 (9.74)
$16,001 - $20,000	40 (7.35)
$20,001 - $24,000	17 (3.13)
$24,001 - $28,000	12 (2.21)
Over $28,000	121 (22.24)
Prefer not to answer	120 (22.06)
Financial resources to pay for studies****	
Parental Support	301 (55.33)
Job	305 (56.07)
Summer job	6 (1.10)
Scholarship or fellowship	305 (56.07)
Financial aid, grant or student loan	275 (50.55)
Military benefits	17 (3.13)
Assistantships	9 (1.65)
Spouse/significant other	4 (0.74)
Other	19 (3.49)
Employment ("Job") – Number of hours/week	
1-10	39 (13.93)
>10-20	148 (52.86)
>20-30	57 (20.38)
>30	36 (12.86)
University Dining Services meal plan use	
Yes	84 (15.44)
No	460 (84.56)
Willing to donate meal plan money (of those who had a meal plan)	
Yes	38 (45.24)
No	46 (54.76)

*Race category totals were updated based on "Other" responses provided. Participants were able to select more than one race, therefore total % exceeds 100%.
**Students may have been concurrently enrolled at both institutions
*** Answers ranging from 6 to 280 were included as 6 or more to consolidate response data
****Categories added for "assistantships", "spouse/significant other", and "summer job" based on "Other" responses provided. Multiple responses were allowed.

Table 2 is a summary of students' responses for the food security portion of the survey. There was an almost even split between students reporting it was "often" or "sometimes" true (45.04%) versus "never" true (54.23%) that their food did not last and

they didn't have money to buy more. A similar split was evident for students reporting it is "often" or "sometimes" true (51.53%) versus "never" true (46.69%) that they could not afford to eat balanced meals. Students' responses were also closely split between "yes" (43.75%) and "no" (56.25%) on the issue of having to cut the size of their meals or skip meals because there was not enough money for food. For respondents who reported cutting or skipping meals because of the lack of money for food in the last 12 months, 26.89% reported doing so in every month, 40.76% in some months, and 28.57% in only 1 or 2 months.

About one-third (36.21%) of students reported eating less than they felt they should because there was not enough money for food. Similarly, 29.41% of students reported not eating even when they were hungry because there was not enough money for food.

Close to one-third (31.99%) of students also reported having difficulty concentrating in class because they did not have enough food to eat. However, only 2.94% of students reported withdrawing from one or more classes because they did not have enough food to eat.

Table 2. General food security.

In the last 12 months…	**Often True n (%)**	**Sometimes True n (%)**	**Never True n (%)**	**Do Not Know n (%)**
The food I bought just didn't last, and I didn't have money to buy more	44 (8.09)	201 (36.95)	295 (54.23)	4 (0.74)
I couldn't afford to eat balanced meals.	90 (16.54)	192 (35.29)	254 (46.69)	8 (1.47)

Table 2. General food security (continued).

In the last 12 months…	**Yes (answer next**	**No (skip next**

		question) n (%)	question) n (%)	
Did you ever cut the size of your meals or skip meals because there wasn't enough money for food?		238 (43.75)	306 (56.25)	
If the previous question was answered "yes"	**Almost Every Month n (%)**	**Some Months, but Not Every Month n (%)**	**Only 1 or 2 Months n (%)**	**Do Not Know n (%)**
How often did this happen?	64 (26.89)	97 (40.76)	68 (28.57)	9 (3.78)
In the last 12 months…		**Yes n (%)**	**No n (%)**	**Do Not Know n (%)**
Did you ever eat less than you felt you should because there wasn't enough money for food?		197 (36.21)	329 (60.48)	18 (3.31)
Were you ever hungry but didn't eat because there wasn't enough money for food?		160 (29.41)	371 (68.20)	13 (2.39)
Did you ever have difficulty concentrating in class because you didn't have enough food to eat?*		174 (31.99)	354 (65.07)	16 (2.94)
Did you withdraw from one or more classes because you didn't have enough food to eat?**		16 (2.94)	520 (95.59)	8 (1.47)

*These questions are not used in the food security status scoring model. They were developed to provide more insight into food security among students specifically.

Students' food security status, determined using the U.S household food security survey: six-item short form is presented in Table 3 (USDA, 2017c). Although 57.54% of students were classified as being food secure (marginal or high food security), 42.46% of students were classified as being food insecure (low or very low food security). Of the 42.46% of students classified as being food insecure, 16.73% were classified as having low food security and 25.74% were classified as having very low food security.

Table 3. Food security status*.

Food Security Status	n (%)
High or marginal food security (food secure)**	313 (57.54)
Low or very low food security (food insecure)**	231 (42.46)
Low food security	91 (16.73)
Very low food security	140 (25.74)

*Determined using the U.S. household food security survey: six-item short form.
**It is common in food security research for high or marginal food security to be deemed "food secure", whereas low or very low food security is deemed "food insecure".

Students' food insecurity coping strategies are reported in Table 4. The majority of the students reported they "often" or "sometimes" ate smaller meals (53.12%) and stretched meals (53.67%) if they did not have enough food. Additionally, students reported "often" or "sometimes" charging food on their bursar account (41.91%) seeking employment to pay for food (39.89%), skipping meals (46.51%), and eating expired foods (21.50%) if they did not have enough food. Only 14.53% reported they "often" or "sometimes" had to choose between paying rent or utilities and 12.13% reported "often" or "sometimes" choosing between eating and buying medicine when lacking food. In addition, students reported "often" or "sometimes" selling or pawning items (11.76%) and selling blood (10.30%) if they did not have enough food. Furthermore, students reported "often" or "sometimes" eating foods that had been stored too long (33.27%), eating community meals provided by local organizations (24.63%) and getting help with food from family or friends (44.31%) if they did not have enough food. However, only 5.88% of students reported having to "often" or "sometimes" choose between feeding a pet and eating, and only 3.49% of students reported having to "often" or "sometimes" choose between eating and feeding their child or children.

Students could also fill in an "other" response for coping mechanisms they used if they did not have enough food. Common responses included drinking more fluids, buying

extremely cheap or clearance foods, eating at home instead of going out, splitting meals with friends, taking advantage of free food opportunities, eating cheap fast food, gardening, extreme budgeting, sleeping more, going without personal care products, eating smaller portion sizes, and stealing food or money from parents.

Table 4. Student's food insecurity coping strategies and behaviors.

If you do not have enough food, do you ever…	**Yes, Often n (%)**	**Yes, Sometimes n (%)**	**No n (%)**	**Does not apply n (%)**
Charge food on your bursar account?	77 (14.15)	151 (27.76)	143 (26.29)	173 (31.80)
Seek employment to pay for food?	123 (22.61)	94 (17.28)	141 (25.92)	186 (34.19)
Eat smaller meals?	87 (15.99)	202 (37.13)	94 (17.28)	161 (29.60)
Skip meals?	72 (13.24)	181 (33.27)	132 (24.26)	159 (29.23)
Stretch meals? (make soups or casseroles; add rice or noodles)	116 (21.32)	176 (32.35)	98 (18.01)	154 (28.31)
Eat expired foods?	22 (4.04)	95 (17.46)	270 (49.63)	157 (28.86)
Eat foods that may have been stored too long?	34 (6.25)	147 (27.02)	204 (37.50)	159 (29.23)
Eat community meals provided by local organizations?	27 (4.96)	107 (19.67)	246 (45.22)	164 (30.15)
Get help with food from family or friends?	72 (13.24)	169 (31.07)	146 (26.84)	157 (28.86)
Have to choose between eating and feeding your child(ren)?	5 (0.92)	14 (2.57)	171 (31.43)	354 (65.07)
Have to choose between eating and paying rent or utilities?	12 (2.21)	67 (12.32)	266 (48.90)	199 (36.58)
Have to choose between eating and buying medicine?	16 (2.94)	50 (9.19)	269 (49.45)	209 (38.42)
Have to choose between eating and feeding a pet?	5 (0.92)	27 (4.96)	243 (44.67)	269 (49.45)
Sell or pawn items?	9 (1.65)	55 (10.11)	299 (54.96)	181 (33.27)
Sell blood?	18 (3.31)	38 (6.99)	310 (56.99)	178 (32.72)

Students' dietary patterns are presented in Table 5. The majority of students indicated that on "most days" they ate lunch (77.94%) and dinner (90.63%). Only 45.12% of participants ate breakfast most days. Nearly half of students reported on "most days" they prepared their own meals (47.79%); however, only 34.50% reported they had the food to make healthy meals most days. In addition, 62.50% of participants reported eating fast food on "some days" and 18.01% on "most days".

Table 5. Dietary patterns.

How often do you…	**Seldom, If Ever n (%)**	**Some Days n (%)**	**Most Days n (%)**
Eat breakfast?	139 (25.60)	159 (29.28)	245 (45.12)
Eat lunch?	15 (2.76)	105 (19.30)	424 (77.94)
Eat dinner?	10 (1.84)	41 (7.54)	493 (90.63)
Prepare your own meals?	62 (11.40)	222 (40.81)	260 (47.79)
Have the food you need to make healthy meals?	104 (19.19)	251 (46.31)	187 (34.50)
Eat fast food?	106 (19.49)	340 (62.50)	98 (18.01)

Factors influencing students' dietary intake are reported in Table 6. The majority of students reported they "often" felt comfortable reading and understanding food labels (61.95%), writing a shopping list (70.59%), selecting healthy foods at the grocery store (63.79%), and preparing meals (64.89%). However, only 45.77% of students "often" felt comfortable planning menus. The majority of students reported they "often" had a car (85.66%), had enough money for gas and car insurance (61.76%), and had working electricity or gas utilities (89.52%).

Table 6. Factors influencing dietary intake.

Do you…	**Yes, Often n (%)**	**Yes, Sometimes n (%)**	**No n (%)**
Feel comfortable reading and understanding food labels?	337 (61.95)	177 (32.54)	30 (5.51)
Feel comfortable planning menus?	249 (45.77)	211 (38.79)	84 (15.44)
Feel comfortable writing a shopping list?	384 (70.59)	136 (25.00)	24 (4.41)
Feel comfortable selecting healthy foods at the grocery store?	347 (63.79)	164 (30.15)	33 (6.07)
Feel comfortable preparing meals?	353 (64.89)	161 (29.60)	30 (5.51)
Have a car?	466 (85.66)	22 (4.04)	56 (10.29)
Have enough money for gas and car insurance?	336 (61.76)	142 (26.10)	66 (12.13)
Have working electricity or gas utilities?	487 (89.52)	39 (7.17)	18 (3.31)

Students' reported access to food preparation equipment and resources are presented in Table 7. The vast majority of students reported they had access to running water (100.00%), a refrigerator (99.82%), a freezer (97.43%), an oven (93.75%), a cooktop/stove (93.75%), a microwave (98.16%). In addition, the majority of students reported having access to a crock pot (69.85%); however, only 43.38% reported having access to an electric skillet. The overwhelming majority of students reported having access to enough space to store frozen food (86.95%), enough space to store refrigerated food (95.59%), enough space to store dry food (93.75%), and the right tools to prepare meals at home (87.32%).

Table 7. Access to food preparation equipment and resources.

On a daily basis, do you have access to...	Yes n (%)	No n (%)
Running water?	544 (100.00)	0 (0.00)
A refrigerator?	543 (99.82)	1 (0.18)
A freezer?	530 (97.43)	14 (2.57)
An oven?	510 (93.75)	34 (6.25)
A cooktop/stove?	510 (93.75)	34 (6.25)
A microwave?	534 (98.16)	10 (1.84)
A crock pot?	380 (69.85)	164 (30.15)
An electric skillet?	236 (43.38)	308 (56.62)
Enough space to store frozen food?	473 (86.95)	71 (13.05)
Enough space to store refrigerated food?	520 (95.59)	24 (4.41)
Enough space to store dry food?	510 (93.75)	34 (6.25)
The right tools to prepare meals at home?	475 (87.32)	69 (12.68)

Students' reported dietary restrictions because of their culture or faith are presented in Table 8. Only 8.82% of students reported not eating certain foods because of their culture or faith. Foods that students reported not eating because of their culture or faith included: meat, beef, pork, ham, alcohol, tobacco, coffee, red meat, animal products, seafood, blood, tea, dairy, eggs, and chicken.

Table 8. Students' food preferences related to culture or faith.

Are there any foods you do not eat because of your culture or faith?	n (%)
No	496 (91.18)
Yes*	48 (8.82)

*Participants were asked to list specific foods

Students' self-reported health conditions are displayed in Table 9. The most prevalent health conditions reported by students were anxiety (34.01%), depression (21.69%), and fatigue (14.15%). However, the majority of students (54.78%) reported having no health conditions. Food allergies were reported by 7.72% of students and included the following: cinnamon, cantaloupe, broccoli, carrots, peanuts, ginger, dairy,

eggs, gluten, nuts, shellfish, tree nuts, bleu cheese, sesame, rye, melons, citrus, corn, oats, wheat, strawberries, kiwi, and bananas.

Table 9. Students' self-reported health conditions.

Do you have any of the following conditions?	n (%)
Anxiety	185 (34.01)
Depression	118 (21.69)
Diabetes	5 (0.92)
Fatigue	77 (14.15)
Food allergies*	42 (7.72)
Heart disease	4 (0.74)
High blood pressure	19 (3.49)
None	298 (54.78)

*Participants were requested to list food allergies.

Students' reported conditions which made it difficult for them to grocery shop, prepare food or eat are shown in Table 10. Only 7.90% of students reported having conditions which made it difficult for them to grocery shop, prepare food or eat which included: arthritis, chronic pain, Hashimoto's, diabetes, tuberculosis, Crohn's, celiac, neurological disorders, depression, gastritis, irritable bowel syndrome, migraines, food intolerances, attention deficit/hyperactivity disorder, anorexia, and knee pain.

Table 10. Conditions making it difficult to shop, prepare food, or eat.

Do you have any conditions that make it difficult for you to grocery shop, prepare food or eat?	n (%)
No	501 (92.10)
Yes*	43 (7.90)

*Participants were asked to list specific conditions

Students' general health status perceptions are shown in Table 11. The majority of students perceived their health as "very good" (33.82%) or "good" (40.44%). Very few people perceived their health as poor (2.57%).

Table 11. General health status perceptions.

Would you say your general health is…	n (%)
Excellent	41 (7.54)
Very good	184 (33.82)
Good	220 (40.44)
Fair	81 (14.89)
Poor	14 (2.57)
I do not know/not sure	4 (0.74)

Students' reported recent unwanted changes to their health are shown in Table 12. A majority (44.67%) of students reported no food intake changes in the past 3 months as opposed to 29.60% reporting a decrease in food intake and 12.32% reporting an increase in food intake. Similarly, 46.51% of students reported no weight change over the past 3 months versus 20.40% reporting a decrease in weight and 21.32% an increase in weight.

Table 12. Recent changes to students' food intake and weight.

Without wanting to…	No n (%)	Yes, decreased n (%)	Yes, increased n (%)	Do not know n (%)
Has your food intake changed over the past 3 months?	243 (44.67)	161 (29.60)	67 (12.32)	73 (13.42)
Has your weight changed over the past 3 months?	253 (46.51)	111 (20.40)	116 (21.32)	64 (11.76)

Students' body mass index based on self-reported height and weight is displayed in Table 13. The majority (52.39%) of students were classified as "normal weight", 27.76% as "overweight", 15.81% as "obese", and 4.04% as "underweight".

Table 13. Body mass index based on self-reported height and weight.

Body Mass Index (BMI)	n (%)
Underweight (> 18.5)	22 (4.04)
Normal weight (18.5 - 24.9)	285 (52.39)
Overweight (25 - 29.9)	151 (27.76)
Obese (> 30)	86 (15.81)

Students' perceived benefit of going to a food pantry and their awareness of the local food and resource center *Our Daily Bread* is shown in Table 14. Perceived benefit of going to a food pantry varied from 33.09% responding "yes", 39.89% responding "no" and 27.02% responding "do not know". About one-third (36.76%) responded they were aware of the food and resource center *Our Daily Bread* in Stillwater.

Table 14. Students' perceived benefit of going to a food pantry and local food pantry awareness.

Do you think being able to get free food from a food pantry would help you?	**n (%)**
Yes	180 (33.09)
No	217 (39.89)
Do not know	147 (27.02)
Are you aware of *Our Daily Bread* in Stillwater?	**n (%)**
Yes	200 (36.76)
No	344 (63.24)

Students reported their feelings on using food assistance or volunteering at the local food and resource center *Our Daily Bread* as shown in Table 15. Only 13.24% said "yes" to going to *Our Daily Bread* food pantry compared to 44.67% who chose "maybe" and 42.10% who chose "no". Responses were fairly evenly split between the 39.15% who responded "yes" they would feel embarrassed to go to a food pantry versus 30.51% who responded "maybe" and 30.33% who responded "no". Responses were fairly evenly split between "yes" (31.62%), "maybe" (31.99%), and "no" (36.40%) on if they felt someone else would think less of them if they visited a food pantry. In addition, 38.97% of respondents said "yes" they would like to volunteer at *Our Daily Bread* compared to 41.36% who indicated "maybe", and 19.67% who indicated "no".

Table 15. Food pantry use or volunteering.

What do you think…	**Yes n (%)**	**Maybe n (%)**	**No n (%)**
Would you like to go to *Our Daily Bread* food pantry in Stillwater?	72 (13.24)	243 (44.67)	229 (42.10)
Would you feel embarrassed going to a food pantry?	213 (39.15)	166 (30.51)	165 (30.33)
Do you feel people would think less of you if you went to a food pantry?	172 (31.62)	174 (31.99)	198 (36.40)
Would you like to volunteer to assist customers at the *Our Daily Bread* food pantry in Stillwater?	212 (38.97)	225 (41.36)	107 (19.67)

Students' desires about *Our Daily Bread's* open days and hours, as well as students' thoughts on how often they would go to the food pantry and how they would travel there are presented in Table 16. Close to one-third of students (31.99%) selected Saturday as the best day to go to *Our Daily Bread*, whereas 28.68% selected a week day (Monday-Thursday), only 18.20% selected Friday, and 43.01% selected "do not know". Students selected the best time frame to go to *Our Daily Bread* as the evening (32.41%) followed by afternoon (29.34%) and morning (17.86%). Student responses to how often they would be interested in going to *Our Daily Bread* were spread across 11.21% for "once a week", 11.21% for "every other week", 11.76% for "once a month", 16.54% for "a few times a year", and 49.26% chose "never". The majority (59.01%) indicated they would drive themselves if they were to visit *Our Daily Bread*. Responses to how *Our Daily Bread* should inform students about open dates, times, and transportation opportunities were represented by 55.33% for "post it on signs around campus", 36.28% for "post it on the *Our Daily Bread* webpage or Facebook page", 29.60% for "post it on the OSU Campus Life webpage", and 19.85% for "print an advertisement in the O-

Colly". "Other" was reported by 11.07% and suggestions included e-mail, social media, chalk on campus, Instagram, text message, twitter, snapchat, online advertisements, flyers, through professor, through advisor, through staff, and A-frame advertising.

Table 16. Food pantry desires (days, hours, attendance, travel to/from, and marketing).

What would be the best day for you to go to the *Our Daily Bread* food pantry in Stillwater?*	**n (%)**
Weekdays (Monday-Thursday)	156 (28.68)
Friday	99 (18.20)
Saturday	174 (31.99)
Do not know	234 (43.01)
What would be the best time frame for you to go to the *Our Daily Bread* food pantry in Stillwater?*	
Morning (8:00 a.m. – noon)	97 (17.86)
Afternoon (noon – 5:00 p.m.)	159 (29.34)
Evening (5:00 p.m. – 8:00 p.m.	176 (32.41)
I would not go to the food pantry	229 (42.17)
How often would you be interested in going to the *Our Daily Bread* food pantry in Stillwater to get free food?	
Once a week	61 (11.21)
Every other week	61 (11.21)
Once a month	64 (11.76)
A few times a year	90 (16.54)
Never	268 (49.26)
If you went to the *Our Daily Bread* food pantry in Stillwater, how would you get there?*	
Drive myself	321 (59.01)
Ride with others	61 (11.23)
Ride the OSU bus	38 (6.99)
Ride a bicycle	31 (5.71)
Walk	53 (9.74)
Other	0 (0.00)
I would not go to the food pantry	191 (35.17)
What is the best way to inform you about the days, times, and transportation to *Our Daily Bread*?*	
Post it on the *Our Daily Bread* webpage or Facebook page	197 (36.28)
Post it on the OSU Campus Life webpage	161 (29.60)
Print an advertisement in the O-Colly	107 (19.85)
Post it on signs around campus	301 (55.33)
Other**	60 (11.07)
Do not know	115 (21.18)

*These questions allowed participants to "select all that apply".
**Participants were asked to list specifics.

Students' responses regarding what types of food they would like to get from a food pantry are presented in Table 17. Grain foods were desired by 43.75% of students. Canned fruits and vegetables were desired by 29.60% of students. Fresh fruits and vegetables were desired by 47.61% of students, the highest "yes" percentage of any food item. Frozen fruits and vegetables were desired by 36.40% of students. Dairy foods were desired by 38.24% of students. Fresh or frozen meat was desired by 40.99% of students, the second highest "yes" percentage of any food item. Canned meat was desired by only 13.79% of students, the lowest "yes" percentage of any food item. Vegetarian proteins were desired by 33.64% of students. Microwave foods were desired by 34.38% of students. However, depending on the food category approximately 45.77% to 46.69% of students responded with "does not apply to me".

Table 17. Food pantry desires (food items).

If you went to the food pantry to get food, what type of foods would you like to get?	**Yes n (%)**	**No n (%)**	**Do not know n (%)**
Grain foods (bread, rice, pasta, crackers)	238 (43.75)	35 (6.43)	19 (3.49)
Canned fruits and vegetables	161 (29.60)	94 (17.28)	39 (7.17)
Fresh fruits and vegetables	259 (47.61)	16 (2.94)	20 (3.68)
Frozen fruits and vegetables	198 (36.40)	73 (13.42)	22 (4.04)
Dairy foods (milk, yogurt, cheese)	208 (38.24)	59 (10.85)	23 (4.23)
Fresh or frozen meat?	223 (40.99)	44 (8.09)	23 (4.23)
Canned meat?	75 (13.79)	178 (32.72)	36 (6.62)
Vegetarian proteins (dried or canned beans, peanut butter, tofu)	183 (33.64)	87 (15.99)	21 (3.86)
Microwave foods	187 (34.38)	74 (13.60)	31 (5.70)

Differences in Responses by Food Security Status

Table 18 presents students' age by food security status. There was a significant difference in the distribution of students' age by food security status (p=0.0030). A

higher percentage of food insecure students were 18-23 years of age (80.52%) compared to the percentage of food secure students in this age group (67.73%).

Table 18. Students' age by food security status.

	Food Secure		Food Insecure		(Chi-square)
	n	**(%)**	**n**	**(%)**	**p value**
What is your age? (n=544)					(11.6249) p = 0.0030
18-23 years of age	212	(67.73)	186	(80.52)	
24-29 years of age	58	(18.53)	29	(12.55)	
30+ years of age	43	(13.74)	16	(6.93)	

Table 19 presents students' gender by food security status. There was no significant difference in the distribution of students' gender by food security status.

Table 19. Students' gender by food security status.

	Food Secure		Food Insecure		(Chi-square)
	n	**(%)**	**n**	**(%)**	**p value**
What is your gender? (n=544)					(2.0401) p = 0.1532
Male	106	(33.87)	92	(39.83)	
Female	207	(66.13)	139	(60.17)	

Table 20 presents student ethnicity and race by food security status. There was a significant difference in the distribution of African American students by food security status (p=0.017). A higher percentage of African-American students were food insecure (8.23%) than food secure (3.51%). There were no significant differences in other racial or ethnicity distributions by food security status.

Table 20. Students' ethnicity and race by food security status.

Ethnicity	**Food Secure n**	**%**	**Food Insecure n**	**%**	**(Chi-square) p value**
Hispanic (n=544)					(4.1615) p = 0.1248
Yes	21	(6.71)	21	(9.09)	
No	288	(92.01)	202	(87.45)	
Prefer not to answer	4	(1.28)	8	(3.46)	
Race (check all that apply)	**Food Secure n**	**%**	**Food Insecure n**	**%**	**(Chi-square) p value**
African American (n=544)					(5.6604) p = 0.0174
Yes	11	(3.51)	19	(8.23)	
No	302	(96.49)	212	(91.77)	
Asian (n=544)					(1.1838) p = 0.2766
Yes	33	(10.54)	18	(7.79)	
No	280	(89.46)	213	(92.21)	
Caucasian (n=544)					(0.0255) p = 0.8731
Yes	243	(77.64)	178	(77.06)	
No	70	(22.36)	53	(22.94)	
Native American (n=544)					(2.5831) p = 0.1080
Yes	25	(7.99)	28	(12.12)	
No	288	(92.01)	203	(87.88)	
Other (n=544)					(2.3045) p = 0.1290
Yes	6	(1.92)	1	(0.43)	
No	307	(98.08)	230	(99.57)	

Table 21 presents students' marital status by food security status. There was a significant difference in the distribution of students' marital status by food security status (p=0.0020). A higher percentage of food insecure students were never married (92.21%) than food secure students (87.54%).

Table 21. Students' marital status by food security status.

	Food Secure n	(%)	Food Insecure n	(%)	(Chi-square) p value
What is your marital status? (n=544)					(12.4238) p = 0.0020
Never married	274	(87.54)	213	(92.21)	
Married	37	(11.82)	11	(4.76)	
Divorced, separated or widowed	2	(0.64)	7	(3.03)	

Table 22 presents students' academic status by food security status. A significant difference was observed in the distribution students' academic status by food security status (p=0.0007). A higher percentage of food insecure participants were undergraduate students (83.55%) than food secure participants (67.73%).

Table 22. Students' academic status by food security status.

	Food Secure n	(%)	Food Insecure n	(%)	(Chi-square) p value
What is your academic status? (n=544)					(19.1868) p = 0.0007
Freshman	1	(0.32)	1	(0.43)	
Sophomore	56	(17.89)	49	(21.21)	
Junior	55	(17.57)	61	(26.41)	
Senior	100	(31.95)	82	(35.50)	
Graduate	101	(32.27)	38	(16.45)	

Table 23 presents students' living situation by food security status. There was no significant difference in the distribution of students' living situation by food security status.

Table 23. Students' living situation by food security status.

	Food Secure n	Food Secure (%)	Food Insecure n	Food Insecure (%)	(Chi-square) p value
What is your living situation? (n=544)					(0.7459) p = 0.9804
Campus dormitory	23	(7.35)	19	(8.23)	
Campus apartment	22	(7.03)	16	(6.93)	
Fraternity or sorority house	24	(7.67)	16	(6.93)	
With parents	9	(2.88)	7	(3.03)	
Off campus house, apartment, or mobile home	232	(74.12)	172	(74.46)	
Other	3	(0.96)	1	(0.43)	

Table 24 presents students' use of university dining service meal plans by food security status. There was no significant difference in the distribution of students using a university dining services meal plan or students' willing to donate money from their meal plan to help hungry students by food security status.

Table 24. Students' use of university dining services meal plans by food security status.

	Food Secure n	Food Secure (%)	Food Insecure n	Food Insecure (%)	(Chi-square) p value
Do you use a university dining services meal plan? (n=544)					(0.1605) p = 0.6887
Yes	50	(15.97)	34	(14.72)	
No	263	(84.03)	197	(85.28)	
Would you be willing to donate money from your meal plan to help students who are hungry? (n=84)					(0.0289 p = 0.8649
Yes	23	(46.00)	15	(44.12)	
No	27	(54.00)	19	(55.88)	

Table 25 presents the number of adults and children living with students by food security status. There were no significant differences in the frequency of adults or children living with students by food security status.

Table 25. Number of adults and children students live with by food security status.

	Food Secure n	(%)	Food Insecure n	(%)	(Chi-square) p value
Not including yourself, how many adults (18 years or older) live with you? (n=544)					(2.6929) p = 0.7472
Zero	61	(19.49)	49	(21.21)	
One	100	(31.95)	66	(28.57)	
Two	63	(20.13)	44	(19.05)	
Three	47	(15.02)	45	(19.48)	
Four	13	(4.15)	9	(3.90)	
Five or more	29	(9.27)	18	(7.79)	
Do any children (younger than 18 years) live with you? (n=544)					(0.2146) p = 0.6432
No	288	(92.01)	215	(93.07)	
Yes	25	(7.99)	16	(6.93)	

Table 26 presents students' financial resources by food security status. There were significant differences in the distribution of students who had parents (p=0.0393), jobs (p=0.0113), or financial aids, grants, or student loans (p<0.0001), as financial resources by food security status. A lower percentage of food insecure students had parents as financial resources (50.22%) than food secure students (59.11%). Whereas a higher percentage of food insecure students had jobs (62.34%) and financial aids, grants, or student loans (62.77%) as financial resources than food secure students (51.44% and 58.79%, respectively). There was no significant difference in the distribution of students who received financial assistance from scholarships/fellowships, military benefits, graduate assistantships, or spouse/significant other.

Table 26. Students' financial resources by food security status.

What financial resources do you use to pay for your studies? (check all that apply)	**Food Secure n**	**(%)**	**Food Insecure n**	**(%)**	**(Chi-square) p value**
Parents (n=544)					(4.2490) p = 0.0393
Yes	185	(59.11)	116	(50.22)	
No	128	(40.89)	115	(49.78)	
Job (n=544)					(6.4107) p =0.0113
Yes	161	(51.44)	144	(62.34)	
No	152	(48.56)	87	(37.66)	
Scholarship or fellowship (n=544)					(2.2136) p = 0.1368
Yes	184	(58.79)	121	(52.38)	
No	129	(41.21)	110	(47.62)	
Financial aid, grant or student loan (n=544)					(23.9804) p < 0.0001
Yes	130	(41.53)	145	(62.77)	
No	183	(58.47)	86	(37.23)	
Military benefits (n=544)					(1.9225) p = 0.1656
Yes	7	(2.24)	10	(4.33)	
No	306	(97.76)	221	(95.67)	
Graduate assistantship (n=544)					(0.3122) p = 0.5763*
Yes	6	(1.92)	3	(1.30)	
No	307	(98.08)	228	(98.70)	
Spouse/significant other (n=544)					(0.5030) p = 0.4782*
Yes	3	(0.96)	1	(0.43)	
No	310	(99.04)	230	(99.57)	

*Chi-square test may not be valid due to an expected cell count warning.

Table 27 presents students' family or friend support by food security status. There was a significant difference by food security status in the distribution of students who had family or friends nearby who could help them (p<0.0001). A lower percentage of food insecure students reported having many friends or family nearby who could help them (22.51%) than food secure students (42.17%).

Table 27. Students' family or friend support by food security status.

	Food Secure n	(%)	Food Insecure n	(%)	(Chi-square) p value
How many family or friends do you have nearby who can help you? (n=544)					(23.0253) p < 0.0001
None	61	(19.49)	58	(25.11)	
Very few	120	(38.34)	121	(52.38)	
Many	132	(42.17)	52	(22.51)	

Table 28 presents students' annual income by food security status. There was a significant difference in the distribution of students' annual income by food security status (p<0.0001). A higher percentage of food insecure students reported annual incomes less than $12,000 (48.05%) compared to food secure students (22.36%).

Table 28. Students' annual income by food security status.

	Food Secure n	(%)	Food Insecure n	(%)	(Chi-square) p value
What range is your annual household income? (n=544)					(51.4980) p < 0.0001
Less than $12,000	70	(22.36)	111	(48.05)	
$12,000 to $16,000	31	(9.90)	22	(9.52)	
$16,001 to $20,000	26	(8.31)	14	(6.06)	
$20,001 to $24,000	8	(2.56)	9	(3.90)	
$24,001 to $28,000	7	(2.24)	5	(2.16)	
Over $28,000	95	(30.35)	26	(11.26)	
Prefer not to answer	76	(24.28)	44	(19.05)	

Table 29 presents students' dietary patterns and behaviors by food security status. There were significant differences by food security status in the distribution of students who ate breakfast (p<0.0001), lunch (p<0.0001), and dinner (p<0.0001); had the food they needed to make healthy meals (p<0.0001) and ate fast food (p=0.0012). On most days, a lower percentage of food insecure students compared to food secure students ate breakfast (31.17% versus 55.45%, receptively), ate lunch (65.37% versus 87.22%,

receptively), ate dinner (83.98% versus 95.53%, receptively), and had the food they needed to make healthy meals (18.70% versus 46.15%, receptively). However, on most days, a higher percentage of food insecure students compared to food secure students ate fast food (24.24% versus 13.42%, receptively). There was no significant difference in the frequency of students reporting they prepared their own meals by food security status.

Table 29. Students' dietary patterns and behaviors by food security status.

How often do you…	Food Secure n	Food Secure (%)	Food Insecure n	Food Insecure (%)	(Chi-square) p value
Eat breakfast? (n=543)					(35.9056) p < 0.0001
Seldom, if ever	56	(17.95)	83	(35.93)	
Some days	83	(26.60)	76	(32.90)	
Most days	173	(55.45)	72	(31.17)	
Eat lunch? (n=544)					(37.2274) p < 0.0001
Seldom, if ever	4	(1.28)	11	(4.76)	
Some days	36	(11.50)	69	(29.87)	
Most days	273	(87.22)	151	(65.37)	
Eat dinner? (n=544)					(30.0664) p < 0.0001
Seldom, if ever	7	(2.24)	3	(1.30)	
Some days	7	(2.24)	34	(14.72)	
Most days	299	(95.53)	194	(83.98)	
Prepare you own meals? (n=544)					(0.9013) p = 0.6372
Seldom, if ever	34	(10.86)	28	(12.12)	
Some days	124	(39.62)	98	(42.42)	
Most days	155	(49.52)	105	(45.45)	
Have the food you need to make healthy meals? (n=542)					(57.0640) p < 0.0001
Seldom, if ever	34	(10.90)	70	(30.43)	
Some days	134	(42.95)	117	(50.87)	
Most days	144	(46.15)	43	(18.70)	
Eat fast food? (n=544)					(13.4623) p = 0.0012
Seldom, if ever	72	(23.00)	34	(14.72)	
Some days	199	(63.58)	141	(61.04)	
Most days	42	(13.42)	56	(24.24)	

Table 30 presents factors influencing students' dietary intake by food security status. There was a significant difference by food security status in the distribution of students who felt comfortable reading and understanding food labels ($p=0.0049$), planning menus ($p=0.0015$), writing a shopping list ($p<0.0001$), selecting healthy foods at the grocery store ($p=0.0013$), and preparing meals ($p<0.0001$). A lower percentage of food insecure students compared to food secure students often felt comfortable reading and understanding food labels (57.58% versus 65.18%, receptively), planning menus (36.80% versus 52.40%, receptively), writing a shopping list (58.87% versus 79.23%, receptively), selecting healthy foods at the grocery store (55.84% versus 69.65%, receptively), and preparing meals (54.98 versus 72.20%, respectively). There was also a significant difference by food security status in the distribution of students who had enough money for gas and car insurance ($p<0.0001$) and had working electric and gas utilities ($p=0.0013$). A lower percentage of food insecure students compared to food secure students often had enough money for gas and car insurance (38.96 versus 78.59%, respectively) and had working electric and gas utilities (83.98% versus 93.61%, respectively). There was no significant difference by food security status in the distribution of students who had a car.

Table 30. Factors influencing student's dietary intake by food security.

Do you…	Food Secure n	(%)	Food Insecure n	(%)	(Chi-square) p value
Feel comfortable reading and understanding food labels? (n=544)					(10.6284) p = 0.0049
Yes, often	204	(65.18)	133	(57.58)	
Yes, sometimes	100	(31.95)	77	(33.33)	
No	9	(2.88)	21	(9.09)	
Feel comfortable planning menus? (n=544)					(13.0430) p = 0.0015
Yes, often	164	(52.40)	85	(36.80)	
Yes, sometimes	107	(34.19)	104	(45.02)	
No	42	(13.42)	42	(18.18)	
Feel comfortable writing a shopping list? (n=544)					(28.0516) p < 0.0001
Yes, often	248	(79.23)	136	(58.87)	
Yes, sometimes	58	(18.53)	78	(33.77)	
No	7	(2.24)	17	(7.36)	
Feel comfortable selecting healthy foods at the grocery store? (n=544)					(13.2467) p = 0.0013
Yes, often	218	(69.65)	129	(55.84)	
Yes, sometimes	83	(26.52)	81	(35.06)	
No	12	(3.83)	21	(9.09)	
Feel comfortable preparing meals? (n=544)					(18.4605) p < 0.0001
Yes, often	226	(72.20)	127	(54.98)	
Yes, sometimes	76	(24.28)	85	(36.80)	
No	11	(3.51)	19	(8.23)	
Have a car? (n=544)					(5.3401) p = 0.0692
Yes, often	276	(88.18)	190	(82.25)	
Yes, sometimes	8	(2.56)	14	(6.06)	
No	29	(9.27)	27	(11.69)	
Have enough money for gas and car insurance? (n=544)					(89.6747) p = < 0.0001
Yes, often	246	(78.59)	90	(38.96)	
Yes, sometimes	42	(13.42)	100	(43.29)	
No	25	(7.99)	41	(17.75)	
Have working electricity or gas utilities? (n=544)					(13.2891) p =0.0013
Yes, often	293	(93.61)	194	(83.98)	
Yes, sometimes	13	(4.15)	26	(11.26)	
No	7	(2.24)	11	(4.76)	

Table 31 presents students' access to food preparation equipment and resources by food security status. There was a significant difference by food security status in the distribution of students' access to a crockpot (p=0.0066), electric skillet (p=0.0078), space to store frozen food (p<0.0001), space to store refrigerated food (p=0.0040), space to store dry food (p<0.0001), and right tools to prepare meals (p=0.0009). A lower percentage of food insecure students than food secure students had access to a crockpot (63.64% versus 74.44%, respectively), electric skillet (36.80% versus 48.24%, respectively), space to store frozen food (77.06% versus 94.25%, respectively), space to store refrigerated food (92.64% versus 97.76%, respectively), space to store dry food (88.74% versus 97.44%, respectively), and the right tools to prepare meals (81.82% versus 91.37, respectively). There was no significant difference by food security status in the distribution of students who had access to running water, a refrigerator, a freezer, an oven, a cooktop/stove, or a microwave.

Table 31. Student's access to food preparation equipment and resources by food security.

On a daily basis, do you have access to…	**Food Secure**		**Food Insecure**		**(Chi-square) p value**
	n	**(%)**	**n**	**(%)**	
Running water? (n=544)					No Statistic**
Yes	313	(100.00)	231	(100.00)	
No	0	(0.00)	0	(0.00)	
A refrigerator? (n=544)					(1.3575) p = 0.2440*
Yes	313	(100.00)	230	(99.57)	
No	0	(0.00)	1	(0.43)	
A freezer? (n=544)					(1.2674) p = 0.2603
Yes	307	(98.08)	223	(96.54)	
No	6	(1.92)	8	(3.46)	
An oven? (n=544)					(0.0246) p = 0.8754

Table 31. Student's access to food preparation equipment and resources by food security (continued).

On a daily basis, do you have access to…	Food Secure n	(%)	Food Insecure n	(%)	(Chi-square) p value
Yes	293	(93.61)	217	(93.94)	
No	20	(6.39)	14	(6.06)	
A cooktop/stove? (n=544)					(0.0246) p = 0.8754
Yes	293	(93.61)	217	(93.94)	
No	20	(6.39)	14	(6.06)	
A microwave? (n=544)					(3.1617) p = 0.0754*
Yes	310	(99.04)	224	(96.97)	
No	3	(0.96)	7	(3.03)	
A crock pot? (n=544)					(7.3678) p = 0.0066
Yes	233	(74.44)	147	(63.64)	
No	80	(25.56)	84	(36.36)	
An electric skillet? (n=544)					(7.0896) p = 0.0078
Yes	151	(48.24)	85	(36.80)	
No	162	(51.76)	146	(63.20)	
Enough space to store frozen food? (n=544)					(34.6207) p < 0.0001
Yes	295	(94.25)	178	(77.06)	
No	18	(5.75)	53	(22.94)	
Enough space to store refrigerated food? (n=544)					(8.2712) p = 0.0040
Yes	306	(97.76)	214	(92.64)	
No	7	(2.24)	17	(7.36)	
Enough space to store dry food? (n=544)					(17.1670) p < 0.0001
Yes	305	(97.44)	205	(88.74)	
No	8	(2.56)	26	(11.26)	
The right tools to prepare meals at home? (n=544)					(10.9580) p = 0.0009
Yes	286	(91.37)	189	(81.82)	
No	27	(8.63)	42	(18.18)	

*Chi-square test may not be valid due to an expected cell count warning.
**All students responded "Yes".

Table 32 presents students' school behaviors by food security status. There was a significant difference in the distribution of students' having difficulty concentration in

class because they did not have enough food to eat (p<0.0001) by food security status. A higher percentage of food insecure students reported they had difficulty concentration in class because they did not have enough food to eat (48.05%) compared to food secure students (20.13%). Although there was a higher percentage of food insecure students who reported they had to withdraw from one or more classes because they did not have enough food to eat (5.63%) than food secure students (0.96%), the chi-square test may not be valid due to an expected cell count warning.

Table 32. Students' school behaviors by food security status.

In the last 12 months…	Food Secure n	(%)	Food Insecure n	(%)	(Chi-square) p value
Did you ever have difficulty concentrating in class because you didn't have enough food to eat? (n=544)					(68.3956) p < 0.0001
Yes	63	(20.13)	111	(48.05)	
No	248	(79.23)	106	(45.89)	
Do not know	2	(0.64)	14	(6.06)	
Did you withdraw from one or more classes because you didn't have enough food to eat? (n=544)					(17.2509) p = 0.0002*
Yes	3	(0.96)	13	(5.63)	
No	309	(98.72)	211	(91.34)	
Do not know	1	(0.32)	7	(3.03)	

*Chi-square test may not be valid due to an expected cell count warning.

Table 33 presents students' food coping strategies and behaviors by food security status. There was a significant difference by food security status in the distribution of students who charged food on their bursar account (p<0.0001), sought employment to pay for food (p<0.0001), ate smaller meals (p<0.0001), skipped meals (p<0.0001), stretched meals (p<0.0001), ate expired food (p<0.0001), ate foods that may have been stored too long (p<0.0001), ate community meals provided by local organizations

($p<0.0001$), and received help with food from family or friends ($p<0.0001$). A higher percentage of food insecure students than food secure students reported often or sometimes charging food on their bursar account (54.97% versus 32.27%, respectively), seeking employment to pay for food (66.23% versus 20.45%, respectively), eating smaller meals (90.05% versus 25.88%), skipping meals (81.38% versus 20.77%, respectively), stretching meals (81.82% versus 32.91%, respectively), eating expired food (35.07% versus 11.50%, respectively), eating foods that may have been stored too long (50.65% versus 20.45%, respectively), eating community meals provided by local organizations (34.63% versus 17.26%, respectively), and receiving help with food from family or friends (71.42% versus 24.28%, respectively).

In addition, there was a significant difference by food security in students' having to choose between eating and feeding children ($p=0.0009$), eating and paying rent or utilities ($p<0.0001$), and eating and buying medicine ($p<0.0001$). A higher percentage of food insecure students than food secure students reported often or sometimes having to choose between eating and feeding their children (6.92% versus 0.96%, respectively), eating and paying rent or utilities (29.43% versus 3.51%, respectively), and eating and buying medicine (25.97% versus 1.92%, respectively). Although there was a higher percentage of food insecure students who reported they often or sometimes had to choose between eating and feeding a pet (12.12%) than food secure students (1.28%), the chi-square test may not be valid due to an expected cell count warning.

Furthermore, there was a significant difference by food security in students' selling or pawning items ($p<0.0001$) and selling blood or plasma ($p<0.0001$). A higher percentage of food insecure students than food secure students reported often or

sometimes selling or pawning items (25.55% versus 1.60%, respectively) and selling blood or plasma (21.64% versus, 1.92%, respectively).

Table 33. Students' food coping strategies and behaviors by food security status.

If you do not have enough food, do you ever…	**Food Secure n**	**(%)**	**Food Insecure n**	**(%)**	**(Chi-square) p value**
Charge food on your bursar account? (n=544)					(83.2137) p < 0.0001
Yes, often	24	(7.67)	53	(22.94)	
Yes, sometimes	77	(24.60)	74	(32.03)	
No	66	(21.09)	77	(33.33)	
Does not apply to me	146	(46.65)	27	(11.69)	
Seek employment to pay for food? (n=544)					(123.8444) p < 0.0001
Yes, often	29	(9.27)	94	(40.69)	
Yes, sometimes	35	(11.18)	59	(25.54)	
No	99	(31.63)	42	(18.18)	
Does not apply to me	150	(47.92)	36	(15.58)	
Eat smaller meals? (n=544)					(246.4140) p < 0.0001
Yes, often	5	(1.60)	82	(35.50)	
Yes, sometimes	76	(24.28)	126	(54.55)	
No	90	(28.75)	4	(1.73)	
Does not apply to me	142	(45.37)	19	(8.23)	
Skip meals? (n=544)					(212.5053) p < 0.0001
Yes, often	5	(1.60)	67	(29.00)	
Yes, sometimes	60	(19.17)	121	(52.38)	
No	107	(34.19)	25	(10.82)	
Does not apply to me	141	(45.05)	18	(7.79)	
Stretch meals (make soups or casseroles; add rice or noodles)? (n=544)					(161.1294) p < 0.0001
Yes, often	19	(6.07)	97	(41.99)	
Yes, sometimes	84	(26.84)	92	(39.83)	
No	73	(23.32)	25	(10.82)	
Does not apply to me	137	(43.77)	17	(7.36)	
Eat expired food? (n=544)					(105.8334) p < 0.0001
Yes, often	2	(0.64)	20	(8.66)	
Yes, sometimes	34	(10.86)	61	(26.41)	
No	138	(44.09)	132	(57.14)	
Does not apply to me	139	(44.41)	18	(7.79)	

Table 33. Students' food coping strategies and behaviors by food security status (continued).

If you do not have enough food, do you ever…	**Food Secure**		**Food Insecure**		**(Chi-square)**
Eat foods that may have been stored too long? (n=544)					(105.1891) p < 0.0001
Yes, often	4	(1.28)	30	(12.99)	
Yes, sometimes	60	(19.17)	87	(37.66)	
No	110	(35.14)	94	(40.69)	
Does not apply to me	139	(44.41)	20	(8.66)	
Eat community meals provided by local organizations? (n=544)					(87.4818) p < 0.0001
Yes, often	6	(1.92)	21	(9.09)	
Yes, sometimes	48	(15.34)	59	(25.54)	
No	117	(37.38)	129	(55.84)	
Does not apply to me	142	(45.37)	22	(9.52)	
Get help with food from family or friends? (n=544)					(145.0255) p < 0.0001
Yes, often	12	(3.83)	60	(25.97)	
Yes, sometimes	64	(20.45)	105	(45.45)	
No	97	(30.99)	49	(21.21)	
Does not apply to me	140	(44.73)	17	(7.36)	
Have to choose between eating and feeding your child(ren)? (n=544)					(16.4901) p = 0.0009
Yes, often	0	(0.00)	5	(2.16)	
Yes, sometimes	3	(0.96)	11	(4.76)	
No	108	(34.50)	63	(27.27)	
Does not apply to me	202	(64.54)	152	(65.80)	
Have to choose between eating and paying rent or utilities? (n=544)					(100.7760) p < 0.0001
Yes, often	0	(0.00)	12	(5.19)	
Yes, sometimes	11	(3.51)	56	(24.24)	
No	145	(46.33)	121	(52.38)	
Does not apply to me	157	(50.16)	42	(18.18)	
Have to choose between eating and buying medicine? (n=544)					(93.5727) p < 0.0001
Yes, often	1	(0.32)	15	(6.49)	
Yes, sometimes	5	(1.60)	45	(19.48)	
No	148	(47.28)	121	(52.38)	
Does not apply to me	159	(50.80)	50	(21.65)	

Table 33. Students' food coping strategies and behaviors by food security status (continued).

If you do not have enough food, do you ever…	**Food Secure**		**Food Insecure**		**(Chi-square)**
Have to choose between eating and feeding a pet? (n=544)					(32.9597) p < 0.0001*
Yes, often	0	(0.00)	5	(2.16)	
Yes, sometimes	4	(1.28)	23	(9.96)	
No	135	(43.13)	108	(46.75)	
Does not apply to me	174	(55.59)	95	(41.13)	
Sell or pawn items? (n=544)					(110.5100) p < 0.0001
Yes, often	0	(0.00)	9	(3.90)	
Yes, sometimes	5	(1.60)	50	(21.65)	
No	160	(51.12)	139	(60.17)	
Does not apply to me	148	(47.28)	33	(14.29)	
Sell blood or plasma? (n=544)					(101.6570) p < 0.0001
Yes, often	0	(0.00)	18	(7.79)	
Yes, sometimes	6	(1.92)	32	(13.85)	
No	160	(51.12)	150	(64.94)	
Does not apply to me	147	(46.96)	31	(13.42)	

*Chi-square test may not be valid due to an expected cell count warning.

Table 34 presents students' self-reported health conditions by food security status. There was a significant difference by food security status in the distribution of students who reported having anxiety (p<0.0001), depression (p<0.0001), fatigue (p<0.0001), and conditions that make it difficult to grocery shop, prepare food, and eat food (p=0.0302). A higher frequency of food insecure students than food insecure students reported having anxiety (43.29% versus 27.16%, respectively), depression (31.17% versus 14.70%, respectively), and fatigue (21.65% versus 8.63%, respectively). There was no significant difference by food security status in the distribution of students who reported having diabetes, food allergies, heart disease or high blood pressure.

Table 34. Students' self-reported health conditions by food security status.

Do you have any of the following health conditions…	**Food Secure n**	**(%)**	**Food Insecure n**	**(%)**	**(Chi-square) p value**
Anxiety (n=544)					(15.4151) p < 0.0001
Yes	85	(27.16)	100	(43.29)	
No	228	(72.84)	131	(56.71)	
Depression (n=544)					(21.2312) p < 0.0001
Yes	46	(14.70)	72	(31.17)	
No	267	(85.30)	159	(68.83)	
Diabetes (n=544)					(2.9103) p = 0.0880*
Yes	1	(0.32)	4	(1.73)	
No	312	(99.68)	227	(98.27)	
Fatigue (n=544)					(18.5392) p < 0.0001
Yes	27	(8.63)	50	(21.65)	
No	286	(91.37)	181	(78.35)	
Food allergies (n=544)					(0.3554) p = 0.5511
Yes	26	(8.31)	16	(6.93)	
No	287	(91.69)	215	(93.07)	
Heart disease (n=544)					(1.7460) p = 0.1864*
Yes	1	(0.32)	3	(1.30)	
No	312	(99.68)	228	(98.70)	
High blood pressure (n=544)					(3.4510) p = 0.0632
Yes	7	(2.24)	12	(5.19)	
No	306	(97.76)	219	(94.81)	
Conditions that make it difficult for you to grocery shop, prepare food, or eat? (n=544)					(4.6963) p = 0.0302
Yes	18	(5.75)	25	(10.82)	
No	295	(94.25)	206	(89.18)	

*Chi-square test may not be valid due to an expected cell count warning.

Table 35 presents recent changes to students' food intake and weight by food security status. There was a significant difference in the distribution of students' reporting changes in food intake (p<0.0001) and weight (p=0.0296) over the past three months by food security status. A higher frequency of food insecure students compared to

food secure students reported decreased food intake (43.29% versus 19.49%, respectively) and decreased weight (24.24% versus 17.57%, respectively) over the past three months.

Table 35. Recent change in students' food intake and weight by food security status.

Without wanting to…	Food Secure n	Food Secure (%)	Food Insecure n	Food Insecure (%)	(Chi-square) p value
Has your food intake changed over the past 3 months? (n=544)					(44.6241) $p < 0.0001$
No	173	(55.27)	70	(30.30)	
Yes, decreased	61	(19.49)	100	(43.29)	
Yes, increased	40	(12.78)	27	(11.69)	
Do not know	39	(12.46)	34	(14.72)	
Has your weight changed over the past 3 months? (n=544)					(8.9746) $p = 0.0296$
No	159	(50.80)	94	(40.69)	
Yes, decreased	55	(17.57)	56	(24.24)	
Yes, increased	69	(22.04)	47	(20.35)	
Do not know	30	(9.58)	34	(14.72)	

Table 36 presents students' general health status by food security status. There was a significant difference in the students' general health status by food security status (p=0.0024). A lower percentage of food insecure students than food secure students reported their general health status as excellent (4.76% versus 9.58%, respectively), very good (30.30% versus 36.42%, respectively), or good (39.39% versus 41.21%). Whereas, a higher percentage of food insecure students than food secure students reported their general health status as fair (21.21% versus 10.22%, respectively).

Table 36. Students' general health status perceptions by food security status.

	Food Secure n	(%)	Food Insecure n	(%)	(Chi-square) p value
Would you say your general health is… (n=544)					(18.5186) p = 0.0024
Excellent	30	(9.58)	11	(4.76)	
Very good	114	(36.42)	70	(30.30)	
Good	129	(41.21)	91	(39.39)	
Fair	32	(10.22)	49	(21.21)	
Poor	7	(2.24)	7	(3.03)	
Do not know	1	(0.32)	3	(1.30)	

Table 37 presents students' body mass index by food security status. There was a significant difference in the distribution of students' body mass index by food security status (p=0.0020). A lower percentage of food insecure students than food secure students were classified as normal weight (50.22% versus 53.00%, respectively) and overweight (23.38% versus 30.99%, respectively); however, a higher percentage of food insecure students than food secure students were classified as underweight (6.93% versus 1.92%, respectively) and obese (19.48% versus 13.10%, respectively).

Table 37. Students' body mass index category by food security status.

	Food Secure n	(%)	Food Insecure n	(%)	(Chi-square) p value
Body mass index category (n=544)					(14.8089) P = 0.0020
Underweight	6	(1.92)	16	(6.93)	
Normal weight	169	(53.99)	116	(50.22)	
Overweight	97	(30.99)	54	(23.38)	
Obese	41	(13.10)	45	(19.48)	

Table 38 presents students' feelings about going to a food pantry by food security status. There was a significant difference by food security status in the distribution of students who reported they felt being able to get food from a food pantry would help them (p<0.0001), they would feel embarrassed going to a food pantry (p<0.0001), and

they felt people would think less of them if they went to a food pantry (p<0.0001). A higher percentage of food insecure students than food secure students reported being able to get food from a food pantry would help them (48.92% versus 21.41%, respectively), they would be embarrassed to go to a food pantry (53.25% versus 28.75%, respectively), and felt people would think less of them if they went to a food pantry (45.02% versus 21.73%, respectively). In addition, there was a significant difference by food security status in the distribution of students reporting they were aware of the *Our Daily Bread* (p<0.0001) and they would like to go to the *Our Daily Bread* (p<0.0001). A lower percentage of food insecure students than food secure students reported they were aware of the *Our Daily Bread* (27.71% versus 43.45%, respectively). However, a higher percentage of food insecure students than food secure students reported they would like or might like to go to the *Our Daily Bread* (72.72% versus 46.96%, respectively). There was no significant difference by food security status in the distribution of students who reported they would like to volunteer or assist customers at *Our Daily Bread*.

Table 38. Students' feelings about going to a food pantry by food security status.

	Food Secure		**Food Insecure**		**(Chi-square)**
	n	**(%)**	**n**	**(%)**	**p value**
Do you think being able to get food from a food pantry would help you? (n=544)					(59.4918) p < 0.0001
Yes	67	(21.41)	113	(48.92)	
No	164	(52.40)	53	(22.94)	
Do not know	82	(26.20)	65	(28.14)	
Are you aware of *Our Daily Bread* in Stillwater? (n=544)					(14.1724) p < 0.0001
Yes	136	(43.45)	64	(27.71)	
No	177	(56.55)	167	(72.29)	

Table 38. Students' feelings about going to a food pantry by food security status (continued).

	Food Secure n	Food Secure (%)	Food Insecure n	Food Insecure (%)	(Chi-square) p value
Would you like to go to *Our Daily Bread* food pantry in Stillwater? (n=544)					(36.6139) $p < 0.0001$
Yes	36	(11.50)	36	(15.58)	
Maybe	111	(35.46)	132	(57.14)	
No	166	(53.04)	63	(27.27)	
Would you feel embarrassed going to a food pantry? (n=544)					(44.3558) $p < 0.0001$
Yes	90	(28.75)	123	(53.25)	
Maybe	97	(30.99)	69	(29.87)	
No	126	(40.26)	39	(16.88)	
Do you think people would think less of you if you went to a food pantry? (n=544)					(48.6470) $p < 0.0001$
Yes	68	(21.73)	104	(45.02)	
Maybe	96	(30.67)	78	(33.77)	
No	149	(47.60)	49	(21.21)	
Would you like to volunteer to assist customers at the *Our Daily Bread* food pantry in Stillwater? (n=544)					(2.6078) $p = 0.2715$
Yes	125	(39.94)	87	(37.66)	
Maybe	121	(38.66)	104	(45.02)	
No	67	(21.41)	40	(17.32)	

CHAPTER V

DISCUSSION

This study assessed food security among Oklahoma State University students in Stillwater, Oklahoma. This study also investigated students' demographics, dietary patterns, health status, food pantries, and related factors as well as differences in these factors by food security status. Overall, based on the USDA ERS six-item short form, 42% of students were food insecure; 17% experienced low food security and 26% experienced very low food security. The 42% rate of food insecure students at Oklahoma State University is higher than the national average for U.S. households (12.3%) and the state average for Oklahoma (15.2%) (USDA, 2017a; USDA, 2017b). However, the 42% food insecurity rate among Oklahoma State University students is similar to that reported by on other postsecondary education campuses. A systematic review of food insecurity among studies at postsecondary campuses in the United States found an average food insecurity rate of 32.9% for all studies and 42% for peer-reviewed studies (Bruening et al., 2017). Researchers who used the USDA ERS six-item short form to determine food insecurity at four-year universities in Oregon and Texas found student food insecurity rates of 59% and 31%, respectively (Biediger-Friedman et al., 2016; Patton-Lopez et al., 2014).

Overall, the majority of participants in this study were Caucasian (77%), female (64%), between 18-23 years of age (73%) never married (90%), living in off-campus housing (74%), and an undergraduate (74%) and which is similar to other food security studies at postsecondary institutions. In fall 2017, Oklahoma State University's enrollment as a whole was reported as 65.69% Caucasian, 48.76% female, and 57% undergraduate (Oklahoma State University, 2017).

In this study, the most represented race/ethnicity was Caucasian/non-Hispanic white at 77%. Many other studies in this field have also had the highest representation group based on race/ethnicity as Caucasian/non-Hispanic white, including the following: Goldrick-Rab et al. (2018) (54%); Bruening et al. (2016) (46%); Lisnic (2016) (83%); Morris et al. (2016) (77%); and Chaparro et al. (2009) (26%). In the present study, among Caucasians, which was the largest racial group, 42% experienced food insecurity, which is similar to two other studies that reported food insecurity rates of 46% (Bruening et al., 2016) and 37% (Lisnic, 2016) for Caucasian students. In the present study, the only significant difference in the racial distribution by food security status was among African American students, with a higher percentage of food insecure than food secure students being African American. In fact, 63% of African American students were food insecure; however, the sample size was only 30 students. This is similar to Morris et al. (2016) and Goldrick-Rab et al. (2018) who reported African American students were more likely to be food insecure.

In addition, the majority of participants in this study were female (63.6%). This is seen in several studies in this field including Goldrick-Rab et al. (2018) (70%); Biediger-Friedman et al. (2016) (60.1%); Patton-Lopez et al. (2014) (72.9%); Bruening et al.

(2016) (62%); Lisnic (2016) (69%); Morris et al. (2016) (66.6%); and Chaparro et al. (2009) (56.6%). In the present study there was no significant difference in the distribution of students' gender by food security status. This is counter to Goldrick-Rab et al. (2018) who reported higher food insecurity rates among females than males.

Furthermore, it is unsurprising the majority of students 18-23 years of age (73%), never married (90%) and living off campus (74%) given that 74% of the participants were college sophomores, juniors, and seniors. In this study, there was no significant difference in the distribution of students' living situation by food security status. This is counter to Morris et al. (2016) who reported students were more likely to be food insecure if they lived off campus without parents. There was a significant difference in the distribution of students' age, marital status, and academic status by food security status, with a higher percentage of food insecure students than food secure students being 18-23 years of age, never married, and undergraduates. Bruening et al. (2017) also reported younger students were more likely to be food insecure. In the present study, food insecurity rates for undergraduate students and graduate students were 48% and 27%, respectively. A study at the University of Hawai'i-Manoa found 23% of undergraduates and 18% of graduate students were food insecure, but a study at the University of Arkansas found 37% of undergraduates and 47% of graduate students were food insecure (Lisnic, 2016; Chaparro et al., 2009).

Overall the majority of students reported living either alone or with one or two other adults (70%) and not living with any children under the age of 18 (92%). In this study, there was no significant difference in the distribution of students by food security status in the number of adults or children students lived with. Bruening et al. (2017) and

Blagg et al. (2017); however, did report students with children were more likely to be food insecure.

Unsurprisingly, in this study, 33% of all students reported they had an annual income less than $12,000. However, among food insecure students, 48% reported annual incomes of less than $12,000. In addition, there was a significant difference in the distribution of students' annual income by food security status, with a higher percentage of food insecure students reporting annual incomes less than $12,000 compared to food secure students. Also, students who reported over $28,000 in annual income were more likely to be food secure (30.35%) than food insecure (11.26%). Low-income being a risk factor for student food insecurity has been reported by others (Morris et al., 2016; Patton-Lopez et al., 2014).

Overall, in the present study, more than 50% of students received financial support from parents; employment; scholarships or fellowships; or financial aid, grants, or student loans to pay for their education. Overall 57.17% of students reported they were employed during their studies. This is similar to other studies in this field including: Goldrick-Rab et al. (2018) (59%); Lisnic (2016) (57%); Morris et al. (2016) (63.7%); and Patton-Lopez et al. (2014) (50.3%). In the present study, there were significant differences in the distribution of students who received financial support from parents; employment; and financial aids, grants, or student loans by food security status. A higher percentage of food insecure students had jobs and financial aid, grants, or student loans as financial resources than food secure students; however, a lower percentage of food insecure students had parents as financial resources than food secure students. Bruening et al. (2017) also reported students were more likely to be food insecure if they were

financially independent from their parents. Thus, lack of parental support for education may be viewed as a risk factor for student food insecurity, and may be a reason why a higher percentage of food insecure students depended on employment and financial aid, grants, or student loans as financial resources.

Although 42% of students were food insecure, less than 10% of students used a food assistance program. Other studies have also reported very low (<10%) food assistance program use among students possibly due to student ineligibility, lack of awareness and knowledge, and social stigmas (Lisnic, 2016; Chaparro et al., 2009).

Overall, only 15% of students in this study reported using the university meal plan which was lower than two other studies at four-year universities that reported university meal plan use at 26% (Patton-Lopez, 2014) and 63% (Bruening et al., 2016). However, in the present study there was no significant difference in the distribution of students using the university dining services meal plan by food security status. Additionally, 45% of students who had a meal plan indicated they would be willing to donate money from their meal plan to help students who were hungry and there was no significant difference in the distribution of students who indicated they would be willing to donate money from their meal plan by food security status.

In regards to risk factors, student responses to dietary intake influences were telling. Overall, the majority of students in this study reported they “often” felt comfortable reading and understanding food labels, planning menus, writing a shopping list, selecting healthy foods at the grocery store and preparing meals. However, there was a significant difference by food security status in the distribution of students who reported they “often” felt comfortable performing these activities with a lower percentage

of food insecure students compared to food secure students reporting they “often” felt comfortable. Similarly, although the majority of students reported they “often” had enough money for gas and car insurance and had working electricity or gas utilities, there was a significant difference by food security status in the distribution of students who reported they “often” had enough money for gas and car insurance and had working electric and gas utilities, with a lower percentage of food insecure students compared to food secure students “often” having these resources. These responses are direct indicators of being at risk for food insecurity. Financial and food management skills were also risk factors for food insecurity reported among students in several other studies (Biediger-Friedman et al., 2016; Gaines et al., 2014; Chaparro et al., 2009).

Access to food preparation equipment and food storage are also important indicators of food insecurity. Although overall, the majority of students reported they had food preparation equipment and food storage, there was a significant difference in the distribution of students’ access to food preparation tools and resources for food storage. A higher frequency of food insecure students than food secure students reported not having a crockpot, an electric skillet, and the right tools to prepare meals at home as well as not having enough space to store frozen, refrigerated, or dry food. This may indicate students with fewer financial resources accommodate by purchasing fewer food preparation tools and may also choose less expensive living accommodations that provide less food storage space.

Overall, close to 32% of students reported having difficulty concentrating in class because they did not have enough food to eat. Of these students, close to 64% were food insecure. The distribution of students reporting they had difficulty concentrating in class

because they did not have enough food to eat was significantly different by food security status, with the percentage being higher among food insecure students than food secure students. This is in agreement with other studies that reported associations between food insecurity in college students to poorer academic performance and difficulty concentrating in class (Blagg et al., 2017; Farahbakhsh et al., 2017; Lisnic, 2016; Morris et al., 2016; Patton-Lopez et al., 2014; Silva et al., 2017).

Dietary consequences of food insecurity were seen in the significantly higher rates of food insecure students compared to food secure students. Food insecure students responded at higher rates that when they did not have enough food they "often" or "sometimes" charged food on their bursar account, sought employment to pay for food, ate smaller meals, skipped meals, stretched meals, ate expired foods, or ate food that may have been stored too long. In addition, "on most days" a lower percentage of food insecure students compared to food secure students reported they ate breakfast, lunch, and dinner and had the food they needed to make healthy meals; however, "on most days", a higher percentage of food insecure students compared to food secure students reported they ate fast food. It appears food insecure college students are trying to cope with food insecurity in ways that could result in poor diet quality and compromise their health and studies. Other studies have also reported poor diet quality among college students and adults who faced food insecurity (Smith et al., 2017; Bruening et al., 2016).

Also, in this study, a higher frequency of food insecure students than food secure students reported having a condition that made it difficult for them grocery shop, prepare food, and eat. Responses to these dietary pattern questions shed light on what may be considered a risk factor for food insecurity and also a consequence of food insecurity.

Overall, students' reported health conditions were notable for anxiety (34%), depression (22%), and fatigue (14%). However, there was a significant difference by food security status in the distribution of students who reported having anxiety, depression, and fatigue with a higher frequency of food insecure students than food secure students reported having anxiety, depression, and fatigue. This finding is consistent with other research reporting college students and adults with anxiety and depression have reported to have higher rates of food insecurity (Farahbakhsh et al., 2017; Hughes, Serebryanikova, Donaldson, & Leveritt, 2011; Patton-Lopez et al., 2014).

Overall in this study, the incidence of diabetes, food allergies, heart disease, and high blood pressure were low and there was no significant difference in the distribution of students with these health conditions by food security status.

Overall the majority of students did not report recent changes in their food intake and weight; however, there was a significant difference in the distribution of students' reporting changes in food intake and weight over the past three months by food security status. A higher frequency of food insecure students compared to food secure students reported decreased food intake and decreased weight, which is not surprising considering a higher percentage of food insecure students than food secure students reported "often" or "sometimes" eating smaller meals and skipping meals. In terms of BMI overall, the majority of students had a BMI classified as "normal weight" however, there was a significant difference by food security status in the distribution of students' BMI. A lower percentage of food insecure students than food secure students were classified as "normal weight" and "overweight"; however, a higher percentage of food insecure students than food secure students were classified as "underweight" or "obese" both of which are

undesirable. A recent systematic review explored the link between food insecurity and "overweight" and "obese" status, which has been observed among several population groups including adult women (Franklin et al., 2012). This paradox is explained by the theory that food insecure individuals are more prone to follow a consistent pattern of eating low-cost, poor-quality foods leading to health consequences such as obesity (Franklin et al., 2012).

An indication of future adverse health may be associated by students' self-reported general health status. Although overall the majority of students (82%) reported their general health status as excellent, very good or good; there was a significant difference in students' general health status by food security status. A lower percentage of food insecure students than food secure students reported their general health status was excellent, very good or good; whereas, a higher percentage of food insecure students than food secure students reported their general health status as fair. Patton-Lopez et al. (2014) also reported student food insecurity was associated with fair or poor health.

Social and emotional challenges involved in trying to get enough food to eat may contribute to differences in students' reported anxiety, depression, fatigue, and general health status by food security status. From this study, food insecurity seems to have an association with emotional stress based on the difficult life choices that students felt they must make when they do not have enough food.

In the present study, the majority of students reported they had very few family or friends nearby that could help them. There was a significant difference in distribution of students' social support by food security status, with a lower percentage of food insecure students than food secure students reporting having many family or friends nearby for

support. To overcome the lack of social support, food insecure students more so than food secure students reported eating community meals provided by local organizations and receiving help with food from family or friends by food security status. Other emotionally challenging coping behaviors were reflected by the significant difference in the distribution of students by food security status who felt they had to choose between eating and feeding children, eating and paying rent or utilities, and eating and buying medicine, with a higher percentage of food insecure students than food secure students reporting they "often" or "sometimes" had to make these choices. Furthermore, there was a significant difference by food security status seen in students' selling or pawning items or blood with a higher frequency of food insecure students than food secure students reporting these activities.

Overall, only 37% of students were aware of the local food pantry, *Our Daily Bread*. However, there was a significant difference in students' awareness of *Our Daily Bread* by food security status, with a lower percentage of food insecure students being aware than food secure students. In addition, overall the majority of students did not think being able to get food from a food pantry would help them. However, there was also a significant difference in students' feeling that getting food from a food pantry would help them by food security status, with a higher frequency of food insecure students than food secure students reporting being able to get food would help them. Similarly, there was a significant difference in the distribution of students by food security status who reported they would like to go to *Our Daily Bread* with a higher percentage of food insecure than food secure students reporting "maybe" or "yes" that they would like to go to *Our Daily Bread.* These responses clearly indicate food pantries have an opportunity to serve food

insecure students at OSU. However, there was also a significant difference in the distribution of how students said they would feel or how they thought others would feel about them by food security status, with a higher percentage of food insecure students indicating they would feel embarrassed going to a food pantry and thought others would think less likely of them. This signals a barrier between food insecure college students and the potential of a food pantry providing assistance. The University of Arkansas food security study reported 54% of college students were aware the university had a food pantry, although only 1% of students overall used the food pantry (Lisnic, 2016). Finally, there was no significant difference by food security status in students' indicating they would like to volunteer at *Our Daily Bread.*

In response to the types of foods students would like to receive at a food pantry, the main desires were for grains (44%), fresh fruits and vegetables (48%), fresh or frozen meat (41%), dairy foods (38%), microwave foods (34%), vegetarian proteins (34%), and canned fruits and vegetables (30%). All of these could be instrumental to a student's healthy diet and help them become or remain food secure. Quantities of food pantry items would differ based on the individuals' needs, household size, the food pantry's inventory, and the food pantry's food assistance offerings.

Students did not have an overwhelming preference on what days they would go to a food pantry, with "do not know" having the highest frequency (43%). Monday-Thursday (29%) and Saturdays (32%) received considerably more interest than Friday (18%). The time frames of "noon to 5:00 p.m." (29%) and "5:00 p.m. to 8:00 p.m." (32%) were selected considerably more than "8:00 a.m. to noon" (18%). Students who indicated they would visit *Our Daily Bread* did not have a clear inclination on how often

they would like to go to the food pantry. This may be due to students not having information about the food pantry or on how much food assistance they would receive.

The overwhelming majority of students indicated they would drive or ride with others to *Our Daily Bread*, which is not surprising considering over 90% of students said they had a car "often" or "sometimes". This helps explain why only 7% of students indicated they would ride the OSU bus to *Our Daily Bread.* The OSU bus system does have a dedicated bus route from the OSU campus to *Our Daily Bread;* however, given the amount of food students may receive, services to assist students to get food from the bus stop back to their living quarters may need further evaluation.

Student responses made it clear on how to market *Our Daily Bread*. Most students preferred online posts (*Our Daily Bread* website, OSU Campus Life webpage, Facebook), as well as signs around campus. Among those who responded "other", students indicated they would prefer updates via e-mail, Instagram, or Twitter. Clearly, student preference was heavily favored on *Our Daily Bread* having an online and OSU campus presence.

CHAPTER VI

CONCLUSION

The results of this study and others preceding it conclusively show many college students live with the problem of food insecurity. Food insecurity among college students seems to be prevalent across a wide range of demographics, although certain characteristics seem to put college students more at-risk for food insecurity. This study showed a significant difference by food security status in students' age range, academic status, financial resources, family and friend support, annual household income, and access to food preparation and storage equipment. There was also a significant difference by food security status in students' perception of general health and coping strategies (eating smaller meals, skipping meals, stretching meals, eating expired foods, and eating foods that have been stored too long) by food security status. In addition, there was a significant difference by food security in students' having to choose between eating and feeding children, eating and paying rent or utilities, and eating and buying medicine. Furthermore, there was a significant difference by food security status in students' having difficulty concentrating in class because of not having enough food to eat. All of these consequences show food insecurity can have an enormously negative impact on a student's academics, health, and quality of life.

This study also sheds light on many barriers that exist to alleviating food insecurity at postsecondary institutions. Although there are many food assistance programs available, not all of these are accessible or known by college students. Results from this study revealed only 27.71% of food insecure Oklahoma State University students were aware of a local food pantry, *Our Daily Bread*. Further, 53.25% said they would be embarrassed to going to a food pantry, and 45.02% said people would think less of them for visiting a food pantry. These findings indicate there is not only a challenge in making students aware of food assistance programs, but also in removing the barriers to students using programs such as a food pantry. Other challenges reported in the literature include a student's time management, financial management, living situation, cooking skills, and food and nutrition knowledge (Blagg et al., 2017; Bruening et al., 2017; Morris et al., 2016; Patton-Lopez et al., 2014; Chaparro et al., 2009). Postsecondary institutions must also be aware that the arrival of new students on campus may constantly change the overall food security status and other factors related to food security. Overall, it seems food insecurity is a challenging and complicated issue to navigate on a college campus because of awareness, knowledge, and resources.

Fortunately, there have been many recent attempts at researching and alleviating food insecurity among college students. The College and University Food Bank Alliance has made it their mission to serve college students by providing resources to campus-based food assistance programs (College and University Food Bank Alliance, 2018). Another program called Swipe Out Hunger has partnered with college campuses to allow college students to donate unused meal plans to food insecure or hungry individuals (Swipe Out Hunger, 2018). Almost half of students in this study who had a meal plan

said they were willing to donate money from their meal plan to students who were hungry. Since 2016, the Wisconsin Hope Lab has published an annual survey assessing the food and housing security needs of college students from across the United States. In 2018, participation in the survey came from over 43,000 students at 66 institutions across 20 states (Goldrick-Rab et al., 2018). Locally in Stillwater, Oklahoma the food pantry, *Our Daily Bread*, a client-choice food pantry, offers food assistance to college students (Our Daily Bread Food & Resource Center, 2017).

There is hope for combating food insecurity among college students with a mixture of focused research, postsecondary institution support, and food assistance program availability. Future research and projects that could be beneficial to this field should focus on a comprehensive and constant assessment of food security status, risk factors, and consequences among Oklahoma State University college students as well as the development and evaluation of a pilot food assistance program for food insecure college students with help from the local food pantry, *Our Daily Bread*. Also, adding course curriculum that introduces the topic of food security to students may build awareness of food assistance programs and improve food security outcomes.

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APPENDICES

Appendix A

Assessment of OSU Student Food Security

Dietary:

1. How often do you…	Seldom, If Ever	Some Days	Most Days	Do Not Know
Eat breakfast?				
Eat lunch?				
Eat dinner?				
Prepare your own meals?				
Have the food you need to make healthy meals?				
Eat fast food?				

2. Do you…	Yes, Often	Yes, sometimes	No
Feel comfortable reading and understanding food labels?			
Feel comfortable planning menus?			
Feel comfortable writing a shopping list?			
Feel comfortable selecting healthy foods at the grocery store?			
Feel comfortable preparing meals?			
Have a car?			
Have enough money for gas and car insurance?			
Have electricity?			

3. On a daily basis do you have…	Yes	No
Running water?		
A refrigerator?		
A freezer?		
An oven?		
A microwave?		
A crock pot?		
An electric skillet?		
Enough space to store frozen food?		
Enough space to store refrigerated food?		
Enough space to store dry food?		
The right tools to prepare meals at home?		

Food Security:

In the last 12 months…	Often True	Sometimes True	Never True	Do Not Know
1. The food I bought just didn't last, and I didn't have money to get more.				
2. I couldn't afford to eat balanced meals.				

In the last 12 months…	Yes **(answer question 4)**	No **(skip question 4)**
3. Did you ever cut the size of your meals or skip meals because there wasn't enough money for food?		

Answer question 4, if you answered Yes on question 3.	Almost Every Month	Some Months, but Not Every Month	Only 1 or 2 Months	Do Not Know
4. How often did this happen?				

In the last 12 months…	Yes	No	Do Not Know
5. Did you ever ***eat less than you felt you should*** because there wasn't enough money for food?			
6. Were you ever ***hungry but didn't eat*** because there wasn't enough money for food?			
7. Did you ever have difficulty concentrating in class because you didn't have enough food to eat?			
8. Did you withdraw from one or more classes because you didn't have enough food to eat?			

9. If you do not have enough food, do you ever…	Yes, Often	Yes, Sometimes	No
Charge food on your bursar account?			
Eat smaller meals?			
Skip meals?			
Stretch meals? (make soups or casseroles; add rice or noodles)			
Eat expired foods?			
Eat foods that may have been stored too long?			
Eat community meals provided by local churches?			
Get help with food from family or friends?			
Have to choose between eating and paying rent or utilities			
Have to choose between eating and buying medicine?			
Have to choose between eating and feeding a pet?			
Sell or pawn items?			
Sell blood?			
Other topics (please list):			

Food Pantry:

1. Do you think being able to get free food from a food pantry would help you?
   _____ Yes
   _____ No
   _____ Do not know

2. Are you aware of the Our Daily Bread food pantry in Stillwater?
   _____ Yes
   _____ No

3. What do you think...	Yes	Maybe	No
Would you like to go to the Our Daily Bread food pantry in Stillwater to receive free food?			
Would you feel embarrassed going to a food pantry?			
Do you feel people would think less of you if you went to a food pantry?			
Would you like to volunteer to assist customers at the Our Daily Bread food pantry in Stillwater?			

4. What would be the best day for you to go to the Our Daily Bread food pantry in Stillwater? [please select all that apply].
   _____ Weekdays (Monday – Thursday)
   _____ Friday
   _____ Saturday

5. What would be the best time frame for you to go to the Our Daily Bread food pantry in Stillwater? [please select all that apply].
   _____ Morning
   _____ Afternoon
   _____ Evening

6. How often would you be interested in going to the Our Daily Bread food pantry to get free food?
   _____ Once a week
   _____ Every other week
   _____ Once a month
   _____ A few times a year
   _____ Never

7. If you went to the food pantry how would you get there? [please select all that apply].
   _____ Drive myself
   _____ Ride with others
   _____ Ride the OSU bus
   _____ Ride a bicycle
   _____ Walk
   _____ Other (please list) _____

8. If you went to the food pantry to get food what type of foods would you like to get?	Yes	No	Do Not Know
Grain foods (bread, cereal, rice, pasta, crackers)			
Canned fruits and vegetables			
Fresh fruits and vegetables			
Frozen fruits and vegetables			
Dairy foods (milk, yogurt, cheese)			
Fresh or frozen meat			
Canned meat			
Vegetarian proteins (dried or canned beans, peanut butter, tofu)			
Microwave foods			

9. What is the best way to inform you about the days, times, and transportation to Our Daily Bread?
   _____ Post it on the Our Daily Bread webpage or Facebook page
   _____ Post it on the OSU Campus Life webpage
   _____ Print an advertisement in the O'Colly
   _____ Post it on signs around campus
   _____ Other (please list) _____

Health status:

1. What is your height? _____

2. What is your weight? _____

3. Without wanting to...	No	Yes, Decreased	Yes, Increased	Do Not Know
Has your food intake changed over the past 3 months?				
Has your weight changed over the past 3 months?				

4. Would you say that in general your health is...
   _____ Excellent
   _____ Very good
   _____ Good
   _____ Fair
   _____ Poor
   _____ Don't know / Not sure

5. Do you have any of these conditions? [please select all that apply]
   _____ Heart Disease
   _____ High blood pressure
   _____ Diabetes
   _____ Fatigue
   _____ Depression
   _____ Food allergies (please list) _____
   _____ None

6. Are there any foods you do not eat because of your culture or faith?
   _____ No
   _____ Yes (please list) _____

7. Do you have any conditions that make it difficult for you to grocery shop, prepare food or eat?
   _____ No
   _____ Yes (please list) _____

Demographics

1. What is your age? _____

2. What is your gender?
   _____ Male
   _____ Female

3. Are you Hispanic?
   _____ Yes
   _____ No

4. What is your race? [please select all that apply]
   _____ African American (Black)
   _____ Asian American
   _____ Caucasian (White)
   _____ Native American
   _____ Other (please list) _____

5. What is your marital status?
   _____ Never married
   _____ Married
   _____ Divorced, Separated or Widowed

6. What is your academic level?
   ____ Freshman
   ____ Sophomore
   ____ Junior
   ____ Senior
   ____ Graduate student

7. Which college or university do you attend? [please select all that apply]
   ____ Oklahoma State University
   ____ Northern Oklahoma College

8. What is your current living situation?
   _____ Campus dormitory
   _____ Campus apartment
   _____ Fraternity or sorority house
   _____ With parents
   _____ Off campus house, apartment, mobile home
   _____ Other (please list) _____

9. Do you use a meal plan from the University Dining Services?
_____ Yes
_____ No

10. Would you be willing to donate money from your meal plan to help students who are hungry?
_____ Yes
_____ No
_____ I do not have a meal plan

11. Not including yourself, how many adults (18 years or older) live with you? _____

12. How many children (younger than 18 years) live with you? _____

13. What financial resources do you use to pay for your studies? [Please select all that apply].
_____ Parental support
_____ Job
How many hours a week? _____
_____ Scholarship/fellowship
_____ Financial Aid/Grant/Student Loan
_____ Military benefits
_____ Other

14. How many family members or friends do you have nearby who can help you?
_____ None
_____ Very few
_____ Many

15. What food assistance programs do you use? [please select all that apply]
_____ Women Infant Children (WIC)
_____ SNAP/Food Stamps
_____ Food Pantries
_____ Community/Church Meals
_____ Food Distribution Program on Indian Reservations
_____ Other (please list) _____

16. What range is your annual household income?
_____ Less than $12,000
_____ $12,000 - $16,000
_____ $16,001 - $20,000
_____ $20,001 - $24,000
_____ $24,001 - $28,000
_____ Over $28,000

If you would like to be entered into the drawing for 1 of 25, OSU dining cards valued at $100 each, please enter your name and e-mail address: in the spaces provided below

[Box to enter name]

[Box to enter e-mail address]

Appendix B

First E-Mail to random sample of 5,000 OSU students

Dear Oklahoma State University Student,

Food insecurity is an increasing concern on college campuses and Oklahoma State University is partnering with the Our Daily Bread food pantry in Stillwater, Oklahoma to address this issue.

My name is Samuel Balsiger and I am a graduate student in the department of Nutritional Sciences at Oklahoma State University. I have developed an assessment survey to gather information about food security among Oklahoma State University students.

You have been randomly selected to complete the online Oklahoma State University student food security assessment survey.

Individuals who volunteer to complete the survey will be given an opportunity to be entered into a drawing for 1 of 25 OSU dining cards valued at $100 each.

The following is a link to the Qualtrics survey.

[insert qualtrics link here]

The survey link will be open for 2 weeks from the date of this e-mail.

Thank you for your time.

Sincerely,

Samuel Balsiger
Graduate Student, Nutritional Sciences

Appendix C

PARTICIPANT INFORMATION
OKLAHOMA STATE UNIVERSITY

Title: Assessment of Food Security among Oklahoma State University Students

Investigator(s): Samuel Balsiger, Graduate Student, Department of Nutritional Sciences Oklahoma State University and Janice Hermann, Professor, Department of Nutritional Sciences, Oklahoma State University

Purpose: The purpose of the research study is to assess food security among Oklahoma State University students. You must be 18 years or older to participate.

What to Expect: This study is administered online. Participation in this study will involve completion of a survey. You are only expected to complete the survey one time. The survey will only advance after answering each question. It should take you about 15 minutes to complete the survey.

Risks: There are no risks associated with this study which are expected to be greater than those ordinarily encountered in daily life.

Benefits: There are no direct benefits to you. However, you may gain awareness of the Our Daily Bread food pantry in Stillwater, Oklahoma.

Compensation: Participants who complete the survey have the opportunity to be entered into a drawing for 1 of 25 Oklahoma State University dining cards valued at $100 each. If you would like to be entered into the drawing, the last two questions of the survey will ask for your name and e-mail address. The winners of the drawing will be notified two weeks after the survey closing date.

Your Rights and Confidentiality: Your participation in this study is voluntary. There is no penalty for refusal to participate, and you are free to withdraw your consent and participation in this study at any time.

Confidentiality: If you are interested in participating in the drawing, to minimize risk of connecting your name and e-mail address to the survey data, names and e-mail address will be stored separately from the survey data.

The records of this study will be kept private. Any written results will discuss group findings and will not include information that will identify you. Research records will be stored on a password protected computer in a locked office and only researchers and individuals responsible for research oversight will have access to the records. Name and e-mail address data will be deleted four weeks after the winners have been notified. Survey data will be deleted one year after the study has been completed.

Contacts: You may contact any of the researchers at the following addresses and phone numbers, should you desire to discuss your participation in the study and/or request information about the results of the study: Samuel Balsiger, Graduate Student, Department of Nutritional Sciences, Oklahoma State University, Stillwater, OK 74078, 405-744-4601 or Janice Hermann, Professor, Department of Nutritional Sciences, Oklahoma State University, Stillwater, OK 74078, 405-744-4601. If you have questions about your rights as a research volunteer, you may contact the IRB Office at 223 Scott Hall, Stillwater, OK 74078, 405-744-3377 or irb@okstate.edu

If you choose to participate: If you agree to participate, please click "I agree to participate in this survey" below. By clicking "I agree to participate in this survey" you are indicating that you freely and voluntarily agree to participate in this project and you also acknowledge that you are at least 18 years of age."

It is recommended that you print a copy of this consent page for your records before you begin the study by clicking below.

Appendix D

Second E-Mail to random sample of 5,000 OSU students

Dear Oklahoma State University Student

This is a reminder about participation in the Oklahoma State University student food security assessment survey.

Food insecurity is an increasing concern on college campuses and Oklahoma State University is partnering with the Our Daily Bread food pantry in Stillwater, Oklahoma to address this issue.

My name is Samuel Balsiger and I am a graduate student in the department of Nutritional Sciences at Oklahoma State University. I have developed an assessment survey to gather information about food security among Oklahoma State University students.

You have been randomly selected to complete the online Oklahoma State University student food security assessment survey.

Individuals who volunteer to complete the survey will be given an opportunity to be entered into a drawing for 1 of 25 OSU dining cards valued at $100 each.

The following is a link to the Qualtrics survey.

[insert qualtrics link here]

The survey link will be open for 1 week from the date of this e-mail.

Thank you for your time.

Sincerely,

Samuel Balsiger
Graduate Student, Nutritional Sciences

Appendix E

Final e-mail with survey link
Subject Line: Online survey of Oklahoma State University student food needs

Dear OSU student,

This is a final reminder about participation in the OSU student food security assessment survey.

Students not having enough food is an increasing concern on college campuses and Oklahoma State University is partnering with the Our Daily Bread food pantry in Stillwater, Oklahoma to address this issue.

My name is Samuel Balsiger and I am a graduate student in the department of Nutritional Sciences at OSU. I have developed an assessment survey to gather information about food security among OSU students.

You have been randomly selected to complete the online OSU student food security assessment survey.

Individuals who volunteer to complete the survey will be given an opportunity to be entered into a drawing for 1 of 25 OSU dining cards valued at $100 each.

The following is a link to the Qualtrics survey.

[insert qualtrics link here]

The survey link will close on Monday, February 26th, at 11:59 pm.

Thank you for your time.

Sincerely,

Samuel Balsiger
Graduate Student, Nutritional Sciences

Appendix F

Oklahoma State University Institutional Review Board

Date:	Wednesday, December 6, 2017
IRB Application No	HE1771
Proposal Title:	Assessment of Food Security Among Oklahoma State University Students
Reviewed and Processed as:	Exempt

Status Recommended by Reviewer(s): Approved Protocol Expires: 12/5/2020

Principal Investigator(s):

Samuel Balsiger	Janice Hermann
	301 HES
Stillwater, OK 74078	Stillwater, OK 74078

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 section 45 CFR 46.

☐ The final versions of any printed recruitment, consent and assent documents bearing the IRB approval stamp are attached to this letter. 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 submitted with the appropriate signatures for IRB approval. Protocol modifications requiring approval may include changes to the title, PI advisor, 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 adverse events to the IRB Chair promptly. Adverse events are those which are unanticipated and impact the subjects during the course of the research; and
4. Notify the IRB office in writing when your research project is complete.

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 Dawnett Watkins 219 Scott Hall (phone: 405-744-5700, dawnett.watkins@okstate.edu).

Sincerely,

Hugh Crethar, Chair
Institutional Review Board

VITA

Samuel Balsiger

Candidate for the Degree of

Master of Science

Thesis: ASSESSMENT OF FOOD SECURITY AMONG OKLAHOMA STATE UNIVERSITY STUDENTS

Major Field: Nutritional Sciences

Biographical:

Education:

Completed the requirements for the Master of Science in Nutritional Sciences at Oklahoma State University, Stillwater, Oklahoma in August 2018.

Completed the requirements for the Bachelor of Science in Nutritional Sciences at Oklahoma State University, Stillwater, Oklahoma in 2016.

Experience:

Graduate Research Assistant – September 2016 – April 2018
Department of Nutritional Sciences
Oklahoma State University, Stillwater, OK

Culinary Assistant – June 2016 – July 2016
Cooking For Kids
Tulsa, OK and Stillwater, OK

Professional Memberships:

Academy of Nutrition and Dietetics