Assessing Food Insecurity Prevalence and Associated Factors among College Students Enrolled in a University in the Southeastern United States

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(Original signatures are on file with official student records.)
Assessing Food Insecurity Prevalence and Associated Factors among College Students Enrolled in a University in the Southeastern United States

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ABSTRACT

Background: Food insecurity is defined as the inability to access adequate and nutritious food. There is a relatively small, but growing body of published research on the prevalence of food insecurity among college students, with most studies finding food insecurity prevalence to be higher on college campuses than in states in which studies were conducted. Two published studies at large, public universities in the Southeast found inconsistent rates of food insecurity, 14% and 46%.

Objective: To assess rates of food insecurity among college students enrolled in campuses of a large public university system in one state in the Southeastern United States and identify factors that are associated with experiencing food insecurity.

Methods: A cross-sectional study design was used. An online survey was administered to eligible, enrolled students (n=38,586), 5,593 responded (14% response rate). After applying exclusion criteria (freshman standing, <18 years old, not a college student, incomplete Adult Food Security Survey Module answers), the final sample size was 4,842. Descriptive statistics were conducted to calculate food insecurity status and identify sample characteristics. Associations between food security status and independent variables were assessed using bivariate analyses (chi square and ANOVA tests), which were further assessed using multivariate logistic regression.

Results: Among students in this sample, a high rate (36%) of food insecurity was identified, which was more than double the rate (13%) of the general population in the same state. When controlling for race, ethnicity, gender, age, and campus attended, factors that were significantly associated with increased likelihood of food insecurity included previous food insecurity, financial factors, and a GPA <3.85. Seniors were significantly more likely to be food insecure.
than graduate students (OR=1.41). No significant relationships were identified between food insecurity prevalence and meal plan participation, sophomores, and juniors.

**Conclusion:** This research identifies high rates of food insecurity among college students enrolled in a large public university system in the Southeastern US, as well as select factors related to food insecurity, demonstrating the need for creation of interventions and programs to assist college students experiencing food insecurity.
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CHAPTER 1: LITERATURE REVIEW

Defining Food Security

The United States Department of Agriculture (USDA) Economic Research Service systematically assesses food security levels of households across the nation and uses specific labels to better define food security status. The USDA defines food security as “access by all people at all times to enough food for an active, healthy life,” while food insecurity is defined as “the limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in socially acceptable ways.” The USDA further delineates food security and food insecurity into four categories: high food security, marginal food security, low food security or very low food security, as seen in Table 1. Marginal food security is identified when one or two indicators of food insecurity are identified by the respondent, which is generally expressed as anxiety over food shortage rather than actual lack of food. Respondents who are classified as low food secure indicated that their diets have decreased quality, variety, or desirability; however, they have hardly or not at all reduced their dietary intake. In contrast, very low food security exists when dietary intake has been reduced on more than a few occasions.

Impacts of Food Insecurity

In 2016, food insecurity prevalence was higher among households with children headed by a single parent, with incomes close to or below the Federal poverty line, with a Black or Hispanic head of house, and with women and men who live alone. Studies have found that experiencing food insecurity is related to an increased risk of developing obesity. Adults who experience food insecurity are at an increased odds of stroke, arthritis, diabetes, chronic heart disease, hypertension, and heart attack when compared to their food secure counterparts.
In children, food insecurity prevalence has been found to negatively impact social skill development and academic performance and to be associated with weight gain. Additionally, food insecure adolescents and young adults have been found to have diminished academic performance, less healthy dietary intake, and poorer mental, social, and overall health. The USDA recommends that food insecurity be assessed among all populations, as it is often considered, “a direct measure of well-being” and has many potential health consequences. These broad but significant health impacts indicate the importance of addressing food insecurity at all levels.

Assessing Food Insecurity

Food security is important as it is a basic need for human existence and higher prevalence of food insecurity can lead to health problems. Additionally, the measurement of food security

Table 1: USDA Food Security Terms Defined

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Food security</td>
<td>Access by all people at all times to enough food for an active, healthy life</td>
</tr>
<tr>
<td>High food security</td>
<td>No reported indications of food-access problems or limitation</td>
</tr>
<tr>
<td>Marginal food security</td>
<td>One or two reported indications—typically of anxiety over food sufficiency or shortage of food in the house</td>
</tr>
<tr>
<td>Food insecurity</td>
<td>The limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in socially acceptable ways</td>
</tr>
<tr>
<td>Low food security</td>
<td>Reports of reduced quality, variety or desirability of diet. Little or no indication of reduced food intake</td>
</tr>
<tr>
<td>Very low food security</td>
<td>Reports of multiple indications of disrupted eating patterns and reduced food intake</td>
</tr>
</tbody>
</table>
status provides a roadmap for public officials, policy makers, service providers, and the public to intervene and provide assistance to those in need. In the *Guide to Measuring Household Food Security* (2013), the USDA explains the importance of measuring food security, the process of actually measuring food security, and calculation of food security status on a standardized US food security scale. The USDA food security screener is comprised of 18 core questions that provides the most reliable measurement and is considered to be the most valid method to ascertain food security data. This set is known as the Household Food Security Survey Module (HFSSM) and is considered to be the gold standard for food security measurement among households. Additionally, there is a 10-item screener known as the Adult Food Security Survey Module (AFSSM), which is the gold standard for assessing food security status among adults without children. Additionally, there is a short form of the HFSSM that contains only 6 items. The choice of which tool to use depends upon the nature of the assessment being conducted (i.e. longitudinal studies, local surveys, national surveys, etc.) and the specific aims of the research (i.e. identifying food insecurity, food access issues, etc.). Determining food security status is based upon the household or individual’s scores which are determined from the responses to the questionnaire.

Each year, the USDA publishes national and state level food security statistics. These statistics are derived from the national food security survey that is conducted along with the Current Population Survey (CPS). Approximately 45,000 households provide information concerning food security and food spending, which yields information for state and national food security prevalence data. These national assessments occur at the household-level, which provides useful information for the general population and households. When the USDA
publishes food security statistics among states, the prevalence is often averaged for data spanning three years to enhance reliability.\textsuperscript{11}

**Trends of Food Insecurity Prevalence**

Between 2014 and 2016, the range of food insecurity across the states varied from 9\% in Hawaii to 19\% in Mississippi.\textsuperscript{2} Among households in the US in 2016, 12\% (15.6 million households) were food insecure, which was not a significant decrease from the previous year (13\%).\textsuperscript{2} Between 1995 and 2007, food insecurity in the US ranged from 10\% to 12\%; however, in 2008, there was a dramatic increase in food insecurity rates to 15\%.\textsuperscript{11} This increase in food insecurity rates was likely due to the economic recession in 2008. Rates slowly started to decline to the current rate of 12\%.\textsuperscript{2} Although rates may seem to be decreasing, the history of food insecurity trends show that the rates ebb and flow with confounding factors, such as the economy. In the Southeastern region, the food insecurity rate was the highest (14\%), which was followed by the Midwest (12\%), the West (12\%), and the Northeast (11\%).\textsuperscript{2} When looking specifically at states in the Southeast, all states had a food insecurity rate that was either the same or higher than the national average, indicating food security disparities in the region.\textsuperscript{2} With these differences among general populations across the nation, it is important to assess food security within different groups, particularly college students.

**Nutritional Status of College Students**

Approximately one in five college students are overweight.\textsuperscript{12} The college population is at a unique phase in life, which frequently referred to as “emerging adulthood” and is defined as the developmental stage from adolescence to adulthood, typically between 18 to 25 years of age.\textsuperscript{13} During the first year of college, many students make their own dietary and physical activity choices for the first time, often establishing lifelong patterns.\textsuperscript{14} Studies have found that the
average weight gain for college students in their first-year ranges from 2.7 to 4.2 pounds,\textsuperscript{14,15} which is much higher than 0.8 pounds, the average yearly weight gain for American adults.\textsuperscript{15} Studies have found that college students consume a higher amount of calories when compared to their counterparts who are not in college,\textsuperscript{16,17} which may be a contributing factor to the increased weight gain often experienced by college students. Additionally, college students consume more saturated fats and less fruits and vegetables than recommended.\textsuperscript{18} College students have also been found to restrict dietary consumption and increase exercise to attempt to compensate for calories from alcohol consumption.\textsuperscript{19} Taken together, this information may indicate that college students have multiple nutrition-related risk factors. These risk factors may be compounded by food insecurity, highlighting the importance of assessing and identifying factors associated with food insecurity in this population.

**Impact of Food Insecurity among College Students**

When students transition to college, they may be faced with a new-found independence, financial burdens, and stressors.\textsuperscript{20-22} Academic, financial, and social stressors can play a role in negatively affecting the mental health of college students.\textsuperscript{23} Since all or part of the responsibility of financial provision may fall upon college students, the continuous increase in tuition cost may cause this population to become more vulnerable to food insecurity.\textsuperscript{24}

In addition, studies have found an inverse relationship between GPA and food security, with food insecure students more likely to have lower GPAs.\textsuperscript{25,26} This troubling relationship has the potential to impair students’ academic performance. Programs designed to increase upward social mobility through expanded access to college education may have the unintended consequence of also increasing risk of food insecurity, especially among low income, minority, and first-generation college students. The National College Health Assessment listed the top
reported factors to inhibit academic performance among college students as stress, sicknesses, sleep problems, computer use, relationship issues, death, and alcohol use.\textsuperscript{27} All of these factors indicate the vast difficulties that many college students experience, which could be exacerbated by food insecurity.\textsuperscript{20-22,27} In order to best equip college students for success, it is important to identify these preventable factors contributing to stress and reducing academic performance, like food insecurity. To date, there are relatively few studies published that measure food security status among college students in the US\textsuperscript{25,26,28-35} The current research on food insecurity among college students indicates the need for more research both on the prevalence of and factors relating to food insecurity across the nation.

Assessing Food Insecurity on College Campuses in the US

A study was completed in Hawaii with the purpose of assessing prevalence and potential predictors of food insecurity among college students.\textsuperscript{32} This study used a survey tool containing questions about demographics, spending patterns, and food security that was delivered to non-freshman students at the University of Hawaii at Manoa (UHM). The 10-item AFSSM screener was used for assessing food security, which was found to be both valid and reliable for the Asian and Pacific Islander population.\textsuperscript{36} With a cross-sectional design, the researchers randomly sampled undergraduate courses for survey administration (33% response rate from professors of the randomly sampled courses).\textsuperscript{32} From the 410 students surveyed, 21% were found to be food insecure, which was almost three times the food insecurity rate (8%) in Hawaii at the time.\textsuperscript{32,37} The probability of experiencing food insecurity increased significantly as spending on transportation, eating out, entertainment, and shopping increased.\textsuperscript{32} Students who reported two or more ethnicities had significantly higher odds of being food insecure than those who reported
only one ethnicity. With each additional year living in Hawaii, there was found to be a decrease in the odds of experiencing food insecurity by 5-8%.32

Another study was conducted at a midsize, rural university in Oregon with the purpose of assessing prevalence and determining associations of food insecurity among students.35 A 40-item survey was emailed to all students at the university, which resulted in 354 completed surveys (a 7% response rate). The survey was developed based on previous research of factors relevant to food insecurity prevalence, used questions to assess financial status and employment, and collected food security status with the 6-item short form of the HFSSM. Results were analyzed with descriptive statistics and regression models. Among the sample of students, 59% were identified as food insecure, which was much higher than the 15% prevalence in Oregon at the time of the study and may be biased to overreport as the survey was part of a broader effort to address food access issues.35 Having an income below $15,000 was the strongest predictor of food insecurity. Additionally, students who reported fair or poor health, being employed, or using food assistance programs had a greater likelihood of being food insecure, while having a grade point average (GPA) greater than or equal to 3.1 indicated a decreased likelihood to experience food insecurity. The results did not find significant relationships between food insecurity prevalence and living arrangement, health insurance status, physical activity, enrollment status, or demographic factors.

At a large, public university in Alabama, a study was conducted to determine the association between food security status of college students and different risk factors.33 The survey was administered using a combination of random and convenience sampling of undergraduate courses, excluding students who were freshman, graduate, part-time, or pregnant to have a sample population that mirrored a more typical college experience (response rate not
reported). The survey tool used previously validated components to assess sociodemographic characteristics, self-efficacy for cooking, financial status, exogenous shock, and food security status using the AFSSM. Contrary to other studies,\textsuperscript{26,32,35} food insecurity prevalence (14%)\textsuperscript{33} among this sample was lower than the prevalence (18%)\textsuperscript{38} in the state of Alabama at the time, which was theorized to be associated with a recent tornado in the area causing more support to be available or due to the use of food assistance programs among the sample.\textsuperscript{33} The sample was fairly representative of the student population but contained more females and seniors. The factors with a significant effect on likeliness of food insecurity were receiving financial aid, getting food assistance, being financially independent from parents, budgeting, and experiencing exogenous shock ("students with any affirmative responses to adverse circumstances").\textsuperscript{33} Possibly as a result of a recent tornado in the area at the time of research, 42\% of the students surveyed had experienced some form of exogenous shock. This study found that financial status and other financial factors of college students had a strong impact on food insecurity prevalence.

Another study was conducted at two community colleges in Maryland to measure the prevalence of food insecurity and relationship with GPA among college students.\textsuperscript{25} One community college was located in a suburban and affluent area, while the other was in an urban area, in which 21\% of residents lived below poverty level. Using a convenience intercept sampling method, the 16-item survey was administered at public areas on the two campuses (response rate not reported). In addition to containing the 10-item AFSSM, the survey included questions on GPA, age, gender, living situation, race/ethnicity, and income.\textsuperscript{25} After surveying 301 students, 150 at the urban community college and 151 at the suburban community college, statistical analyses were completed. Overall, 56\% of the community college students were classified as food insecure with prevalence rates of 53\% in the suburban sample and 60\% in the
urban sample. Students who identified as African American, Hispanic, and Asian were significantly more likely to be food insecure compared to those who identified as white. Students who lived with parents or relatives were less likely to be food insecure than those who lived alone, with spouses/partners, or roommates. The students within the lowest GPA range were more likely to be food insecure than those in the highest GPA range, potentially indicating the negative association between food insecurity and academic performance.

In Illinois, a study was conducted at four, large public universities. The purpose of this study was to determine food security status among college students across the state and its relationship with sociodemographic characteristics. A survey containing sociodemographic questions and the 10-item AFSSM was sent to the email listserv at each institution. Between the four universities, 48,658 students received the survey, and 1,882 undergraduate students participated (response rate of 4%). Among the sample, 35% were classified as food insecure, which was more than double the rate of 14% in Illinois at the time of the study. Although African American students were underrepresented in the study, they were found to have a significantly greater association with food insecurity than their non-African American counterparts. Additionally, students who received funding requiring repayment, such as student loans, were more likely to be food insecure than their counterparts who did not receive funding requiring repayment. Students who had lower GPAs compared to those who had higher GPAs were more likely to be food insecure. A significant relationship existed between food security status and living situation; students who resided off-campus without parents or guardians were more food insecure than those on-campus or living with parents or guardians. This study was the first to assess food security status at four universities in one state, and it found similar results across the participating universities.
At a large university in Arizona, a study was completed among college freshmen to assess food insecurity status and its associations with health outcomes. During Fall and Spring semesters, a cohort of 533 college freshman living in two residence halls were invited to participate in the study. Among those invited to participate, 209 college freshmen (42% response rate) completed the 128-item survey, measuring demographics, dietary behaviors, physical activity behaviors, social environmental factors related to nutrition, physical activity, and weight, access to food from parents, mental health, and food security status, which was measured with a validated two-item questionnaire adapted from the HFSSM. These questions were modified to refer to the past three months. Individuals were defined as food insecure if they responded positively to either question. Overall, the study found food insecurity to be present among one in three students in the past three months and to be associated with higher odds of performing unhealthy behaviors, like skipping breakfast or rarely eating home cooked meals. Additionally, the odds of depression were three times higher in the freshman who were identified as food insecure in comparison to their food secure counterparts. Significant relationships were not found between food insecurity and being overweight, consuming fast-food, consuming fruits and vegetables, eating healthy on campus, binge drinking, and stress. A limitation to consider when interpreting this study is the study only looked at freshman students which limits generalizability to the entire college population.

At a large, public university in Michigan, a study was conducted to determine if housing type, with or without food provision (dormitory/sorority/fraternity house or apartment/condo/parents/etc., respectively), was associated with a difference in food security predictors and fruit and vegetable intake among college students. During two different school years, a survey was administered to a random sample of 5,000 students each year from the
campus listserv, with the 514 as the final sample size (7% response rate). Along with assessing demographics, the survey inquired about housing type, car access, fruit and vegetable intake, and food security status using the 6-item short form of the USDA HFSSM, which was modified to focus on the individual rather than the household. Classification of food security status based on the 6-item short form is as follows: zero positive responses were classified as high food security, one positive response was classified as marginal food security, two to four positive responses were classified as low food security, and five to six positive responses were classified as very low food security. Among the college students in this sample, low food security was identified in 25%, and very low food security was identified in 16% of the sample, totaling 41% classified as food insecure. In housing with food provision, male students showed a greater risk of being food insecure, while Asian students were found to eat significantly more fruits and vegetables. Among those living in housing without food provision, an increased likelihood of food insecurity was found in male students, underrepresented minorities, and those without car access along with significantly lower fruit and vegetable intake in male students, those without car access, and those with marginal and low food security.

At a Historically Black College or University (HBCU) in Texas, 160 African-American female college students enrolled in courses in the Department of Health and Human Performance were recruited to participate in a study with a final sample of 112 students (70% response rate). The purpose of this study was to examine if behavioral and psychosocial differences were present among female students with or without food security. In this study, food security was assessed by only one question, “In the last month, have you experienced problems with food insecurity?” If the participant responded affirmatively, to this one question, she was categorized as food insecure. The survey included questions about future orientation, self-
esteem, partner conflicts, family connectedness, personal conflict resolution, substance abuse, demographics, age, grades, and school classification. Overall, participants who reported experiencing food insecurity in the last month were significantly more likely to report drug use, conflict with partners, lower future orientation, or lower self-esteem within the last month. Additionally, food insecurity served as a predictor for significantly lower self-esteem and more conflict with partner when variables like age, grades, and school classification were held constant. After conducting this study, Lin et al. (2013) hypothesized that African-American students who experience food insecurity may have more partner conflict and psychological distress. A major limitation of this study is that the food security question was not from a validated tool and could have been misinterpreted by participants.

In a descriptive study, researchers in Ohio assessed the need for food assistance on one college campus. A convenience sample of almost 150 students was asked about the need for a food pantry. In the survey, food insecurity was defined as, “not having enough money to buy enough food.” Among the student responses, 48% claimed to have experienced food insecurity, and 60% agreed or strongly agreed to using a food pantry if the need arose.

At a rural, public university in the Appalachian region in North Carolina, researchers assessed the prevalence and correlates of food insecurity, as well as identified variables that could potentially predict food insecurity status. At two different time points throughout one academic year, an online survey with 73-items was administered to a nonprobability sample of 6,000 students. The survey consisted of sections asking about spending habits, coping strategies, sociodemographic information, academic progress, and food insecurity, which was measured using the 10-item AFSSM. Among the final sample of 1,093 students (18% response rate), 46% were classified as food insecure. Students who had lower GPAs, received financial aid, rated
health status as fair or poor, and never cooked for themselves were significantly more likely to experience food insecurity. Purchasing cheap, processed food, stretching food, and eating less healthy meals to eat more were the most abundant strategies that students reported for coping with food insecurity.\textsuperscript{30} This study provided much higher food insecurity rates compared to the only other published study in the Southeast, which had a food insecurity rate of 14%.\textsuperscript{33} These contradictory findings indicate the need for further assessment in the Southeastern region to identify any consistency.

At a large, public mid-Atlantic university, researchers assessed food insecurity prevalence, associated factors, and potential risk factors among college students to provide baseline data for the establishment of a campus food pantry.\textsuperscript{31} Researchers recruited 250 undergraduate students from 8 classes to participate in the study, with a final sample size of 237 (62\% response rate). Students were asked about several factors including: demographics, student status, financial status, housing, academic performance, health, and food security using the HFSSM. Overall, 15\% of students in the sample were food insecure, which was higher than the current rate (11\%) in the state where the study took place. Students who did not receive familial financial support were more likely to be food insecure compared to those who did receive that support. Additionally, students who had housing instability and reported receiving multiple forms of financial aid were more likely to be food insecure. A limitation when interpreting results from this study is that the sample was recruited from courses required by students majoring in family science, community health, or agriculture, rather than sampling from random courses or the entire student population.

Among published literature, the first longitudinal study assessing food insecurity effects among college students over time was published from a secondary analysis of a large, NIH study
entitled Social impact of Physical Activity and NutRition in College (SPARC), which assessed nutrition, physical activity behaviors, and weight outcomes of freshman in college. At four points through the academic year, data were collected through anthropometric measurements and a survey assessing food security status, self-reported eating, alcohol, physical activity, sleep, mental health, and sociodemographic. Food security status was assessed using the USDA six-item short form of the HFSSM with an altered scale to ask about food security in the past month rather than year. At baseline, there were 1,138 students in the sample; however, the sample varied at each subsequent data collection time (555, 428, and 400). Food insecurity prevalence was significantly higher at the ends of each semester with rates of 35% \( (p \leq 0.01) \) at the end of first semester and 36% \( (p \leq 0.01) \) at the end of the second semester. Additionally, authors found that food insecurity status was significantly higher among students who reported regularly not consuming an evening meal, high levels of stress, and high levels of depressed mood at all four of the time points. This study provided perspective of the longitudinal nature of food insecurity and identified the time points during the semester where students would be more at risk for food insecurity, which is informative for future research and intervention planning.

**Synthesis of Studies**

In these studies, food insecurity prevalence among college students in the US ranged from 14% to 59%. A systematic review of seventeen peer-reviewed studies found a food insecurity average of 42% among colleges and universities. It should be noted that these studies used varying techniques for assessment of food insecurity, including the 10-item AFSSM, the 18-item HFSSM, the 6-item short form of the HFSSM, or brief one to two question instruments. In the majority of studies, the food insecurity rate in the state in which the study was conducted was lower than that of the college student.
samples.\textsuperscript{26,31,32,35} However, one study had opposite findings, the university-based study in Alabama reported that the food insecurity prevalence of the state (18\%) was higher than the university (14.1\%), which is currently the only published study to find a relationship in this direction.\textsuperscript{33}

Financial related factors, like student loans, low-income status, or spending habits, were found in some studies to be associated to prevalence of food insecurity.\textsuperscript{26,30,32,33,35} A positive association was found between food insecurity and receiving financial support, like student loans\textsuperscript{26} or financial aid.\textsuperscript{33} As students increased spending on transportation, eating out, shopping, and entertainment, they had a higher probability of being food insecure.\textsuperscript{32} Students who did not have familial financial support had increased odds of experiencing food insecurity compared to those receiving that support.\textsuperscript{31} Among the studies that assessed GPA, a significant association was found with food insecurity prevalence.\textsuperscript{25,26,35} Students who were food insecure were less likely to have GPA above a 3.1,\textsuperscript{35} and students whose GPA was in the lowest range were less likely to be food secure.\textsuperscript{26} Studies found that students who experienced food insecurity were more likely to have poor health status\textsuperscript{35} When comparing undergraduate and graduate students, one study did not find a significant association with food insecurity status;\textsuperscript{32} however, others identified a significantly increased likelihood of food insecurity among undergraduate students compared to graduate students.\textsuperscript{30,34}

\textbf{Gaps in the Literature}

In 2016, the general population in the Southeastern region had the highest rate of food insecurity (14\%) when compared to other regions in the US (Midwest, 12\%; West, 12\%; and Northeast, 11\%);\textsuperscript{2} however, it is unknown if these higher regional rates in the Southeast are consistent among college populations as well. Currently, the two published studies at large,
public universities in the Southeastern region, in Alabama and North Carolina, found inconsistent rates of food insecurity, 14% and 46%, respectively.\textsuperscript{30,33} The potential negative impact of food insecurity\textsuperscript{8,25,26,30,32,35} coupled with higher rates of food insecurity in the general population in the Southeast,\textsuperscript{2} and inconsistencies of rates in Southeastern college populations clearly demonstrate the need to assess food insecurity prevalence among students at other universities in the Southeastern region. Additionally, research related to food insecurity in college population is still an emerging field. More research is needed to identify which factors increase the likelihood of experiencing food insecurity. Factors related to finances,\textsuperscript{26,32,33,35} GPA,\textsuperscript{25,26,35,43} housing,\textsuperscript{25,26} employment,\textsuperscript{35} and race\textsuperscript{25,26} have been identified to affect or be associated with food insecurity, but often these factors have only been assessed by a very small number of studies. Identifying these related factors may allow policy makers and program developers to identify specific target areas for intervention.

**Specific Aims**

The current literature indicates the importance of identifying and addressing food insecurity prevalence among college students as the average food insecurity rate among studies is alarmingly high.\textsuperscript{42} With the rates of food insecurity being inconsistent among college students in the Southeast,\textsuperscript{30,33} it is important to identify if consistent trend exists and if it is similar to that of the general population in Southeastern states. This study aims to address these gaps in the literature by:

1. Assessing the rates of food insecurity among college students enrolled in campuses of a large public university system in one state in the Southeastern United States.
2. Identifying factors that increase the likelihood of experiencing food insecurity among students enrolled in a large public university system in one state in the Southeastern United States.

The results of this study will provide clarity related to the trends of food insecurity among college students in the Southeastern region contributing to the evidence of this public health dilemma. Identifying high rates of food insecurity would signify the severity of the issue and provide justification for interventions and policies to assist these students. By identifying factors that increase students’ risk of experiencing food insecurity, interventions can be planned with aims of effecting the prevalence of those factors that are modifiable. Additionally, the population of students who are food insecure will be better understood related to financial strain and academic achievement, which will provide evidence to report to policy makers within the university system. Ultimately, this study will help guide the direction for interventions and changes needed to assist these students experiencing food insecurity.
CHAPTER 2: MANUSCRIPT

Introduction

In 2016, approximately 12% of US households (41.2 million people) experienced food insecurity, or lack of consistent access to enough food for an active, healthy life.\textsuperscript{2} Studies have found that food insecurity is related to increased likelihood of obesity prevalence.\textsuperscript{3,4} Adults who experience food insecurity are at an increased odds of stroke, arthritis, diabetes, chronic heart disease, hypertension, and heart attack when compared to their food secure counterparts.\textsuperscript{5} The United States Department of Agriculture (USDA) recommends that food insecurity be assessed among all populations as it is often considered, “a direct measure of well-being” and has many potential health consequences.\textsuperscript{8} Research suggests that food insecure adolescents and young adults are at high risk for diminished academic performance, less healthy dietary intake, and poorer mental, social, and overall health.\textsuperscript{6-9}

Multiple factors associated with the college experience may make college students particularly vulnerable to food insecurity. When students transition to college, they may be faced with a new-found independence, financial burdens, and stressors.\textsuperscript{20-22} All or part of the responsibility of financial provision may fall upon the student. Annual increases in tuition costs may enhance these financial burdens and other factors like increased living costs or reliance on financial aid may also contribute to food insecurity in this population.\textsuperscript{24,25,33}

In the past few years, research studies have begun to assess prevalence of food insecurity among college students. In these studies, food insecurity prevalence among college students in the US ranged from 14% to 59%.\textsuperscript{25,26,28-35} In a systematic review of seventeen peer-reviewed studies, the average food insecurity rate among college students was 42%.\textsuperscript{42} It should be noted that these studies used varying techniques for assessment of food insecurity, including the USDA 10-item Adult Food Security Survey Module (AFSSM),\textsuperscript{25,26,30,32,33} the 18-item USDA Household
Food Security Survey Module (HFSSM), the 6-item short form of the USDA HFSSM, or brief one to two question instruments. In most studies, the food insecurity rate in the state in which the study was conducted was lower than that of the college student samples. However, one study in Alabama had opposite findings and reported that the food insecurity prevalence of the state (18%) was actually higher than the university (14%); this is currently the only published study in the US to find a relationship in this direction.

In select studies, financial related factors, i.e. having student loans, being lower-income, or increased spending were significantly associated with prevalence of food insecurity. A study of college students at four large, public universities in Illinois found a positive association between food insecurity and receiving student loans. Similarly, a study at a large, urban university in Alabama found a positive association between food insecurity and receiving financial aid. At a large, Appalachian university in North Carolina, one study found that receiving financial aid, and higher monetary expenditures increased the likelihood of food insecurity status. Interestingly, a study conducted at a large mid-Atlantic university found decreased odds of food insecurity among students who received familial financial support. Students who receive financial aid were at an increased risk of food insecurity, while those who received familial financial support were at a decreased risk of food insecurity. At a university in Hawaii, a study found that as students increased spending on transportation, eating out, shopping, and entertainment, they were significantly more likely to be food insecure. Both generalized and specific categorical higher monetary expenditures, i.e. monthly spending and eating out or shopping, respectively, were associated with increased likelihood of food insecurity. Several studies found significant associations between food insecurity prevalence and GPA. One study at a midsize rural university in Oregon found that students who were
food insecure were less likely to have GPAs above a 3.1 and more likely to have poor health status. Additionally, a study at four campuses in Illinois found that students whose GPAs were in the lowest range were more likely to be food insecure. These studies identified that students experiencing food insecurity were more likely to have a lower GPA, identifying a relationship that may hinder academic achievement. When comparing undergraduate and graduate students, one study at a university in Hawaii did not find a significant association with food insecurity status; however, studies at large, public universities in Michigan and North Carolina identified a significantly increased likelihood of food insecurity among undergraduate students compared to graduate students. These studies identified the inconsistencies in association with food insecurity among students at different time points in their college experience, whether undergraduate or graduate.

In 2014-2016, the general population in the Southeastern US had the highest rate of food insecurity (14%) when compared to other regions in the US (Midwest, 12%; West, 12%; and Northeast, 11%); however, it is unknown if these higher regional rates in the Southeast are consistent among college populations as well. Currently, the two published studies at large, public universities in the Southeastern region, in Alabama and North Carolina, found inconsistent rates of food insecurity, 14% and 46%, respectively. The potential negative impacts of food insecurity coupled with higher rates of food insecurity in the general population in the Southeast, and inconsistencies in rates identified in previous research with Southeastern college populations demonstrates the need to assess food insecurity prevalence among students at multiple universities in the Southeastern region. Further, more research is needed to confirm which factors increase the likelihood of experiencing food insecurity. Food insecurity has been related to factors such as finances and GPA, in several
studies, and to factors such as housing, employment, and race in a small number of studies. Additional analyses are needed to enhance our understanding of these important relationships. This study aims to address these gaps in the literature by:

1. Assessing the rates of food insecurity among college students enrolled in a large public university system in one state in the Southeastern US.
2. Identifying factors that increase the likelihood of experiencing food insecurity among students enrolled in a large public university system in one state in the Southeastern US.

Methods

Participants and Recruitment

Students enrolled at three campuses of a large university system in one state in the Southeast were recruited to participate in this study via a series of three emails. The emails were sent to all enrolled students (total n=46,680) through campus-wide systems at each school over three weeks in September-October 2017. The first email explained the online survey and invited the students to participate via the web-link, which was unique to each campus. The following two emails, sent one and two weeks after the first email, reminded students to take the survey and contained the web-link. The survey remained available for a total of four weeks. Participation was incentivized by offering respondents an opportunity to take part in a drawing for one of eight $100 gift cards. Participants in the survey who were not a college student (n=5), did not complete the AFSSM (n=695), and below the age of 18 (n=51) were excluded from analysis, resulting in a final sample of 4,842. Since the AFSSM asks about food insecurity experiences in the last 12 months, freshmen were not eligible as their past 12 months were likely not spent in the college environment. Informed consent was provided on the first screen of the
survey. This study was approved by the Institutional Review Board at the University of Tennessee, Knoxville (UTK IRB-17-03491-XM).

**Survey Development**

The online survey was developed by a consortium of researchers from universities across the Southeast to assess food insecurity status among college students (http://hunger-research.sog.unc.edu/content/about). The survey collected information on food security status, academic standing/success, health status, and demographic and socioeconomic indicators. Prior to implementation, pilot testing of the survey was completed with a total of 36 students from two colleges in the Southeastern region who were similar to the target population due to their geographic location in the Southeast and college enrollment. Students were asked to complete the survey via the web link and discuss the questions as a group with an emphasis on readability and relevance of the questions to a college population, as well as acceptability of survey delivery method. Feedback from nutrition and public health experts was sought to assess content validity in the adaptation of selected questions. Survey questions were modified based upon their feedback prior to the start of data collection.

**Food Security**

Food security status was assessed using the AFSSM, a 10-item questionnaire from the USDA that is considered the gold standard for assessing food security status among adults. This 10-item questionnaire focuses on experiences within the last 12 months with questions about anxiety related to food supply, experience of running out of food or money to buy food, inadequate food intake due to lack in either quantity or quality, and experiencing hunger or weight loss due to reduced food intake. Responses for questions referred to either frequency of food insecurity related experiences (‘often true’, ‘sometimes true’, or ‘never true’) or presence of
food insecurity (‘yes’ or ‘no’). In the questions with a ‘yes’ or ‘no’ response, an affirmative answer was followed by questions asking about the frequency of the presence of food insecurity (‘almost every month’, ‘some months but not every month’, and ‘only 1 or 2 months’). The responses were coded based on established protocols where responses of ‘yes’, ‘often’, ‘sometimes’, ‘almost every month’, and ‘some months but not every month’ were coded as positive, equaling 1 point. The scores of the responses were summed, delineating the food security status category. A score of zero was classified as high food security, and a score of 1-2 was marginal food security. Both high and marginal food security categories were deemed food secure. Classification of food insecure included the low food security category (score of 3-5), and very low food security category (score of 6-10). Both low and very low food security categories were deemed food insecure. For the purpose of this analysis, the food security categories were dichotomized to food secure (high and marginal food security; entered into the model as 0) and food insecure (low and very low food security; entered into the model as 1).

In addition, students were asked about their food security status before coming to college through two questions adapted from a previously developed food security status screener. The statements were as follows: ‘before I came to college, we (my parent/guardian and/or I) worried whether our food would run out before we had money to buy more’ and ‘before I came to college, the food we (my parent/guardian and/or I) bought just didn't last and we didn't have money to get more.’ Responses were ‘often,’ ‘sometimes,’ and ‘never,’ with an affirmative response to either question indicating food insecurity status before attending college (entered into the model as 1, while no previous food insecurity (entered into the model as 0). These adaptations were assessed and reviewed through content and face validation with experts in the field.
Demographics, Academic Factors, and Meal Plan Participation

Four questions were used to collect demographic information from the students. The questions included gender, age, race, and ethnicity. To collect information related to academic factors, students were asked to simply select their year in school (‘sophomore,’ ‘junior,’ ‘senior,’ ‘graduate,’ ‘other’) and identify as a part- or full-time student. Additionally, students were asked to report their GPA on a 4.0 scale. Similar to previous studies, the GPA variable was categorized using the following ranges to capture academic achievement levels ‘<3.00,’ ‘3.00-3.49,’ ‘3.50-3.84,’ ‘3.85-4.00.’ Students were asked to identify, ‘yes’ or ‘no,’ if they participated in an on-campus meal plan.

Financial Factors

Questions about socioeconomic factors included asking about income sources and monthly expenditures. Students were asked to select any of following terms to best describe their income source: ‘parent/family support’, ‘spouse/partner/significant other support’, ‘scholarship/grant (that you don’t have to pay back)’, ‘private or federal loan (that you do have to pay back)’, ‘one or more part-time jobs’, ‘one full-time job’, ‘personal savings’, and ‘other (please indicate).’ This variable was dichotomous with either a ‘yes’ or ‘no’ response in each category. For the purpose of analysis, ‘parent/family support’ and ‘spouse/partner/significant other support’ were combined to one variable, ‘familial financial support.’ Additionally, students were asked about their monthly expenditures from a set of questions adapted from Chaparro and colleagues (2009). First, students were asked about monthly expenditures on housing and cell phones with different dollar amount ranges per category, including: housing: ‘$0,’ ‘$1-500,’ ‘$501-750,’ $751-1,000,’ ‘>$1,000,’ and cell phone: ‘$0,’ ‘$1-30,’ ‘$31-60,’ ‘$61-90,’ ‘$91-120,’ ‘>$120.’ Students were asked to select their monthly expenditures for groceries, eating out,
shopping, transportation, and entertainment provided dollar amounts included: ‘$0,’ ‘$1-50,’
‘$51-100,’ ‘$101-150,’ ‘$151-200,’ ‘$151-200,’ ‘$200,’ Lastly, students were asked to indicate their
spending for one-time large expenses per semester with the following dollar amounts provided as
options: ‘$0,’ ‘$1-350,’ ‘$351-500,’ ‘$501-750,’ ‘$751-1,000,’ ‘$1,000.’ For the analysis,
scores from housing, cell phone, groceries, and transportation categories were summed to create
an ‘essential expenditures’ category (Mean=7.96±3.90, Min=0, Max=19, Cronbach’s
alpha=0.68). Scores from eating out, shopping, and entertainment were summed to create a
‘nonessential expenditures’ category (Mean=4.07±2.44, Min=0, Max=15, Cronbach’s
alpha=0.72).

**Statistical Analyses**

Frequencies were conducted to check for outliers and missing data. Outliers were
evaluated to determine if they are errors in responses or true outliers. Responses deemed errors
were dropped from the dataset, while true outliers were retained, and sensitivity analyses were
conducted to determine the impact of the outliers. Descriptive statistics were used to assess
characteristics of the sample and food security status levels. Bivariate analyses were completed
using chi square tests and ANOVA tests to assess associations between the dependent variable of
food security status and independent variables (food insecurity before college, familial financial
support, part-time job, full-time job, personal savings, loans requiring repayment, participation in
a meal plan, scholarships not requiring repayment, year in school, GPA, essential expenditures,
and nonessential expenditures). The variables that were significant in the bivariate analyses were
included in the multivariate logistic regression model, including academic factors (GPA and year
in school), participation in a meal plan, and financial factors (income sources and monthly
expenditures). Additionally, similar to the previous literature, factors were controlled for
included: age, race, ethnicity, gender, and campus location. Students who had missing responses for the variables in the model were excluded from analysis (n=850). The missing responses were visually inspected and appeared to be missing at random.\textsuperscript{47} The Hosmer-Lemeshow test was completed to assess goodness of fit; and assumptions of multivariate logistic regression (that the variables are independent, sample size is large, and the dependent variable is binary) were checked.\textsuperscript{48} Data were analyzed using SPSS Software 24.0 (IBM SPSS Statistics for Windows Version 24.0, Armonk, New York). Statistical significance for all tests was determined at alpha \leq 0.05 level.

**Results**

Among eligible students (n=38,586), 5,593 responded to the survey (14% response rate). After applying the aforementioned exclusion criteria, the final sample size was 4,842. As seen in Table 2, the majority of students were undergraduate students (72.0%) and enrolled full-time (91.0%). The mean GPA of students was 3.41 ± 0.6, with most having a GPA between 3.50 and 3.84 (31.5%). The average age of students was 23.6 ± 6.7. Most students identified as white (81.4%), not Hispanic or Latino (95.3%), and were female (70.1%).

According to the scores from the AFSSM, 19.5% of students were classified as very low food secure and 16.1% as low food secure, taken together, 35.6% of students were classified as food insecure. A total of 64.4% of students were classified as food secure with 42.0% classified as high food secure and 22.4% as marginal food secure.

Chi square analyses were used to assess associations between demographic, financial, and academic variables and food security status (Table 3). Students who were food insecure before college ($p < .001$), did not receive familial financial support ($p < .001$), had part-time or full-time jobs ($p < .001$), relied on personal savings ($p=.001$), received loans requiring repayment
Table 2. Participant demographics and characteristics of college students at a large public university system in the Southeastern US (n=4842) by food security status, 2017

<table>
<thead>
<tr>
<th>Variable</th>
<th>Total Sample n (column%)</th>
<th>Very low food security n (column%)</th>
<th>Low food security n (column%)</th>
<th>Marginal food security n (column%)</th>
<th>High food security n (column%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender (n=4769)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>3344 (70.1)</td>
<td>672 (73.0)</td>
<td>557 (73.1)</td>
<td>783 (73.1)</td>
<td>1332 (66.1)</td>
</tr>
<tr>
<td>Male</td>
<td>1425 (29.9)</td>
<td>249 (27.0)</td>
<td>205 (26.9)</td>
<td>288 (26.9)</td>
<td>683 (33.9)</td>
</tr>
<tr>
<td>Race (n=4713)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian</td>
<td>291 (6.2)</td>
<td>35 (3.8)</td>
<td>43 (3.8)</td>
<td>62 (5.9)</td>
<td>151 (7.6)</td>
</tr>
<tr>
<td>Black or African American</td>
<td>270 (5.7)</td>
<td>99 (10.8)</td>
<td>57 (7.6)</td>
<td>48 (4.6)</td>
<td>66 (3.3)</td>
</tr>
<tr>
<td>White</td>
<td>3835 (81.4)</td>
<td>708 (77.2)</td>
<td>609 (81.1)</td>
<td>866 (82.3)</td>
<td>1652 (82.9)</td>
</tr>
<tr>
<td>Other</td>
<td>130 (2.8)</td>
<td>23 (2.5)</td>
<td>16 (2.1)</td>
<td>36 (3.4)</td>
<td>55 (2.8)</td>
</tr>
<tr>
<td>Two or more</td>
<td>187 (4.0)</td>
<td>52 (5.7)</td>
<td>26 (3.5)</td>
<td>40 (3.8)</td>
<td>69 (3.5)</td>
</tr>
<tr>
<td>Ethnicity (n=4719)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>220 (4.7)</td>
<td>52 (5.7)</td>
<td>38 (5.1)</td>
<td>61 (5.8)</td>
<td>69 (3.5)</td>
</tr>
<tr>
<td>Not Hispanic or Latino</td>
<td>4499 (95.3)</td>
<td>868 (94.3)</td>
<td>714 (94.9)</td>
<td>991 (94.2)</td>
<td>1926 (96.5)</td>
</tr>
<tr>
<td>Age mean ± SD (n=4785)</td>
<td>23.62 ± 6.7</td>
<td>22.92 ± 5.3</td>
<td>22.91 ± 5.7</td>
<td>23.30 ± 6.2</td>
<td>24.4 ± 7.6</td>
</tr>
<tr>
<td>GPA (n=4576)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 3.00</td>
<td>748 (16.3)</td>
<td>265 (29.5)</td>
<td>148 (20.5)</td>
<td>137 (13.4)</td>
<td>198 (10.2)</td>
</tr>
<tr>
<td>3.00-3.49</td>
<td>1234 (27.0)</td>
<td>293 (32.6)</td>
<td>204 (28.3)</td>
<td>273 (26.8)</td>
<td>464 (24.0)</td>
</tr>
<tr>
<td>3.50-3.84</td>
<td>1440 (31.5)</td>
<td>213 (23.7)</td>
<td>241 (33.4)</td>
<td>338 (33.1)</td>
<td>648 (33.5)</td>
</tr>
<tr>
<td>3.85-4.00</td>
<td>1154 (25.2)</td>
<td>128 (14.2)</td>
<td>129 (17.9)</td>
<td>272 (26.7)</td>
<td>625 (32.3)</td>
</tr>
<tr>
<td>Year in school (n=4690)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sophomore</td>
<td>1035 (22.1)</td>
<td>209 (22.8)</td>
<td>175 (23.3)</td>
<td>237 (22.6)</td>
<td>414 (20.9)</td>
</tr>
<tr>
<td>Junior</td>
<td>1176 (25.1)</td>
<td>260 (28.4)</td>
<td>196 (26.1)</td>
<td>262 (25.0)</td>
<td>458 (23.2)</td>
</tr>
<tr>
<td>Senior</td>
<td>1164 (24.8)</td>
<td>296 (32.3)</td>
<td>201 (26.8)</td>
<td>245 (23.4)</td>
<td>422 (21.3)</td>
</tr>
<tr>
<td>Graduate</td>
<td>1315 (28.0)</td>
<td>150 (16.4)</td>
<td>178 (23.7)</td>
<td>304 (29.0)</td>
<td>683 (34.5)</td>
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<tr>
<td>Enrollment status (n=4727)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part-time</td>
<td>425 (9.0)</td>
<td>63 (6.8)</td>
<td>52 (6.9)</td>
<td>105 (10.0)</td>
<td>205 (10.3)</td>
</tr>
<tr>
<td>Full-time</td>
<td>4302 (91.0)</td>
<td>861 (93.2)</td>
<td>700 (93.1)</td>
<td>948 (90.0)</td>
<td>1793 (89.7)</td>
</tr>
</tbody>
</table>
Table 3. Bivariate analyses of food security status with demographic, financial, and academic factors* among college students at a large public university system in the Southeastern US, 2017

<table>
<thead>
<tr>
<th>Variable</th>
<th>Sample n (%)</th>
<th>Very low food security n (%)</th>
<th>Low food security n (%)</th>
<th>Marginal food security n (%)</th>
<th>High food security n (%)</th>
<th>$\chi^2$</th>
<th>$P$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food insecure before college</td>
<td>Yes 3710 (80.1)</td>
<td>413 (45.4)</td>
<td>220 (30.1)</td>
<td>172 (16.8)</td>
<td>116 (5.9)</td>
<td>665.8</td>
<td>&lt;.001</td>
</tr>
<tr>
<td></td>
<td>No 281 (19.9)</td>
<td>497 (54.6)</td>
<td>512 (69.9)</td>
<td>854 (83.2)</td>
<td>1847 (94.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Familial financial support</td>
<td>Yes 1636 (35.2)</td>
<td>436 (47.9)</td>
<td>486 (65.8)</td>
<td>690 (66.7)</td>
<td>1365 (69.4)</td>
<td>83.97</td>
<td>&lt;.001</td>
</tr>
<tr>
<td></td>
<td>No 3016 (64.8)</td>
<td>475 (52.1)</td>
<td>253 (34.2)</td>
<td>344 (33.3)</td>
<td>603 (30.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part time job</td>
<td>Yes 2259 (48.6)</td>
<td>355 (39.0)</td>
<td>410 (55.5)</td>
<td>544 (52.6)</td>
<td>883 (44.9)</td>
<td>72.98</td>
<td>&lt;.001</td>
</tr>
<tr>
<td></td>
<td>No 2393 (51.4)</td>
<td>556 (61.0)</td>
<td>490 (47.4)</td>
<td>512 (44.1)</td>
<td>1847 (94.1)</td>
<td></td>
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<tr>
<td>Full time job</td>
<td>Yes 2781 (61.3)</td>
<td>607 (66.6)</td>
<td>706 (67.3)</td>
<td>717 (69.3)</td>
<td>1188 (60.4)</td>
<td>17.37</td>
<td>.001</td>
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<tr>
<td></td>
<td>No 1801 (38.7)</td>
<td>304 (33.4)</td>
<td>437 (42.3)</td>
<td>597 (57.7)</td>
<td>870 (45.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal savings</td>
<td>Yes 4035 (86.7)</td>
<td>803 (88.1)</td>
<td>673 (91.1)</td>
<td>914 (88.4)</td>
<td>1645 (83.6)</td>
<td>33.07</td>
<td>&lt;.001</td>
</tr>
<tr>
<td></td>
<td>No 617 (13.3)</td>
<td>108 (11.9)</td>
<td>66 (8.9)</td>
<td>120 (11.6)</td>
<td>323 (16.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loans requiring repayment</td>
<td>Yes 2851 (61.3)</td>
<td>673 (91.1)</td>
<td>597 (57.7)</td>
<td>1188 (60.4)</td>
<td>1645 (83.6)</td>
<td>17.37</td>
<td>.001</td>
</tr>
<tr>
<td></td>
<td>No 1346 (29.1)</td>
<td>282 (31.0)</td>
<td>314 (30.6)</td>
<td>509 (25.9)</td>
<td>1538 (78.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participation in a meal plan</td>
<td>Yes 3285 (70.9)</td>
<td>628 (69.0)</td>
<td>712 (69.4)</td>
<td>1453 (74.1)</td>
<td>131.44</td>
<td>&lt;.001</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No 1346 (29.1)</td>
<td>282 (31.0)</td>
<td>314 (30.6)</td>
<td>509 (25.9)</td>
<td>1538 (78.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scholarships not requiring repayment</td>
<td>Yes 2490 (53.5)</td>
<td>529 (58.1)</td>
<td>553 (51.7)</td>
<td>933 (47.4)</td>
<td>1035 (52.6)</td>
<td>9.68</td>
<td>.021</td>
</tr>
<tr>
<td></td>
<td>No 2162 (46.5)</td>
<td>382 (41.9)</td>
<td>499 (48.3)</td>
<td>933 (47.4)</td>
<td>1035 (52.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year in school</td>
<td>Sophomore 1315 (28.0)</td>
<td>150 (16.4)</td>
<td>304 (29.0)</td>
<td>683 (34.5)</td>
<td>121.34</td>
<td>&lt;.001</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Junior 1164 (24.8)</td>
<td>296 (32.3)</td>
<td>240 (23.7)</td>
<td>422 (21.3)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Senior 1035 (22.1)</td>
<td>209 (22.8)</td>
<td>175 (23.3)</td>
<td>237 (22.6)</td>
<td>414 (20.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Graduate 1176 (25.1)</td>
<td>260 (28.4)</td>
<td>196 (26.1)</td>
<td>262 (25.0)</td>
<td>458 (23.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GPA</td>
<td>&lt;3.00 1440 (31.5)</td>
<td>213 (23.7)</td>
<td>241 (33.4)</td>
<td>338 (33.1)</td>
<td>464 (24.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.00-3.49 1154 (25.2)</td>
<td>128 (14.2)</td>
<td>129 (17.9)</td>
<td>272 (26.7)</td>
<td>625 (32.3)</td>
<td>288.70</td>
<td>&lt;.001</td>
</tr>
<tr>
<td></td>
<td>3.50-3.84 1234 (27.0)</td>
<td>293 (32.6)</td>
<td>204 (28.3)</td>
<td>273 (26.8)</td>
<td>464 (24.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.85-4.00 748 (16.3)</td>
<td>265 (29.5)</td>
<td>148 (20.5)</td>
<td>137 (13.4)</td>
<td>198 (10.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Essential Expenditures**</td>
<td>7.75 ± 3.9</td>
<td>7.62 ± 3.5^a</td>
<td>7.27 ± 3.6^a</td>
<td>7.56 ± 3.7^a</td>
<td>8.09 ± 4.2^b</td>
<td>-</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Nonessential expenditures**</td>
<td>3.99 ± 2.4</td>
<td>2.96 ± 1.9^a</td>
<td>3.77 ± 2.1^b</td>
<td>4.01 ± 2.2^b</td>
<td>4.55 ± 2.6^c</td>
<td>-</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

Note: *Values are counts (%) for chi square analyses or means ± SD for ANOVA analyses; **Means within a row with different superscripts are significantly different at $p < .01$; ab=Tukey post-hoc tests; Essential expenditures include monthly expenditures on housing, groceries, transportation, cell phones; Nonessential expenditures include monthly expenditures on shopping, entertainment, eating out

28
(p < .001), participated in a meal plan (p=.001), received scholarships not requiring repayment
(p=.021), were undergraduates (p<.001), had decreased nonessential expenditure (p<.001), and
had increased essential expenditure (p<.001) were significantly more likely to be classified as
food insecure (p < .001).

Many of the variables included in the multivariate logistic regression were statistically
significant (Table 4). The Hosmer-Lemeshow test indicated the model was a good fit (χ²=4.70,
p=0.789. While controlling for race, age, gender, ethnicity, and holding all other variables in the
model constant, previous food security status was the strongest correlate of food insecurity (odds
ratio (OR), 4.78; 95% confidence interval (CI), 4.00-5.71), indicating that students with previous
food insecurity were 4.78 times more likely to be food insecure than the students who did not
experience food insecurity before college. Among those who received a loan that had to be
repaid, there was a 1.42 times increased likelihood of food insecurity compared to those who did
not receive loans that had to be repaid. (CI, 1.22-1.66). Similarly, those who had not received
familial financial support were 1.56 times more likely to be food insecure than those who had
received familial financial support (CI, 1.33-1.84). Among students who did not receive
scholarships that did not require repayment, there was a 1.20 times increased likelihood of food
insecurity compared to those who received scholarships that did not require repayment (1.03-
1.39). Students who had part-time jobs were 1.28 times more likely to be food insecure
compared to those who did not have part time jobs (CI, 1.10-1.50), while those without full-time
jobs were 1.30 times more likely to be food insecure compared to those who had full-time jobs
(CI, 1.00-1.69). Additionally, students who used personal savings as an income source had an
increased likelihood of food insecurity compared to those who did not (OR, 1.21; CI 1.04-1.40).
Table 4. Multivariate logistic regression of factors associated with food insecurity among college students at a large public university system in the Southeastern US, 2017

<table>
<thead>
<tr>
<th>Variable (reference category*)</th>
<th>B</th>
<th>P value</th>
<th>Odds Ratio</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Familial financial support (yes)</td>
<td>No</td>
<td>0.45</td>
<td>&lt;.001</td>
<td>1.56</td>
</tr>
<tr>
<td>Loans requiring repayment (no)</td>
<td>Yes</td>
<td>0.35</td>
<td>&lt;.001</td>
<td>1.42</td>
</tr>
<tr>
<td>Scholarships not requiring repayment (yes)</td>
<td>No</td>
<td>0.18</td>
<td>0.018</td>
<td>1.20</td>
</tr>
<tr>
<td>Part-time job (no)</td>
<td>Yes</td>
<td>0.25</td>
<td>0.001</td>
<td>1.28</td>
</tr>
<tr>
<td>Full-time job (yes)</td>
<td>No</td>
<td>0.26</td>
<td>0.049</td>
<td>1.30</td>
</tr>
<tr>
<td>Personal savings (yes)</td>
<td>No</td>
<td>0.19</td>
<td>0.014</td>
<td>1.21</td>
</tr>
<tr>
<td>Participation in a meal plan (no)</td>
<td>Yes</td>
<td>0.08</td>
<td>0.328</td>
<td>1.09</td>
</tr>
<tr>
<td>Year in school (graduate)</td>
<td>Sophomore</td>
<td>0.14</td>
<td>0.299</td>
<td>1.15</td>
</tr>
<tr>
<td></td>
<td>Junior</td>
<td>0.21</td>
<td>0.085</td>
<td>1.24</td>
</tr>
<tr>
<td></td>
<td>Senior</td>
<td>0.35</td>
<td>0.004</td>
<td>1.41</td>
</tr>
<tr>
<td>Food insecure before college (no)</td>
<td>Yes</td>
<td>1.57</td>
<td>&lt;.001</td>
<td>4.78</td>
</tr>
<tr>
<td>GPA (3.85-4.00)</td>
<td>&lt;3.00</td>
<td>1.05</td>
<td>&lt;.001</td>
<td>2.85</td>
</tr>
<tr>
<td></td>
<td>3.00-3.49</td>
<td>0.62</td>
<td>&lt;.001</td>
<td>1.85</td>
</tr>
<tr>
<td></td>
<td>3.50-3.84</td>
<td>0.34</td>
<td>0.001</td>
<td>1.41</td>
</tr>
<tr>
<td>Essential expenditures**</td>
<td>0.03</td>
<td>0.033</td>
<td>1.03</td>
<td>1.00-1.05</td>
</tr>
<tr>
<td>Nonessential expenditures**</td>
<td>-0.17</td>
<td>&lt;.001</td>
<td>0.84</td>
<td>0.81-0.87</td>
</tr>
</tbody>
</table>

Note: total sample = 4385, participants with missing data were dropped from the analysis
Adjusted for campus attended, gender, race, ethnicity, age

α, p ≤ 0.05
*Reference category included for categorical variables
**Essential includes monthly expenditures on housing, groceries, transportation, cell phones; Nonessential includes monthly expenditures on shopping, entertainment, eating out
As essential expenditures increased, the likelihood of being food insecure also increased (OR, 1.03; CI, 1.00-1.05). Conversely, the likelihood of being food insecure decreased as nonessential expenditure increased (OR, 0.84; CI, 0.81-0.87).

Students who were seniors were significantly 1.41 times more likely to be food insecure than graduate students (CI, 1.12-1.79). When compared to students with a GPA of 3.85-4.00, students with a GPA < 3.00 were 2.85 times more likely to be food insecure (CI, 2.23-3.64), followed by those with a GPA of 3.00-3.49 (OR, 1.85; CI, 1.49-2.29) and those with a GPA of 3.50-3.84 (OR, 1.41; CI, 1.15-1.73). No significant associations were found with students who were sophomores, juniors, or participated in a meal plan.

**Discussion**

Among the college students in this sample, 34% were food insecure, which was more than double the average rate (14%) in the Southeast from 2014-2016 and comparable to rates in other studies that found these rates higher than the general population in the same area and the national average. Contrary to one study in a state in the Southeastern region where the food insecurity rates were lower than the state average, this study found a food insecurity rate much higher than the regional average, which was similar to another study in a state in the Southeastern region.

Results from the multivariate regression analyses indicated that students who were food insecure before entering college were 4.6 times more likely to be food insecure in college when holding all other variables in the model constant. These findings indicate that some of the high rates of food insecurity among college students could be partially due food insecurity among students prior to college entry. Similar to studies in Oregon and Illinois, students with a lower GPA (<3.85) were significantly more likely to be food insecure when compared to
students in the highest GPA range (3.85-4.00). This troubling relationship has continued to be established in studies and identifies the potential to impair academic performance among food insecure students.

Results from the multivariate analyses showed that undergraduate seniors were significantly more likely to be food insecure compared to graduate students, excluding sophomores and juniors. These findings identified a similar relationship to other studies with undergraduate students at increased risk for food insecurity compared to graduate students. Among undergraduate students, as year in school increased, food insecurity rates significantly increased (Table 3). With high rates of food insecurity among all groups of students, interventions should be targeted towards all students, however, if resources are particularly limited, targeting communications for upperclassman undergraduate students may have the largest impact as they had the highest rates of food insecurity.

In concordance with previous studies, financial related factors (student loans, spending habits, and financial support) were significantly associated with food insecurity prevalence from the multivariate regression analysis. Similar to a study at a mid-Atlantic university, students in this study had a decreased likelihood of food insecurity when they received familial financial support. This provides information indicating a potential relationship between independence from familial support and lower food security status. Students in this sample who received loans that required repayment were more likely to be classified as food insecure, which supports similar findings in another study. Conversely, students who did not receive scholarships that did not require repayment were more likely to be food insecure. Additionally, students who were employed part-time were significantly more likely to be food insecure; however, students who were not employed full-time were more likely to be food
insecure. These findings identify a potential relationship between financial instability and food insecurity. Contrary to a study in Hawaii, as students increased spending on non-essential items (including eating out, shopping, and entertainment), they had a significantly lower probability of food insecurity. This may mean that students who were food secure had more disposable income that allowed them to make such expenditures. However, since this is inconsistent with previous studies, the relationship between spending habits and food insecurity status should continue to be studied. As students increased spending on essential items (including housing, large expenses, transportation, cell phones, and groceries), they had a small but statistically significant increase in the likelihood of food insecurity.

**Strengths and Limitations**

This study is novel since food insecurity among college students in an emerging area of research with a small, but growing field of published studies. Additionally, this research fills an important gap in identifying food insecurity prevalence among college students in the Southeast as the results of other studies are inconsistent. Within the survey tool, the use of the AFSSM contributes to the strength of the research, as the AFSSM is considered the gold-standard for measuring food security status among adults. Another strength of this study was the high response rate, 14%, which can be difficult to achieve using web-based surveys.

One limitation of the study was the cross-sectional design, inhibiting causal inferences to be deduced from the findings. Additional research is needed, particularly including intervention trials, to address food insecurity among college students. Since this study used a self-reported survey technique to collect data, recall and social desirability biases could be present in the results. This limitation is consistent with limitations in published research assessing food insecurity among college students. Additionally, the sample was non-random and
may not be representative of and within the university system overall. When completing regression analyses, 9% of the final sample was dropped due to missing responses. Lastly, the results may be biased as students with financial strains may have been more likely to participate in the survey with hopes of winning the drawing for one of the $100 gift cards.

Conclusion

Overall, the students across this large public university system in the Southeast had high rates (34%) of food insecurity, which was more than double the rate (13%) of the general population in the same state. These findings support similar findings at universities, with an average food insecurity rate of 42% among college students. Factors that increased the likelihood of food insecurity included previous food insecurity, receiving a loan requiring repayment, not receiving familial financial support, increased essential expenditures, decreased nonessential expenditures, undergraduate status, having a GPA <3.85.

Future research should further explore the relationship between food security status during college and previous food insecurity to determine what factors in the college setting may be exacerbating food insecurity. Additionally, identifying food security in states across the US should be done to identify any regional trends that may mimic national food insecurity trends. Future research should assess the financial situations between undergraduate students, particularly seniors, and graduate students to identify if there are particular strategies used by graduate students with similarly financial restrictive situations or if graduate students simply are in a more stable financial state. As predictors associated with food insecurity are being established, future studies should explore interventions and programming that can influence those factors to help reduce food insecurity rates. As these high rates continue to be discovered on college campuses, policy and programmatic changes need to be implemented to address the
growing issue and help maintain retention rates. For example, it may be beneficial to provide students with food assistance resources (such as contact information to on-campus food pantries, meals sharing programs) as part of campus orientation activities; this may be a useful strategy for reaching students who enter college with a history of food insecurity.
CHAPTER 3: EXTENDED METHODOLOGY

Study Design

To assess food insecurity status and associated factors, a cross-sectional survey design was used for this study. This design captured the food security status among college students enrolled in the UT System at the time of survey administration and allowed for description of food insecurity prevalence among college students as well as factors associated with food insecurity status.

Project Collaboration

This project was conducted in partnership with researchers from Appalachian State University (ASU), with the support of the Southeastern Universities Consortium on Hunger, Poverty, and Nutrition (Consortium), which is a collaboration of university faculty in Tennessee, South Carolina, North Carolina, Florida, Alabama, and Mississippi as well as leaders from the USDA (http://hunger-research.sog.unc.edu/content/about). The common goal of the Consortium is to identify food insecurity among diverse populations and to develop collaborative projects to address hunger and food insecurity problems in the Southeastern US. The Consortium has projects focused on messaging of low sodium products to children, participation rates of the USDA’s Summer Food Service Program, Supplemental Nutrition Assistance Program redemption at farmer’s markets and participant employment and training, and college food insecurity.50

The ASU research team generated the initial concept for surveying food insecurity among college students in the Southeast and worked with partners at East Carolina University, Mississippi State University, University of North Carolina at Greensboro, University of Southern Mississippi, West Virginia University, and University of North Carolina at Chapel Hill and with this project at UT to aggregate and evaluate data on college food insecurity throughout the
Southeast. The survey was administered to the UT System and was developed based upon the survey designed by ASU, yet tailored to the specific aims of this project. The Qualtrics Online Survey Software (Qualtrics Online Survey Software & Insight Platform, Provo, Utah) was used for survey administration.

Sample

The sample population included college students enrolled in the UT System at the four campuses, located in Knoxville, Chattanooga, Martin, and the Health Science Center in Memphis. The UT Health Science Center in Memphis was not included in the final sample analysis in the manuscript due to its differences in population and degree paths compared to the other three campuses. The mission of the UT System is “delivery of education, discovery, outreach and public services that contributes to the economic, social and environmental well-being of all Tennesseans.” The campuses in the UT System have both diverse student populations and education programming, with varying enrollment, student demographics, tuition costs, and housing (see Tables 2, 3, and 4). Additionally, the campuses are located across the state of TN (see Figure 1). Overall, there were 49,879 students enrolled in the UT System as of Fall 2017 with 78.5% undergraduate students and 21.5% graduate/professional students.

Recruitment

Students enrolled in the four campuses of the University of Tennessee System (Knoxville, Chattanooga, Martin, and the Health Science Center in Memphis) were recruited to participate in this study via a series of 3 emails. Based on similarly conducted research and the successful methods of research partners in the Consortium, the research team sent the invitation to take the survey to all students (total n=49,987) enrolled in the UT System. The emails were sent through campus-wide systems at each school over three weeks in September-October 2017.
Table 5. Comparison of Student Enrollment at Each Campus in the UT System, Fall 2017

<table>
<thead>
<tr>
<th>Category</th>
<th>UTK</th>
<th>UTC</th>
<th>UTM</th>
<th>UTHSC</th>
<th>Total without UTHSC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Students</td>
<td>28,321</td>
<td>11,587</td>
<td>6,772</td>
<td>3,199</td>
<td>46,680</td>
</tr>
<tr>
<td>Undergraduate</td>
<td>22,317</td>
<td>10,176</td>
<td>6,330</td>
<td>339</td>
<td>38,823</td>
</tr>
<tr>
<td>(78.8%)</td>
<td>(87.8%)</td>
<td>(93.4%)</td>
<td>(10.6%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graduate/Professional</td>
<td>6,004</td>
<td>1,411</td>
<td>442</td>
<td>2,860</td>
<td>7,857</td>
</tr>
<tr>
<td>(21.2%)</td>
<td>(12.2%)</td>
<td>(6.5%)</td>
<td>(89.4%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 1: Locations of the Four Campuses in the UT System
The first email (see A-1) explained the online survey and invited the students to participate via the web-link, which was unique to each campus. The following two emails (A-2, A-3) were sent one and two weeks after the initial email, respectively. These emails reminded students to take the survey and contained the web-link. Due to unforeseen technical difficulties in administration of emails during the first week of recruitment, the first email was not sent on the same day to each campus. These technical issues were resolved, and all four campuses received the second and third emails on the same day to ensure consistency with data collection. The survey was sent mid-semester to avoid weekends, holiday breaks, and days off school. Additionally, the survey was sent on Monday mid-morning based on successful methodology of a study on electronic survey response rates. The survey remained available for a total of four weeks based on published literature. Participation was incentivized by offering respondents an opportunity to be put into a drawing for one of eight Amazon $100 gift cards.

**Survey Development**

The initial survey design was developed by researchers from the Consortium but was modified to better fit this specific study. The majority of the questions included in the survey were asked as part of a larger project for the Consortium and were not pertinent to this specific study. The complete survey had 55 questions and collected information on food security status, academic standing/success, health status, demographics, and socioeconomic indicators (see A-4).

At the end of each campus-specific survey, a list of resources was included that referred students to resources in their area and/or on campus for assistance with food security (see A-5 – A-8). Included on this end of survey screen was the link for a separate entry form for students to enter in the drawing for the gift cards (see A-9).
Pilot Testing

Two separate pilot tests of the survey were conducted to obtain feedback on the survey with convenience samples of 15 and 21 college students at Maryville College and Pellissippi State Community College, respectively. These students were similar to the target population due to their TN residence and enrollment in college. Students were asked to independently fill out the survey via weblink and then participate in a group discussion. The discussion focused on readability and relevance of the questions to a college population, and acceptability of survey delivery method. Survey questions were modified based upon their feedback prior to the start of data collection.

Feedback from nutrition and public health experts was sought to assess content validity in the adaptation of the food security screener that was used to assess food security status before entering college. The feedback was incorporated into the questions prior to the start of data collection.

Coding for Multivariate Logistic Regression Model

When entering variables into the multivariate logistic regression model, they were coded in a way that maintained consistency with interpreting results and keeping the reference category as those who were less likely to be food insecure (Table 6). The dependent variable of food security status was dichotomized from the four categories describing food security status to the two categories, food secure and food insecure. This variable was entered into the model with food insecure coded as ‘1’ and food secure coded as ‘0,’ allowing for results to be interpreted with variables effecting food insecurity status compared to food security status. The model controlled for campus, age, gender, race, and ethnicity.
Table 6. Coding and Entering of Independent Variables into the Multivariate Logistic Regression Model

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Type of variable</th>
<th>Reference category (coded value)</th>
<th>Remaining categories (coded value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food security before college</td>
<td>Dichotomous</td>
<td>No (0)</td>
<td>Yes (1)</td>
</tr>
<tr>
<td>Familial financial support</td>
<td>Dichotomous</td>
<td>Yes (0)</td>
<td>No (1)</td>
</tr>
<tr>
<td>Full-time job</td>
<td>Dichotomous</td>
<td>Yes (0)</td>
<td>No (1)</td>
</tr>
<tr>
<td>Part-time job</td>
<td>Dichotomous</td>
<td>No (0)</td>
<td>Yes (1)</td>
</tr>
<tr>
<td>Personal savings</td>
<td>Dichotomous</td>
<td>Yes (0)</td>
<td>No (1)</td>
</tr>
<tr>
<td>Scholarship not requiring repayment</td>
<td>Dichotomous</td>
<td>Yes (0)</td>
<td>No (1)</td>
</tr>
<tr>
<td>Loans requiring repayment</td>
<td>Dichotomous</td>
<td>No (0)</td>
<td>Yes (1)</td>
</tr>
<tr>
<td>Participation in meal plan</td>
<td>Dichotomous</td>
<td>No (0)</td>
<td>Yes (1)</td>
</tr>
<tr>
<td>Year in school</td>
<td>Nominal</td>
<td>Graduate (0)</td>
<td>Senior (1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Junior (2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sophomore (3)</td>
</tr>
<tr>
<td>GPA</td>
<td>Nominal</td>
<td>3.85-4.00 (0)</td>
<td>&lt;3.00 (1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3.00-3.49 (2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3.50-3.84 (3)</td>
</tr>
<tr>
<td>Essential expenditures</td>
<td>Continuous</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Nonessential expenditures</td>
<td>Continuous</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Note: Controlled for gender, age, race, ethnicity, and campus attended
Dissemination Materials

To disseminate the results of this study with key stakeholders, infographics were created to briefly discuss the study design, food insecurity rates, associated factors, and next steps. An infographic was created for the UT System (see A-10), which included food security rates of each campus within the UT System and the factors that were identified to be significantly associated with food insecurity.


52. The University of Tennessee. *We Are One*. 2016.
APPENDICES
A-1 Email #1. Invitation to Complete Survey.

Subject line: Participate in a food access survey and get a chance to win 1 of 8 $100 gift cards!

Hello!
You are invited to take part in a research study about your usual access to food. This study is being conducted by Dr. Elizabeth Anderson Steeves and Dr. Marsha Spence, two professors in the Department of Nutrition at the University of Tennessee.

If you agree to participate, it will take about 10 to 15 minutes of your time to complete the following self-administered, questionnaire. We request that you complete it in a private setting.

Your participation is strictly voluntary, and you will not receive any compensation or academic credit for participating. However, you will have the opportunity to enter your email address to enter a drawing for one of eight $100 Amazon Gift Cards. We assure you that your answers will be kept confidential and will not be connected to your email address in any way. Your answers will help us to design activities about how to enhance student access to nutritious food.

Take the survey by clicking here

We would appreciate you completing it by Monday, September 25th. Study results will be shared during the Fall 2017 semester.

If you have any questions about this study, please contact Drs. Anderson Steeves or Spence at the telephone numbers or e-mail addresses listed below.

Respectfully,

Elizabeth (Betsy) Anderson Steeves, PhD, RD
Assistant Professor
Department of Nutrition
University of Tennessee, Knoxville
Jessie Harris Building, Room 229
Email: eander24@utk.edu
Office phone: 865.974.6254

Marsha Spence, PhD, MPH, RDN, LDN
Associate Professor of Practice
Director, Public Health Nutrition Graduate Program
Department of Nutrition
University of Tennessee, Knoxville
Jessie Harris Building, Room 229
Email: mspence@utk.edu
Office phone: 865.974.6265
A-2 Email #2. Reminder to Complete Survey.

Subject line: Participate in a food access survey and get a chance to win 1 of 8 $100 gift cards!

Hello!
Last week, you were invited to take part in a research study about your usual access to food. If you have already taken the survey, please disregard this email.

This study is being conducted by Dr. Elizabeth Anderson Steeves and Dr. Marsha Spence, two professors in the Department of Nutrition at the University of Tennessee.

If you agree to participate, it will take about 10 to 15 minutes of your time to complete the following self-administered, questionnaire. We request that you complete it in a private setting.

Your participation is strictly voluntary, and you will not receive any compensation or academic credit for participating. However, you will have the opportunity to enter your email address to enter a drawing for one of three $100 Amazon Gift Cards. We assure you that your answers will be kept confidential and will not be connected to your email address in any way. Your answers will help us to design activities about how to enhance student access to nutritious food.

Take the survey by clicking here

We would appreciate you completing it by Friday, September 29th. Study results will be shared during the fall 2017 semester.

If you have any questions about this study, please contact Drs. Anderson Steeves or Spence at the telephone numbers or e-mail addresses listed below.

Respectfully,

Elizabeth (Betsy) Anderson Steeves, PhD, RD
Assistant Professor
Department of Nutrition
University of Tennessee, Knoxville
Jessie Harris Building, Room 229
Email: eander24@utk.edu
Office phone: 865.974.6254

Marsha Spence, PhD, MPH, RDN, LDN
Associate Professor of Practice
Director, Public Health Nutrition Graduate Program
Department of Nutrition
University of Tennessee, Knoxville
Jessie Harris Building, Room 229
Email: mspence@utk.edu
Office phone: 865.974.6265
A-3. Email #3. Final Reminder to Complete Survey.

Subject line: Last Chance! Participate in a food access survey and get a chance to win 1 of 8 $100 gift cards!

Hello!
Three weeks ago, you were invited to take part in a research study about your usual access to food. If you have already taken the survey, please disregard this email.

This study is being conducted by Dr. Elizabeth Anderson Steeves and Dr. Marsha Spence, two professors in the Department of Nutrition at the University of Tennessee.

If you agree to participate, it will take about 10 to 15 minutes of your time to complete the following self-administered, questionnaire. We request that you complete it in a private setting.

Your participation is strictly voluntary, and you will not receive any compensation or academic credit for participating. However, you will have the opportunity to enter your email address to enter a drawing for one of three $100 Amazon Gift Cards. We assure you that your answers will be kept confidential and will not be connected to your email address in any way. Your answers will help us to design activities about how to enhance student access to nutritious food.

Take the survey by clicking here

We would appreciate you completing it by Monday, October 9th. Study results will be shared during the fall 2017 semester.

If you have any questions about this study, please contact Drs. Anderson Steeves or Spence at the telephone numbers or e-mail addresses listed below.

Respectfully,

Elizabeth (Betsy) Anderson Steeves, PhD, RD
Assistant Professor
Department of Nutrition
University of Tennessee, Knoxville
Jessie Harris Building, Room 229
Email: eander24@utk.edu
Office phone: 865.974.6254

Marsha Spence, PhD, MPH, RDN, LDN
Associate Professor of Practice
Director, Public Health Nutrition Graduate Program
Department of Nutrition
University of Tennessee, Knoxville
Jessie Harris Building, Room 229
Email: mspence@utk.edu
Office phone: 865.974.6265
A-4. Survey

Hello!
You are invited to take part in a research study about your usual access to food. This study is being conducted by Dr. Elizabeth Anderson Steeves and Dr. Marsha Spence, two professors in the Department of Nutrition at the University of Tennessee. This study is open to freshman through graduate students who are over 18 years of age and are enrolled in the University of Tennessee System, including UTK, UTC, UTM, and UTHSC.

If you agree to participate, we will ask for about 10 to 15 minutes of your time to complete a self-administered questionnaire. There are no foreseeable risks other than those encountered in everyday life, however, we request that you complete it in a private setting.

Your participation in this study is strictly voluntary, and you are free to stop answering questions at any time without penalty. If you withdraw from the study before data collection is completed, any incomplete information will be removed from the survey.

We do not anticipate that you will experience any inconvenience from completing this questionnaire other than the time it takes to answer the questions. Please understand that no compensation, academic credit, or direct benefits to you that are being offered for your participation; however, you may enter your email address to enter a drawing for one of eight $100 Amazon Gift Cards by clicking a new link on the last page of the survey.

Your participation would be very valuable to us since the answers you provide will help us to design activities about how to enhance student access to nutritious food. If you do not want to participate in the survey, but would like to be entered into the drawing, please email Dr. Anderson Steeves at healthe@utk.edu.

All information in the study records will be kept confidential and will only shared with members of the research team. We assure you that the answers you give will not be reported individually or connected to your email address in any way. Only combined group information for the University of Tennessee, and several Universities throughout the Southeast, will be reported in the article that we write about this research.

Thank you for considering this invitation. If you have any questions about this study, please contact Drs. Anderson Steeves or Spence at the telephone numbers or e-mail addresses listed below. If you have questions about your rights as a participant, you may contact the University of Tennessee IRB Compliance Officer at utkirb@utk.edu or (865) 974-7697.

Respectfully,

Elizabeth (Betsy) Anderson Steeves, PhD, RD
Email: eander24@utk.edu
Office phone: 865.974.6254

Marsha Spence, PhD, MPH, RDN, LDN
Email: mspence@utk.edu
Office phone: 865.974.6265

CONSENT
I have read the above information, and I can print this information if I choose to do so. By clicking on the button to continue and completing the survey constitutes my consent to participate.

Part One - AFSSM
Select the answer choice that BEST applies to you. All questions concern your access to food within the past 12 months.

Q1. Which statement best describes the food available to you in the past 12 months? Check your answer.

- Enough of the kinds of food I want to eat
- Enough, but not always the kinds of food I want to eat
- Sometimes not enough to eat
- Often not enough to eat

Q2-4. For the statements in the table below, please select the answer choice that BEST applies to you.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Often</th>
<th>Sometimes</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>In the last 12 months, I worried whether my food would run out before I got money to buy more.</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>The food I bought just didn't last, and I didn't have money to get more.</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>I couldn't afford to eat balanced meals.</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Q5. In the last 12 months, did you ever cut the size of your meals or skip meals because there wasn't enough money for food?

- Yes
- No

Q6 How often did you cut the size of your meals or skip meals because there wasn't enough money for food? Please choose the answer choice that BEST applies to you.

- Almost every month
- Some months, but not every month
- Only one or two months

Q7 In the last 12 months, did you ever eat less than you thought you should because there wasn't enough money for food?

- Yes
- No
Q8 In the last 12 months, were you ever hungry but didn't eat because there wasn't enough money for food?
   ○ Yes
   ○ No
Q9 In the last 12 months, did you lose weight because there wasn't enough money for food?
   ○ Yes
   ○ No
Q10 In the last 12 months, did you ever not eat for a whole day because there wasn't enough money for food?
   ○ Yes
   ○ No

Display This Question:
If In the last 12 months, did you ever not eat for a whole day because there wasn't enough money for... = Yes

Q11 How often did you not eat for a whole day because there wasn't enough money for food? Please choose the answer choice that BEST applies to you.
   ○ Almost every month
   ○ Some months, but not every month
   ○ Only one or two months

Part Two
These questions ask for information about you and your lifestyle. All of your answers will be kept confidential. Please select the answers that best apply to you, or write the answer in the textbox provided.
Q12 Your gender is:
   ○ Male
   ○ Female
   ○ Other ________________________________________________

Q13 How old are you in years? Please only enter numbers, not text.
________________________________________________________________

Q14 Do you consider yourself to be:
Q15 Which term best describes your marital status?

- Never married
- Married
- Separated
- Divorced
- Widowed

Q16 Do you have any dependent children living with you?

- Yes
- No

Display This Question:
If Do you have any dependent children living with you? = Yes

Q17 How many children currently live with you?

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10+
Q18 About how much do you currently weigh? Please only enter numbers.
   - Pounds: ________________________________________________

Q19 About how tall are you? Please only enter numbers.
   - Feet: ________________________________________________
   - Inches: ________________________________________________

Q20 What year are you in school?
   - Freshman
   - Sophomore
   - Junior
   - Senior
   - Graduate student
   - Other ________________________________________________

Q21 Are you an international student?
   - Yes
   - No

*Display This Question:*
If Are you an international student? = Yes

Q22 How long have you been in the United States (in years)? Please only enter numbers, not text.
   ________________________________________________

Q23 Are you a:
   - Part-time student
   - Full-time student

Q24 Is your degree program:
   - Traditional (attend most classes on campus)
   - Online (online classes, little to no attendance on campus)
   - Other, please describe: ________________________________________________
Q25 What is your major?

________________________________________________________________

Q26 How would you rate your:

<table>
<thead>
<tr>
<th></th>
<th>Excellent</th>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall progress in school including graduating on time</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Class attendance</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Attention span in class</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Understanding of concepts in class</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Q27 What is your current grade point average (GPA)?

________________________________________________________________

Q28 What is your race? Select all that apply.

☐ American Indian/Alaskan Native

☐ Asian

☐ Black or African American

☐ Native Hawaiian/Other Pacific Islander

☐ White

☐ Other  ________________________________

Q29 What is your ethnicity?

☐ Hispanic or Latino

☐ Not Hispanic or Latino
Q30 Aside from your role as a student, which term best describes your employment status?

- Unemployed
- One part-time job
- More than one part-time job
- One full-time job
- Other_________________________________________________

Q31 Do you live:

- On campus
- Off campus

Q32 If you live off-campus, who do you live with?

- Roommates
- Family/guardian
- Spouse/partner
- No one

Q33 Do you have a car?

- Yes
- No

Q34 Do you take public transportation such as the bus?

- Yes
- No
Q35 Which term best describes your income source? (Pick all that apply)

- Parent/family support
- Spouse/partner/significant other support
- Scholarship/grant (that you don't have to pay back)
- Private or federal loan (that you do have to pay back)
- Part-time job
- Full-time job
- Personal savings
- Other ________________________________

Q36 Do you currently receive income from some type of financial aid like a scholarship, grant, private or federal loan?

- Yes
- No

Q37 What is your personal (not family) average monthly income, in dollars? (Please enter only numbers) __________________________________________

Q38 Please select the approximate amount of money that you spend on housing (utilities, rent, wifi, etc.) during an average month.

- $0
- $1-500
- $501-750
- $751-1000
- >$1000
Q39 Please select the approximate amount of money that you spend on the **following categories** during an average month:

<table>
<thead>
<tr>
<th>Category</th>
<th>$0</th>
<th>$1-50</th>
<th>$51-100</th>
<th>$101-150</th>
<th>$151-200</th>
<th>&gt;$200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groceries</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>Eating out</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>Shopping (clothes, shoes, etc.)</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>Transportation (car payment, gas, etc.)</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>Entertainment (concerts, sporting events, going out, etc.)</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
</tbody>
</table>

Q40 Please select the approximate amount of money that you spend on your **cell phone** during an average month.

- o $0
- o $1-30
- o $31-60
- o $61-90
- o $91-120
- o >$120

Q41 Please select the approximate amount of money that you spend on **one-time large expenses** (tuition, books, travel, etc.) per semester.

- o $0
- o $1-350
- o $351-500
- o $501-750
- o $751-1000
- o >$1000
Q42 Before coming to college, did you have your own bedroom (for just you, or you and your partner/spouse)?
   0 Yes
   0 No

Q43 How many computers/laptops does your family own?
   0 0
   0 1
   0 2
   0 3
   0 4
   0 5
   0 6
   0 7
   0 8
   0 9
   0 10
   0 More than 10

Q44 How many cars, vans, or trucks does your family own?
   0 0
   0 1
   0 2
   0 3
   0 4
   0 5
   0 6
   0 More than 6
Q44 How many times did you travel away on vacation with your family during the past 12 months?
  - Never
  - 1 time
  - 2 times
  - 3 or more times

For the next two statements, please select the answer choice that best applies to you.

Q45 Before I came to college, we (my parent/guardian and/or I) worried whether our food would run out before we had money to buy more.
  - Often
  - Sometimes
  - Never

Q46 Before I came to college, the food we (my parent/guardian and/or I) bought just didn't last and we didn't have money to get more.
  - Often
  - Sometimes
  - Never

Q47 How would you rate your current health?
  - Excellent
  - Good
  - Fair
  - Poor

Q48 Do you currently participate in an on-campus meal plan?
  - Yes
  - No

Q49 Do you currently have health insurance?
  - Yes
  - No
Q50 Please identify the food group(s) where most of the foods come from that you currently eat. Select your choice(s).

- **Grains/cereals** (e.g. breakfast cereals, breads, crackers, noodles, other pastas, rice, sweet pastries/cookies/cake, etc.)

- **Vegetables/juices** (e.g. potatoes, carrot, green leafy vegetables, corn, broccoli, etc.)

- **Fruits/juices** (e.g. apples, oranges, tomatoes, peaches, grapes, etc.)

- **Meat/fish/poultry** (e.g. beef, pork, chicken, fish, shellfish, etc.)

- **Other protein foods** (e.g. peanut butter, nuts, seeds, soy foods, different beans other than green beans, etc.)

- **Dairy foods** (e.g. fat-free or regular milk, block cheese, cottage cheese, ice cream, yogurt, etc.)

- **Sweets** (e.g. hard/gummy candy, candy bars, regular soft drinks, jams/jellies, honey, table sugar, etc.)

Q51 Please identify the food group(s) that you would eat more foods from if you had access to these foods or access to the resources that would allow you to eat more of these foods. Select your choice(s).

- **Grains/cereals** (e.g. breakfast cereals, breads, crackers, noodles, other pastas, rice, sweet pastries/cookies/cake, etc.)

- **Vegetables/juices** (e.g. potatoes, carrot, green leafy vegetables, corn, broccoli, etc.)

- **Fruits/juices** (e.g. apples, oranges, tomatoes, peaches, grapes, etc.)

- **Meat/fish/poultry** (e.g. beef, pork, chicken, fish, shellfish, etc.)

- **Other protein foods** (e.g. peanut butter, nuts, seeds, soy foods, different beans other than green beans, etc.)

- **Dairy foods** (e.g. fat-free or regular milk, block cheese, cottage cheese, ice cream, yogurt, etc.)

- **Sweets** (e.g. hard/gummy candy, candy bars, regular soft drinks, jams/jellies, honey, table sugar, etc.)

- **Not Applicable** (e.g. adequate access to desired food groups)
Q52 As a student, generally how do you feel about your current food situation? Select all that apply.

- [ ] Satisfied
- [ ] Embarrassed
- [ ] Anxious
- [ ] Angry
- [ ] Other ________________________________
- [ ] Worried
- [ ] Resentful
- [ ] Pleased
- [ ] Guilty
- [ ] Insecure
- [ ] Sad
- [ ] Fine/Okay
- [ ] Humiliated
- [ ] Helpless
- [ ] Frustrated
- [ ] Secure
- [ ] Ashamed

Q53 Can you count on anyone to provide you with support in accessing food such as driving you to the store or helping you prepare meals?

- [ ] Yes
- [ ] No
- [ ] Don't need help
Q54 In the last 12 months, who was most helpful in providing you with access to food? Select one choice only.

- Spouse
- Sister/Brother
- Parent
- Friend
- Other relative
- Neighbors
- Coworkers
- Church members
- Club members
- Professionals
- Don't know
- Other ________________________________
- Don't need help

Q55 Below is a list of strategies that some people use to get food when their own food is low or when they have run out of food. Please select how often you have used any of these strategies in the past 12 months to get food.
<table>
<thead>
<tr>
<th>Activity</th>
<th>Often</th>
<th>Sometimes</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sold textbooks and/or personal possessions</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Taken fewer classes to save tuition money</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Used less utilities</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Shared rent with other people</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Held one or more part-time or full-time jobs</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Used a credit card to buy food</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Planned menus before buying food</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Used food coupons</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sold blood, plasma, sperm, and/or eggs</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Participated in a research study</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Borrow money from friends or family</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Attended on-campus or community functions where there was free food</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Obtained food from a food bank or food pantry</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bartered (traded) services or items</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Participated in a federal or state food assistance program (e.g. SNAP, WIC, etc.)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Taken food home from on-campus dining hall</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Saved money on medications or medical appointments</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Activity</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>-----</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>Stretched food to make it last longer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shared groceries and/or meals with roommates</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obtained food from a dumpster or trash</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saved a supply of food in case of emergency</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ate more than normal when food was plentiful</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Joined a church or other organizational group where free meals were provided</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ate less healthy meals and/or purchased cheap processed food (e.g. ramen noodles, frozen pizza, etc.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visited family on the weekend in order to bring back food to school</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
A-5. End of Survey Messages with Resources for UT, Knoxville

Thank you for completing this questionnaire!

Please click on the link below to be entered to win a gift card!
https://utk.co1.qualtrics.com/jfe/form/SV_bJJxTBzxCX4BrPn

Below is a list of resources that may be helpful to you in accessing food and other support services:

Smokey’s Pantry (A food pantry for Tennessee Vols)
Located within Tyson House
Address: 824 Melrose Place, Knoxville, TN 37916
Website: https://smokeyspantry.wordpress.com/

Big Orange Meal Share (Donate or obtain meals)
Dean of Students
Website: http://dos.utk.edu/big-orange-meal-share/
Phone: 865-974-3179

University of Tennessee Center for Health and Wellness (CHEW)
Campus address: 1800 Volunteer Blvd., Suite 201
Website: http://wellness.utk.edu/
Phone: 865-974-4357
A-6. End of Survey Messages with Resources for UT, Chattanooga

Thank you for completing this questionnaire!

Please click on the link below to be entered to win a gift card!
https://utk.co1.qualtrics.com/jfe/form/SV_hJxTBzxCX4BrPn

Below is a list of resources that may be helpful to you in accessing food and other support services:

Chattanooga Area Food Bank
Address: 2009 Curtain Pole Road, Chattanooga, TN 37406
Phone: 423-622-1800
Website: http://www.chattfoodbank.org/hungry#panel

Dean of Students
Student Outreach and Support for Food Insecurity Issue
Campus Address: University Center 310
Phone: 423-425-4301
Email: sos@utc.edu
A-7. End of Survey Messages with Resources for UT Health Science Center

Thank you for completing this questionnaire!

Please click on the link below to be entered to win a gift card!
https://utk.co1.qualtrics.com/jfe/form/SV_bJJxTBzxCX4BrPn

Below is a list of resources that may be helpful to you in accessing food and other support services:

Mid-South Food Bank
Address: 239 South Dudley, Memphis, TN 38104
Phone: 901-527-0841
Website: http://www.midsouthfoodbank.org/

St. John Baptist Church Pantry
Address: 640 Vance Avenue, Memphis, TN 38126
Phone: 901-525-1092

St. Patrick Catholic Church Soup Kitchen
Address: 297 South Fourth Street, Memphis, TN 38126
Phone: 901-527-2542
A-8. End of Survey Messages with Resources for UT, Martin

Thank you for completing this questionnaire!

Please click on the link below to be entered to win a gift card!
https://utk.co1.qualtrics.com/jfe/form/SV_bJxTBzxCX4BrPn

Below is a list of resources that may be helpful to you in accessing food and other support services:

We Care Ministries
Address: 530 N Lindell Street, Martin, TN 38237
Phone: 731-587-6257
Hours: Mon/Wed/Thurs 9:30-11:30 A.M.

Calvary Baptist Church Food Pantry
Address: 2250 East Reelfoot Avenue, Union City, TN 38261
Phone: 731-885-2961

Pilgrim Rest M.B. Church Food Pantry
Address: 1410 Meadow Drive, Union City, TN 38261
Phone: 731-885-7362
A-9. Gift Card Raffle Entry Form

Thank you for completing the questionnaire!
Please provide the following information to be entered in the drawing for one of eight $100 Amazon Gift Cards. Winners will be randomly selected and contacted via email once the questionnaire is closed.
Q1 First Name: __________________________________________________________

Q2 Last Name: __________________________________________________________

Q3 Email Address: _______________________________________________________

Q4 Confirm Email Address: _______________________________________________

Q5 Secondary Email Address: _____________________________________________

Q6 Confirm Secondary Email Address: ______________________________________
Food Security Among College Students
Across the University of Tennessee System

RESEARCH STUDY DESIGN

There is a relatively small, but growing body of published research on the prevalence of food insecurity among college students with most studies finding food insecurity prevalence to be higher on college campuses than the states in which the studies were conducted. In the Fall of 2017, a study was conducted in the Department of Nutrition at UT, Knoxville to assess food security rates among college students enrolled in the UT System at the campuses in Chattanooga, Knoxville, Martin, and Health Science Center in Memphis. An online survey was administered to eligible, enrolled students (38,586).

Overall, 33.8% of students were food insecure, which is more than double the state rate of 13.4% and national rate of 12.3%.

Factors that increase the likelihood of food insecurity
- Food insecurity before college
- Financial support from spouse/family members
- Loans requiring repayment
- Part-time jobs
- Higher monthly expenditure on housing, groceries, cell phone, and transportation
- GPA < 3.85
- Junior and senior status

NEXT STEPS...
- Provide support to Smokey’s Pantry located at the Tyson House
- Continued monitoring of food security rates
- Include the 2-item food security screen in visits at Student Health Centers
- Distribute information on available resources and helpful strategies at freshman orientation or other events throughout the year

For a full report of this information, go to: Wooten R, Anderson Steeves E, Spence M, Colby S. Assessing Food Insecurity Prevalence and Associated Factors among College Students Enrolled in a University in the Southeastern United States. Under review by Public Health Nutrition.
VITA

Ruth Wooten was born in Franklin, Tennessee. In May 2016, she graduated from the University of Mississippi with a Bachelor of Science degree in Nutrition and Dietetics. In the fall of 2016, she began her graduate studies at the University of Tennessee, Knoxville for a Master of Science degree in Public Health Nutrition. During her graduate studies, she was a member of the Healthful Eating and Active Living Through Healthy Environments (HEALTHE) Lab under the supervision of Dr. Elizabeth Anderson Steeves, where she contributed to the current research on the mechanisms in built environments that contribute to food-related decisions as well as nutrition assessments of communities. Additionally, she was a funded Nutrition Leadership Trainee on the Maternal and Child Health Bureau grant under the supervision of Dr. Marsha Spence where she was trained to be a leader within the field of Public Health Nutrition.