

INTERVENTION APPROACHES TO IMPROVE AWARENESS OF
FOOD SECURITY RESOURCES AVAILABLE TO UNIVERSITY
STUDENTS

By

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ABSTRACT

Food insecurity is a prevalent issue in college campuses across the country. The Hunger on Campus study found that 48% of college students face food insecurity. Oklahoma State University (OSU) also experiences high rates of food insecurity. A recent study found that approximately 43.1% of OSU Stillwater students were food insecure and sophomores, upperclassmen, and minority students were at the highest risk. This 2020 study found that food insecure students at OSU were not utilizing the food security resources available to them. The purpose of this mixed methods study was to understand why students are not utilizing the available food security resources and to develop and test the effectiveness of an intervention to promote food resource utilization. The first phase was qualitative and utilized interviews with sophomores, juniors, and senior-level OSU students to identify obstacles preventing resource utilization. Randomized email lists were used for recruitment, and participation was encouraged in ethnically diverse campus organizations. Interviews were transcribed and analyzed for emerging themes. The second phase, the quantitative phase, was informed by the interview results, and included a social media campaign promoted throughout campus using A-Frames. This intervention utilized the social media platform Instagram to promote available resources to students. Student engagement in the intervention was measured by the number of QR scans and Instagram analytics. To measure the effectiveness of increasing resource awareness, a survey was administered to Instagram followers through a direct message. The results of the qualitative phase demonstrated a major limitation in student resource usage is a lack of awareness, and the best way to distribute information on campus was social media and A-Frames. Overall, students at OSU Stillwater are facing food insecurity but are not aware of the resources available; the use

of A-frames and social media demonstrate potential to increase awareness. The long-term implication of this study is a reduced prevalence of food insecurity at OSU Stillwater's campus.

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INTRODUCTION

Not having enough food of nutritional quality to eat at all times, or not being food secure is an emerging national public health concern.¹ Food security exists as a range, from high to very low food security, with food secure individuals being high food secure or marginal food secure. Food insecure individuals experience either low food security or very low food security.² More than 38 million Americans experienced hunger in 2020 and 11.1% of the United States population is food insecure.^{1,3} Food insecurity is even more prevalent in college campuses, with a wide range of 14-60% of students experiencing some level of food insecurity depending on the college.^{4,5,6} The ethnicity and race of a student was found to be a common risk factor of food insecurity, along with many other student demographics, such as LGBTQ students, independents, and veterans.^{6,7} Because there is an increasing awareness of the prevalence of food insecurity among college students, many universities are providing campus-based food resources; however, the effectiveness of campus interventions are rarely studied, but there are many proposed interventions. The effectiveness of interventions is important because many negative outcomes are associated with food insecurity in students. Students facing food insecurity are more likely to drop out, reduce course loads, neglect studies, and perform worse than students that are food secure.^{6,8} Likewise, experiencing food insecurity increases students' risk for having poor general health, reduced diet quality, and being unable to concentrate during exams and class.⁹ Further, food insecurity negatively impacts student's mental health, as it can cause stress and social disruption.¹⁰ Collectively, these outcomes marginalize a student's academic performance.⁶

Similar to other university campuses, the Oklahoma State University (OSU) Stillwater campus is facing high levels of food insecurity, 43.1% of students are food insecure with racial

minority students and upper classman being at the greatest risk.¹¹ Food insecure students at OSU are not utilizing the available food resources, despite facing hunger.¹¹ The aim of this study is to identify why students are not using resources and to develop and test the effectiveness of an intervention to promote food resource utilization.

Terms and Definitions

Instagram analytics: Data obtained from Instagram account providing insight to the performance of the social media campaign and content.

Accounts reached: An Instagram analytic providing the number of unique users that saw the content.

Impressions: An Instagram analytic reporting the number of times the content was shown to users.

Content interactions: An Instagram analytic reporting user interactions such as account likes, saves, comments, or sharing of the content.

Accounts engaged: An Instagram analytic reporting the number of accounts that interacted with the content.

Story interactions: An Instagram analytic reporting the number of times a user shared, comment, or responded to a poll posted on the Instagram page.

LITERATURE REVIEW

There are a few things every person needs to survive, and sufficient energy obtained from food is one. Unfortunately, access to safe and nutritionally adequate foods is not guaranteed in the United States. Food security exists on a spectrum, ranging from high to very low food security.² High food security is characterized as having no problems or anxiety about

consistently accessing sufficient quality and quantity of food needed to live an active life.²

Marginal food security occurs when an individual may have anxiety of food sufficiency or food shortage, but there is no change indicated in the diet or food intake.² An individual with high food security or marginal food security is considered to be food secure.² On the other hand, low and very low food security are collectively referred to as food insecurity.² With low food security there are reports of reduced quality, variety, or desirability of the diet, however there is still no indication of reduced food intake.² Lastly, very low food security is when eating patterns are changed and there is not enough food to eat.²

Food insecurity is a common issue faced by Americans. Data from the USDA's Household Food Insecurity in the United States report indicates that more than 38 million Americans experienced hunger in 2020.¹ This national nutrition concern is addressed in the Healthy People 2030 plan; the objective is to reduce household food insecurity and hunger from a national prevalence level of 11.1% to 6.0%.³

The Social Determinants of Health is a framework that provides understanding of factors that place households at a higher risk of food insecurity.¹² The Social Determinants of Health include five different domains: economic, education, health care access and quality, neighborhood and built environment, and social and community context.¹² An example of how the determinants can influence food security is, low education levels influence what type of job an individual acquires and consequently their economic situation, neighborhood environment, and access to food and health care. Likewise, the social and community domain influences the amount and type of community food resources available could possibly alleviate or contribute to local food insecurity.

While food insecurity is a prevalent issue across the entire nation, college and university campuses are experiencing this insecurity at even higher rates. It is hard to quantify the prevalence of food insecurity across college campuses because it varies based on geography and type of school. A study conducted in a public university in southeastern United States found that 14% of students were experiencing some form of food insecurity.⁴ This is a sharp contrast to the study in a rural university in Oregon where 59% of students had experienced food insecurity.⁴ Yet, at the University of Hawaii, Ohio University, and Bowling Green State University one in five students (about 20%) experienced food insecurity.⁴ In Maryland, students enrolled in community colleges were found to have high rates of food insecurity, with 56% of students experiencing some level of insecurity.⁵ A study examining both 2-year and 4-year universities discovered that more than 60% of students had experienced food insecurity within the last month or housing insecurity in the last year.⁶

Many different student demographics result in an increased risk of food insecurity. A common risk factor for students is ethnicity and race.^{6,7} African American students at a Mid-Atlantic University were found to have four times the odds of being food insecure than their white peers.¹³ Maroto et. al reported 61% of African American students, 50% of Hispanics, and 71% of students who self-identified as multiracial were food insecure, compared to 32% of white students.⁵ Women, in some studies, were identified to be at a higher risk than male students as well, especially if it was a single female household with children.^{5,14} The first year and transition to college was identified to be a vulnerable time in food security, especially in first generation students.¹⁴ Other risk factors for students included, enrollment at a 2-year institution, veterans, LGBTQ students, and students classified as an independent from their parents.⁶

A variety of interventions have been developed across the nation to address the high rates of food insecurity. At the university level, several interventions have been proposed but their effectiveness has not yet been studied. Community food banks have created campus food pantries and mobile pantries to distribute food near campuses to meet college campus needs.¹⁵ Other efforts include Supplemental Nutrition Assistance Program application assistance.¹⁵ An on-campus food pantry was analyzed and found that the pantry was primarily utilized by graduate and international students with occasional food insecurity.¹⁶ This occasional food insecurity seen differs from previous studies stating that first year students are at a greater risk of food insecurity. Some proposed campus interventions include cooking classes, personal budget training, discounted meal plans, general meal plans funded from unspent dollars from student meal cards, campus farmers markets, and campus gardens for campus food pantries.¹⁷

The consequences of food insecurity are a major issue on college campuses due to the associated health and academic outcomes. At a large, public, four-year midwestern university researchers found that food insecure students were more likely to consider dropping out of school due to debt, reduce their course load due to debt, and neglecting academic studies.⁸ Another study found that students who were either food or housing insecure were less likely to earn A's and more likely to earn B's and below.⁶ Students that are food insecure have a greater likelihood of poor general health, being unable to concentrate during classes and exams, and consuming fewer fruits, vegetables, and legumes each day as compared to their food secure peers.⁹ Outside of the classroom, low food security also adversely affects an individual's overall health. The exact health consequences, are difficult to pin down because many studies that evaluate food security are cross-sectional and do not provide a complete picture of this complex problem.¹⁸ Even so, food insecurity in adult women is associated with low levels (defined as less

than 50% of RDA) of vitamins A, C, E, and B-6, and food insecure households' overall energy intake has been observed to be 13% lower than food secure households.¹⁸ When individuals experience low or marginal food security they may experience adverse physical effects such as hunger pangs, fatigue, and illness related to low food security¹⁸. Food insecurity can also take a psychological toll on individuals. A lack of food can produce feelings of being constrained by social norms, stress, and pessimism.¹⁰ Social consequences for food insecurity also exist. For example, respondents to a survey evaluating the consequences of food insecurity in Canada indicated that the inability to invite friends over to share a meal was socially damaging and distressing.¹⁰

Oklahoma State University is not immune to the unfortunate reality of food insecurity. A recent study conducted in 2018 found that 42.46% of OSU students were food insecure.¹⁹ A similar study was conducted in 2020 to determine the impact of COVID-19 on food insecurity among students at OSU. The researchers found the rate to not be significantly different. Approximately two of every five OSU Stillwater students (43.1%) experienced food insecurity, with 23% of students being low food secure and 19.7% being very low food secure.¹¹ This rate is higher than both the national prevalence rate of 11.1% and Oklahoma's food insecurity rate of 14.3%.^{1,20} This study identified racial minority students to be at a greater risk of experiencing very low food security (28.2%) compared to Caucasian students (16.1%).¹⁹ Academic year classification was also a predictor of food insecurity. Sophomores, juniors, and seniors experienced food insecurity rates ranging from 51.6-59.3%, which is significantly greater than freshmen, with a food insecurity rate of 19.4% and graduate students 35.2%.¹⁹ A possible explanation is that at OSU freshman are required to have a meal plan with a minimum of \$1,400 a semester. While it was clearly established that food insecurity is an issue at OSU, the study

also found that very few students took advantage of the campus and community available food resources. These included, Our Daily Bread Mobile Market, Our Daily Bread Food Resource Center, Pete's Eats, Pete's Pantry Network, OSU Nutrition Services, SNAP, First United Methodist Church Thursday night dinner, and First Presbyterian Church Saturday brunch. Even with the multitude of resources, 78.3% of very low food secure students reported not using any resources despite not having enough food.¹⁹ Low food secure students reported utilizing resources slightly more with 41.5% stating they did not have enough food but did not use any resources.¹⁹ While it is clear that food insecure students are not taking advantage of available food security resources, the reasons are not clearly understood.

The purpose of this mixed methods project was to first qualitatively identify obstacles and reasons resulting in the under-utilization of available food resources. This information was then used to inform the development of the quantitative phase, an intervention that promoted awareness of food security resources on the OSU campus through a social media campaign on the platform Instagram.

METHODS

This mixed methods study was conducted in two phases. The qualitative phase was developed to serve as a needs assessment. This phase served to inform the planning of the quantitative phase, an intervention aimed at increasing awareness and utilization of the OSU campus and Stillwater Community food resources. Both phases of the study were approved by the Oklahoma State University Institutional Review Board.

Qualitative Phase:

The purpose of this phase was to identify obstacles and reasons resulting in the under-utilization of available food resources and contributing factors to campus food insecurity. The first phase of this study was conducted at Oklahoma State University in Fall 2021.

Participants

Participants were recruited from a random list of 1,000 emails generated by the OSU Institutional Research & Analytics office. To ensure ethnic minority students' voices were heard, the researchers obtained university email addresses, from OSU Campus Link, of student leaders in organizations for underrepresented populations. Inclusion criteria included non-first year students over the age of 18 years enrolled in courses at Oklahoma State University in Fall 2021. Exclusion criteria consisted of first year students and students under 18 years old. Participation was incentivized by compensation to all participants in the form of \$10 University Dining Cards.

Data Collection

The qualitative data was collected using focus groups and personal interviews. Questions used in the interviews and focus group were developed by the research team using proven techniques to establish credibility/validity and dependability/reliability (Appendix A). Interview and focus group questions were based on results of a previous OSU food security study (Forrest, 2018). Content validity of the questions was provided by leadership at OSU Leadership and Campus Life familiar with the campus food resources and target population. Dependability of the study was established by conducting multiple interviews and a focus group until no new information was being gained as well as the content analysis described below. The interviews were audio recorded and field notes were taken. The audio recordings of the focus group/interviews were transcribed verbatim by the PI.

At the beginning of each interview and focus group session, informed consent information (Appendix B) was distributed and reviewed with participants, and consent was provided by all seven participants. Those participating virtually provided consent by writing their name in the Zoom chat, this included five of the participants. In-person consent was provided by signing a consent form. The demographic data of participants was collected anonymously through a demographic survey and food insecurity information was collected using the USDA six question food security screener (Appendix C).

Data Analysis

The data was analyzed by the research team using thematic analysis. Two researchers took multiple passes at reading each transcript to identify and code units of dialogue.^{21, 22} When a dialogue unit matched more than one code it was placed under each code. Subsequently, the coded units across focus groups were analyzed to establish the common themes. The emerging themes were tested for adequacy by comparison to the archived field notes and through independent critiques by one other researcher familiar with the project.²³

Descriptive statistics were calculated for demographics including gender, academic level, and race. Food security was determined using USDA protocols.²⁴ Questions 1, 2, 3, 4, 5, and 6 were coded and summed. Summed responses 0-1 indicated high or marginal food security, 2-4 indicated low food security, and 5-6 indicated very low security.

Quantitative Phase:

Collaborators

Phase two of the project was completed in collaboration with OSU Leadership and Campus Life, Our Daily Bread Stillwater, and OSU Student Government Association Food Insecurity Group. Phase two was conducted in Spring 2022.

Intervention

The purpose of the intervention was to increase students' awareness of food security resources using a social media platform. Findings from the qualitative phase of the study were shared with the team of campus collaborators. The intervention consisted of placing four rented A-Frames on widely used pedestrian sidewalks and plazas around the OSU Stillwater campus. A-Frames were selected for outreach because it received the most positive responses following flyers and less negative responses than flyers. Two of the A-Frame locations were posted for six weeks, and two were up for five weeks. The A-Frame included a simple message of "Need free food? Scan Here!" and a QR code leading to an Instagram social media platform (Appendix D). The Instagram page included four highlighted stories for each of the four main campus food resources: Our Daily Bread Mobile Market, OSU Night at Our Daily Bread, Pete's Pantry Network, and Pete's Eats. Our Daily Bread Food and Resource Center partners with OSU to host OSU Night at Our Daily Bread and a Mobile Market. OSU Night at Our Daily Bread is a monthly shopping night where the OSU community is welcome to come to Our Daily Bread's main campus to receive groceries for free. The Mobile Market is a monthly pop-up food pantry at the Family Resource Center that is open to all students. Pete's Pantry Network consists of several different food pantry locations and is open to all students for free. There is a pantry on the second floor of the Student Union, in the Bennett Residential Hall, and two new ones: in the basement of the Student Union, created in collaboration with Our Daily Bread, and in Nancy Randolph Davis West's second floor. Pete's Eats is a food recovery program that redistributes OSU dining services' unserved meals; alerts are sent to registered students when meals are available.

The purpose of the Instagram page was to increase awareness of the food resources on campus through engagement with a social media platform. Stigma of using the food resources was addressed in part by providing information and statistics on the Instagram page promoting awareness about the high prevalence rate of food insecurity among university students as a way to ‘normalize’ the temporary situation experienced by college students.

Data Collection

Data collected through Instagram analytics included: accounts reached, followers, and accounts engaged. Accounts reached refers to the number of unique accounts that have seen any content at least once and accounts engaged means the number of accounts that have interacted with any content. To assess if the Instagram resulted in an increase in resource awareness, a survey was distributed to the followers through direct messages, assessing what resources they knew about and utilized before and after following the Instagram page (Appendix E). Survey participation was incentivized by entering participants in a drawing to win one of six \$10-dollar university dining cards.

Data Analysis

The survey administered to Instagram followers was downloaded from Google Forms into SPSS (IBM SPSS Statistics, Version 25, Copyright ©) and cleaned. Frequency analysis of the Instagram Analytics and data provided by the Marketing and Communications department at OSU was conducted. The food resource awareness and use data was then coded: the numeral 1 was assigned to resource awareness and usage and 0 for lack of awareness and usage. The data was analyzed using paired T test to assess change from pre to post A-Frame intervention in awareness and use of the individual food resources. Statistical significance was set at p-value <0.05.

Ethics

Both phases of the study were approved by the Oklahoma State University Institutional Review Board.

FINDINGS

Qualitative Phase:

Seven students responded to the recruitment emails to comprise one focus group of two people and five individual interviews. The focus group was conducted in-person in a study room at the OSU Edmon Low Library, a central location on campus; the individual interviews were conducted virtually using Zoom. Participant demographics are summarized in Table 1. Out of the seven participants, two identified as Caucasian American, with the remaining five identifying as African, European, Hispanic, Asian American, and Central/South American. All respondents identified as female, with the majority being juniors (42.9%) and an even number of sophomores and seniors (28.6%). Based on the demographic intake, few participants were high or marginal food secure (28.6%). While none of the participants were very low food secure, the majority of respondents (71.4%) were experiencing low food security.

Table 1. Demographic characteristics of participants.

Demographic Characteristic	n (%)
Gender	
Male	0 (0%)
Female	7(100%)
Transgender male	0 (0%)
Transgender female	0 (0%)
Gender queer	0 (0%)
Not listed	0 (0%)
Prefer not to answer	0 (0%)
Academic level	
Freshmen	0 (0%)
Sophomore	2 (28.6%)

Junior	3 (42.9%)
Senior	2 (28.6%)
Graduate	0 (0%)
Race	
Caucasian American	2 (28.6%)
African (international)	1 (14.3%)
European (international)	1 (14.3%)
Central/South American (international)	1 (14.3%)
Hispanic	1 (14.3%)
Asian American	1 (14.3%)
Food Security Category	
High or marginal food security	2 (28.6%)
Low food security	5 (71.4%)
Very low food security	0 (0%)

The identified themes throughout the interviews are portrayed in Appendix F. Most participants, when asked if they knew what food insecurity was, believed it was not being able to afford a healthy balanced diet. Some people also included not being able to obtain food or resources they need for any reason, such as money or transportation problems. Most participants agreed that food insecurity is a threat to students because food insecure students are not able to focus and perform well academically. The following participant quotes are representative of the finding.

“They are more likely to drop out, because they can’t sustain that life by themselves.”

“If I am hungry I can’t concentrate on my studies.”

All participants acknowledged food insecurity existed at OSU; however, all but one underestimated the prevalence. The estimates ranged from 20-50% of students; the average response was 30%. When asked about times of the year that food insecurity is more prevalent, a common theme was towards the end of the semester or the holiday season.

Regarding causes of food insecurity, common responses indicated that college expenses take priority over groceries, new found independence, and feeling like they cannot ask for help.

“Being able to pay for college is hard enough, so having that on top of rent, groceries, utilities”

“He hadn’t eaten anything in two days because he was scared he was going to run out of food and he didn’t have money to buy more food.”

“If you ask for help, it’s like you’re an embarrassment or something.”

“It’s not easy to work on top of the time it takes to do school.”

Most participants agreed that some sub-populations of students are at higher risk for food insecurity than others. One primary theme was that upperclassmen are at a higher risk than freshmen, because they do not have a mandatory meal plan, as reflected in the following statements

“I spent a lot in my freshman (year) and started looking at ways that I can gradually reduce that to the bare minimum, one of it was food... I remember my freshman year I would eat up to three times a day, but now, I eat once.”

“When you are a freshman you have to have the meal plan and live on campus. So, you know that you’ll have at least some way to get food.”

The majority of participants (71.4%) stated that they agree with ethnic minority groups being at risk for food insecurity. One insight provided as to why food insecurity may be higher in minority populations was that some cultures may view individuals as a disappointment if they asked for help. Another possible explanation provided was that some minority students may come from a low socioeconomic background. Other potential at-risk groups that were mentioned were LGBTQ students, coming from a low-income family, students without parental support, and those with eating disorders.

“I don’t know if it’s from my ethnic group, but if you ask for help its kind of like you’re being an embarrassment.”

The overall knowledge of campus food security resources was low. Most participants shared awareness of Our Daily Bread. Other resources including Pete’s Eats, First Christian Church, and the Mobile Market were all mentioned once by separate individuals. One participant did not know of any and four participants only knew about Our Daily Bread. There was a general consensus that food security resources are not used as much as they could be. This was attributed to low awareness by most participants. Two individuals mentioned transportation also being a potential limitation in student usage of resources, because buses do not run on the weekend.

“Do you know about any food resources on campus that may help food insecure students?” “No, I haven’t heard anything.”

“It could also be transportation issues. I have friends that live off campus and they come to classes using the bus. The bus doesn’t run on weekends from what I have heard.”

There were mixed responses about different campus outreach techniques with potential to increase usage of the food resources, participant opinions are summarized in Table 2. Flyers had mixed reception. The majority of the students (71%) said flyers worked for them; others said they ignore people handing out flyers. Only three participants indicated that they paid attention to bulletin boards. Everyone else either ignored them or stated that the boards were too crowded. A-frames were another form of outreach that had mixed reviews. The TV screens had a few proponents, but the majority of participants did not pay much attention to them. Social media outreaches had the best response by far with all participants saying it was effective. When asked about other forms of outreach, a few participants mentioned emails as a possibility. One participant mentioned speaking to freshmen level introduction classes about available resources.

Another suggested collaborating with an influential student organization, such as Student Union Activities Board.

Table 2. Forms of outreach

Forms of Outreach	n (%)
Flyers	
Effective	5 (71.4%)
Not effective	2 (28.6%)
Indifferent	0 (0%)
Flyers on bulletin boards	
Effective	3 (42.9%)
Not effective	4 (57.1%)
Indifferent	0 (0%)
A-Frames	
Effective	4 (57.1%)
Not effective	1 (14.3%)
Indifferent	2 (28.6%)
TV monitors in building hallways	
Effective	2 (28.6%)
Not effective	3 (42.9%)
Indifferent	2 (28.6%)
Social Media	
Effective	6 (85.7%)
Not effective	0 (0%)
Indifferent	1 (14.3%)

When asked about what decision makers on campus should know, a few people mentioned that handing out more free food would be beneficial, especially if it was marketed as an event rather than a ‘hand-out’. One student proposed making pantries on campus more conspicuous and ubiquitous by mandating pantries in every dorm. Several participants mentioned that decision makers should try to reduce the stigma of food insecurity by displaying statistics about food insecurity and personal stories from other students.

“I feel like there is this stigma around it, like I can’t go to the food pantry because people are going to make fun of me or I am going to be embarrassed.”

“Stigma comes from people who don’t understand what it feels like to have the need to go to a place like this. So, I think that is where the shame is coming from.”

Quantitative Phase:

Table 3 summarizes the demographics of our followers and the reach the Instagram campaign had six weeks after the A-Frames were posted, February 1 through March 11, 2022. The QR code on the A-Frames was scanned by 108 people and there was a total of 181 Instagram followers. Of the followers, the majority were female (65.8%) and between 18-24 years old (60.2%). The Instagram posts and stories reached 3,684 different accounts, and the content was seen by users a total of 10,220 times. The Instagram profile was viewed by 698 users and there were 54 clicks on the link to the OSU Basic Needs Website that was listed on the Instagram biography.

A total of 146 different accounts engaged with the Instagram content and there was a total of 564 interactions with the Instagram content, 20 saves, 43 shares, and 14 story interactions. Out of the 25 posts that were shared during the intervention, the top post had a total of 29 likes and the bottom post had 4 likes, with the average likes being 13.

Table 3. Instagram Analytics & Demographics

Instagram Outreach & Demographics	n
A-Frame QR Scans	108
Demographic Characteristics of Followers	181
Gender of Followers	65.8% Female
Age of Followers	-
18-24 yrs	60.2%
25-34 yrs	27.1%
35-44 yrs	7.9%
45-54 yrs	2.6%
Accounts Reached	3,684
Impressions	10,220
Profile Visits	698
Content Interactions	564
Accounts Engaged	146
Saves	20
Shares	43
Story Interactions	14
Clicks on Basic Needs Site	54
Likes (total)	357
Top Post Likes	29
Bottom Post Likes	4
Average Likes	13

Accounts Reached: the number of unique users that saw our content. Impressions: The number of times our content was shown to users. Content Interactions: Any time an account likes, saves, comments, or shares our content. Accounts engaged: number of accounts that interacted with our content. Story Interactions: Number of times a user shared, comment, or responded to a poll on our stories.

The survey administered to the Instagram followers to assess awareness of food security resources is reflected in Figure 1. Before following the page 33.3% were aware of Pete’s Eats, 55.6% Our Daily Bread Mobile Market, 25.9% Pete’s Pantry SU 042, 29.6% Pete’s Pantry SU 2nd floor, 7.4% Pete’s Pantry Bennett Hall, 0.0% Pete’s Pantry NRDW, 33.3% OSU Night at Our Daily Bread, and 18.5% did not know of any of the resources. After following the Instagram, 55.6% were aware of Pete’s Eats, 74.1% Our Daily Bread Mobile Market, 88.9% Pete’s Pantry SU 042, 74.1% Pete’s Pantry SU 2nd floor, 66.7% Pete’s Pantry Bennett Hall, 51.9% Pete’s Pantry NRDW, 77.8% OSU Night at Our Daily Bread, and 0% did not know of any of the resources.

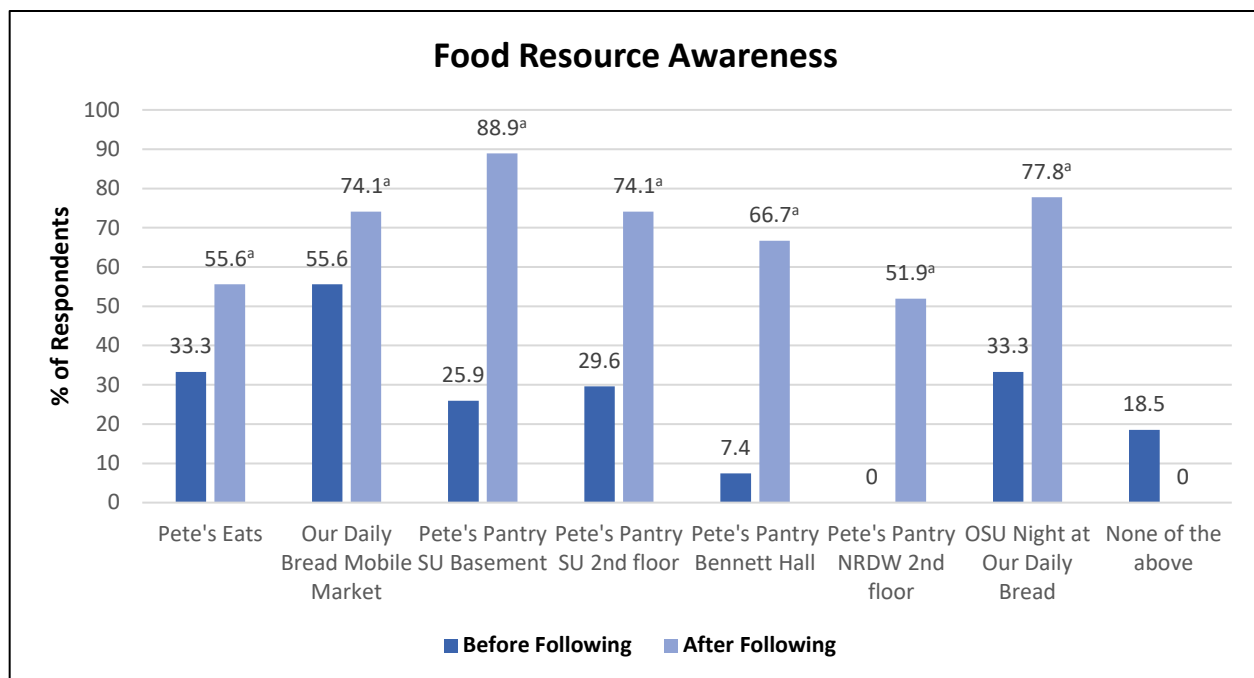


Figure 1: Food Resource Awareness. The percent of respondents that were aware of specific food resources available before and after following the Instagram page.
a: statistically significant increase $p < 0.05$

Figure 2, as shown below, summarizes the percent of respondents that utilized food security resources before and after following the page. Prior to following the page 7.4% used Pete’s Eats at least once, 29.6% Our Daily Bread Mobile Market, 3.7% Pete’s Pantry SU 042, 14.8% Pete’s Pantry SU 2nd floor, 3.7% Pete’s Pantry Bennett Hall, 0.0% Pete’s Pantry NRDW, 11.1% OSU Night at Our Daily Bread, and 55.6% had not used any resources. Since following the Instagram, 25.9% had used Pete’s Eats, 18.5% Our Daily Bread Mobile Market, 29.6% Pete’s Pantry SU 042, 29.6% Pete’s Pantry SU 2nd floor, 7.4% Pete’s Pantry Bennett Hall, 0.0% Pete’s Pantry NRDW, 14.8% OSU Night at Our Daily Bread, and 29.6% had not used any resources.

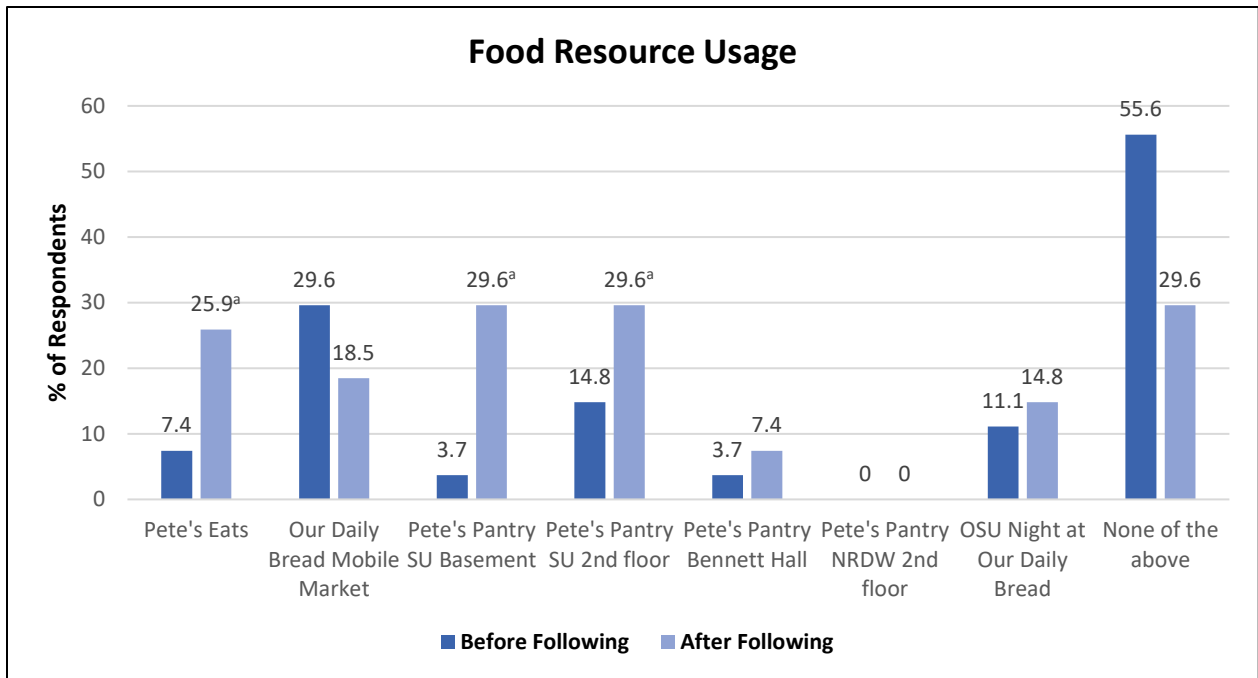


Figure 2: Food Resource Usage. The percent of respondents that used a specific food resource before and after following the Instagram page.

a: statistically significant increase $p < 0.05$

The survey inquired how the respondents heard about the Instagram. Answers varied from a friend referral, Instagram recommendations, campus organization promotions, and the campus A-Frames. When asked about what they liked about the Instagram, survey respondents mentioned learning about resources they did not know about, the convenience of having all information in one space, and the clear and informative nature of the posts.

“It shares resources I didn’t know about”

“(The Instagram page) gives all relevant information about the free food resources”

Another respondent mentioned that the Instagram can be used to decrease the stigma surrounding using food security resources.

“(They liked that the page shows) that it is ok to use these resources”

The Instagram also led to several students personally reaching out to the page through Direct Messages for more information. One student reached out asking about how the inclement

weather and campus closure affected the pantries. Another student reached out when they saw a post promoting a pantry about how to donate groceries, specifically allergy friendly items. Three different students reached out about information for a news story they were working on over food insecurity on campus. One student reached out and asked for more details regarding when Pete's Eats food was available in response to a story promoting it. Another student reached out and asked about food resources in general that were available to them.

DISCUSSION

Qualitative Phase:

The purpose of the study's qualitative phase was to hear student perspectives and understand why food insecure students do not utilize available food resources. Findings from the interviews demonstrated that most students either know about Our Daily Bread or have no knowledge of resources. There was an overall consensus among participants that resources are not utilized fully due to a lack of student awareness. This finding aims to explain previous OSU research that found 78.3% of very low food secure and 41.5% of low food secure students did not utilize available food resources even though they did not have enough food.¹⁹

The interviews demonstrated that participating students agree with a 2018 study¹⁹ that OSU sophomores, juniors, and seniors were experiencing food insecurity, along with students in racial minority groups, at a higher rate than their freshman and Caucasian peers. Students from ethnic minority groups are often described to be at a greater risk of experiencing food insecurity compared to their white peers.^{5,6,7,13} Interview findings indicated that a potential cause between the racial discrepancy of food insecurity could be cultural pressure. One student shared that based on their culture, they could be seen as an embarrassment and that asking for help is seen as

a failure. Along with these groups, additional student groups were mentioned to be at a potential risk of experiencing food insecurity. Participating students indicated students that are lacking parental financial support are likely at an increased risk, such as LGBTQ+ students and students from a low-socioeconomic background. This supports Dedman's findings that LGBTQ+ students and students classified as an independent from their parents are at higher risk of being food insecure.⁶ Most interview participants agreed that at OSU freshman were not at as high of a risk of food insecurity as upper classman. This contradicts studies that identify freshman at greater risk.¹⁴ While interviews identified that the transition to college and newfound independence could potentially contribute to food insecurity, at OSU freshman are required to purchase a meal plan. This discrepancy between OSU and other studies can be attributed to the required meal plan forcing freshman to purchase food for themselves.

Students proposed explanations as to why food insecurity is taking place at OSU, many of which were financial related. Most students agreed that food is expensive and there are many expenses related to going to college. Food may not get the first priority with students' budget. A lack of parental support was also mentioned as a possible influencer of food insecurity in students. A student mentioned that there could be an embarrassment and stigma surrounding asking parents for assistance. While it is generally well accepted that college students are hungry and experience food insecurity, there is limited studies examining the influencers behind their food insecurity.

In the interviews, students indicated that campus A-Frames and social media platforms were the best ways to distribute information across campus. This is compared to bulletin boards, TV screens, and passing out flyers which were determined to not be effective modes of communication.

Quantitative Phase:

The purpose of the study's quantitative phase was to assess whether a social media campaign, promoted through campus A-Frames, would increase the awareness and usage of available food security resources. This approach was identified by OSU students during the qualitative phase of the study as having the most potential to increase awareness of food security resources and in turn usage. Findings from this study corroborated previous studies conducted at OSU that students have a low awareness of available resources. The observed increase in the amount of resource awareness after following the page supports students' recommendations to use A-frames and social media campaigns to increase awareness of the food security resources. The findings from the survey also showed that the Instagram resulted in a small increase in resources usage by followers of the social media campaign. The usage findings are likely presenting lower than they would be in an extended intervention, due to inclement weather and campus closures during the intervention period.

One unintended positive outcome from the study was the expansion of the Pete's Pantry Network. During the qualitative phase, a recommendation from a student was to expand the Pete's Pantry Network by adding mini pantries throughout campus, making them more accessible and possibly reducing stigma. The Student Government Association acted on this finding by creating a Pete's Pantry in the Nancy Randolph Davis West Building in March 2022, during the social media campaign. This helps explain the low awareness and small change in use of this specific resource.

Instagram analytics of the followers and their demographics demonstrated that the majority of the followers were female. This agrees with studies that identified women to be at higher risk of facing food insecurity than men.^{5,14} The analytics also demonstrated the majority

of followers were 18-24 years old, which is reflective of the target audience, college age students. The A-Frame resulted in 104 QR scans, while it is unsure if all scans resulted in a follow, there were 181 followers at the end of the intervention. This could show that the A-Frames did help promote the Instagram as the focus groups decided. Instagram analytics of engagement in posts demonstrate a high reach and engagement to users.

Strengths and Limitations:

There are several strength and limitations to the study that should be considered in developing the conclusions. This is the first known study that has utilized input from students to develop and investigate the use of a social media campaign to increase awareness and use of food security resources on a college campus. A second strength of the study is that it was mixed methods and incorporated both quantitative and qualitative approaches to understanding the awareness and utilization of food resources.

While the interview participant sample size of seven students was small, a strength of the qualitative study was the consistency in responses between the interviews and consistency with findings of previous research.^{5,6,7,13} Also, the small number of participants represented the target population of minority students, upperclassman, and food insecure students. The stigma that surrounds food insecurity could be a reason for the low respondent rate for the qualitative phase of this study. In addition, two of the interview participants shared that students can be hesitant to fill out paperwork, and another mentioned the aversion towards feeling like a research subject, this mindset could have been a deterrent to participating in the study.

Because this study was completed on a restricted timeline, the intervention could only be performed in the early spring semester. This conflicts with evidence that food insecurity is more prevalent at the end of semesters, especially the fall semester. Because of the restricted timeline

and recency of implementing several of the food resource initiatives, researchers did not have year-to-date data for assessing change over a period of time or during periods of the academic year when food insecurity tends to be more prevalent. We cannot conclusively say if the social media campaign is responsible for any notable changes in resource usage.

Another limitation this study faced was the inclement weather during the social media campaign. There were 6 days that campus was closed during the intervention time period, February 2nd-4th and 23rd-25th. During this time, students were not seeing the A-Frames, could not access campus resources, and could have possibly returned home and restocked on food items. All of these factors contribute to a lower chance of students utilizing campus resources.

CONCLUSION

The underutilization of food security resources at OSU can be attributed, in part, to overall low student awareness of what is available and possibly a stigma surrounding food insecurity. Social media interventions, specifically Instagram, pose as a promising strategy to increase awareness and usage of food security resources. This social media campaign demonstrated that students at Oklahoma State University would engage in social media content about food security resources. Ultimately, students had an increased awareness and reported a small increase in usage of available food security resources after following the social media campaign.

Implications for future research

Based on the findings and limitations of this study, further research on the effects of a social media campaign over an extended period of time to include the end of the fall semester, when food insecurity is believed to be more prevalent, and to include data that can be compared

to food resource usage on a year-to-date basis is needed. A longitudinal study would also be beneficial to assess any changes with the newly formed resources and provide a more complete perspective on the effectiveness of a social media campaign long-term.

APPENDICES

APPENDIX A

1. Have you heard of the term food insecurity before, and if you have, what does it look like to you?
 - a. The USDA defines food insecurity as not having consistent access to an adequate amount of food for a healthy lifestyle that is obtained in a socially acceptable way.
 - b. What do you think the prevalence rate of food insecurity is on OSU's campus? This includes everyone attending classes on Stillwater's campus, they could be living on or off campus.
 - i. Do you think that food insecurity is a threat to OSU students? If so, in what way?
 - ii. A study completed last year found that 42% of OSU students on the Stillwater campus reported experiencing some level of food insecurity.

2. Knowing that there is a problem, what do you think the underlying causes of food insecurity on campus are?
 - a. Do you believe there are times during a semester when food insecurity is more prevalent among students on campus than other times? When are the times students seem to experience more food insecurity?

3. The survey I just mentioned indicated that the groups at higher risk were the sophomores, juniors, and seniors, and minority groups.
 - a. How do these findings compare to what you have observed or heard people talk about?
 - b. Why do you believe the identified groups are at a higher risk?
 - c. Are there any other groups you feel like are at a higher risk of food insecurity?

4. Now we are going to shift focus and examine how OSU addresses student food insecurity.
 - a. What food assistance resources have you heard about?
 - b. What resources do you think people actually use?
 - c. If you were in charge, what would you do to improve food insecurity on campus?

5. So, I would like to get some quick feedback on different types of campus outreach. Either give a thumbs up or thumbs down if you feel like the type of media normally gets your attention or is effective.
 - a. When people pass out flyers?
 - b. How about the A Frames on the sidewalks?
 - c. TV Screens in different buildings?
 - d. Social Media Outreaches?
 - e. Do you have any other forms of outreach that works well for you?

6. What else do you think decision makers on campus should know about reducing food insecurity for students on campus?

APPENDIX B

Study Information and Consent to Participate ***Understanding awareness of food security resources available to university students***

We are asking you to participate in a research study titled “Understanding awareness of food security resources available to university students”. We will describe this study to you and answer any of your questions. This study is being led by Isabelle Posey, a Nutritional Sciences student at Oklahoma State University. The Faculty Advisor for this study is Deana Hildebrand, PhD, RD, Nutritional Sciences Department, in the Oklahoma State University.

What the study is about

The purpose of this research is to understand factors limiting students’ usage of campus food assistance resources, and to create a program aimed to increase students’ usage of food assistance programs. The goal is to reduce low and very low food security among OSU students on the Stillwater campus.

What we will ask you to do

We will ask you to participate in a focus group to gain insight into the food insecurity among students enrolled at Oklahoma State University’s Stillwater campus. The discussion will brainstorm limitations preventing students from using food assistance resources, potential solutions to increase use of the resources, and why they believe food insecurity takes place. The discussion should take approximately 45 minutes.

Participants will also be asked to complete a brief demographic survey and 6-item USDA Food Security survey. The purpose of the data is to know to what extent focus group participants represent the broader OSU student population.

Risks and discomforts

There is an emotional risk associated with this research. The focus group will be covering some sensitive issues such as food insecurity, poverty, and hunger. These topics may be sensitive to some individuals and may be hard to discuss based on personal history. We do not anticipate any additional risks to the participants with this research.

Benefits

There are no direct benefits in completing this research. The expected benefits of this research are a decrease in low and very low food security at Oklahoma State University’s Stillwater campus. The results of the research will also contribute to a better understanding of what intervention techniques are useful in a university setting.

Compensation for participation

Participants in this study will be compensated with a \$10 OSU meal card.

Audio/Video Recording

The focus group sessions will be audio recorded for transcription to accurately analyze the information. Upon completion of the research, the audio recordings will be destroyed.

Please sign below if you are willing to have this interview audio recorded.

- I do not want to have this interview audio recorded.
- I am willing to have this interview audio recorded:

Signed: _____

Date: _____

Privacy/Confidentiality/Data Security

All information will be confidential and only accessible to the researchers. During the focus groups participants are asked to not use their name or any other person’s name in the discussion. The recorded discussions will be downloaded onto password protected computers located in locked offices on the OSU campus for transcription.

The demographic and food security survey ask for no personal identifiers that can be traced back to you or your focus group comments. All focus group information will be reported to OSU food resource program planners and decision makers as general themes. All demographic and food security data will be aggregated for reporting.

Sharing De-identified Data Collected in this Research

De-identified data from this study may be shared with the research community at large to advance science and health. We will remove or code any personal information that could identify you before files are shared with other researchers to ensure that, by current scientific standards and known methods, no one will be able to identify you from the information we share. Despite these measures, we cannot guarantee anonymity of your personal data.

Taking part is voluntary

Participant involvement is voluntary, the participant may refuse to participate before the study begins, discontinue at any time, or skip any questions or topics that may make him/her feel uncomfortable, with no penalty to him/her, and no effect on the compensation earned before withdrawing, or their academic standing, record, or relationship with the university or other organization or service that may be involved with the research.

Contacts and Questions

The Institutional Review Board (IRB) for the protection of human research participants at Oklahoma State University has reviewed and approved this study. If you have questions about

the research study itself, please contact the Principal Investigator at 918-899-5406, isabelle.posey@okstate.edu, or the study advisor at 405-744-5059, deana.hildebrand@okstate.edu. If you have questions about your rights as a research volunteer or would simply like to speak with someone other than the research team about concerns regarding this study, please contact the IRB at (405) 744-3377 or irb@okstate.edu. All reports or correspondence will be kept confidential.

Statement of Consent

I have read the above information and have received answers to any questions I asked. I consent to take part in the study.

Your Signature _____ Date _____

Your Name (printed) _____

Signature of person obtaining consent _____ Date _____

Printed name of person obtaining consent _____

This consent form will be kept by the researcher until the end of the study.

APPENDIX C

Understanding awareness of food security resources available to university students

Food Security and Demographic Intake Form

Add brief statement that information will be confidential and not tied to the focus group conversations.

Food Security Questionnaire

1. In the last month, the food I bought just didn't last, and I didn't have money to get more.
 - Often true
 - Sometimes true
 - Never true
 - Do not know

2. In the last month, I couldn't afford to eat balanced meals.
 - Often true
 - Sometimes true
 - Never true
 - Do not know

3. In the last month, did you ever cut the size of your meals or skip meals because there wasn't enough money for food?
 - Yes (answer question 4)
 - No (skip question 4)

4. How often did this happen? (Answer only if you answered 'yes' to question #3.)
 - Almost every day
 - Some days but not every day
 - Only 1 or 2 days
 - Do not know

5. In the last month, did you ever eat less than you felt you should because there wasn't enough money for food?
 - Yes
 - No
 - Do not know

6. In the last month, were you ever hungry but didn't *eat* because there wasn't enough money for food?
 - Yes

- No
- Do not know

Demographic Information

Are you currently enrolled as a student at OSU-Stillwater Campus?

- Yes
- No

How do you identify racially? Select all the options that apply.

- American Indian
- Asian American
- Black/African American
- Caucasian American
- Native Alaskan
- Native Hawaiian
- Native Pacific Islander
- International
 - African
 - Asian
 - European
 - Middle Eastern
 - Central/South American

Do you identify ethnically as Hispanic/Latinx?

- Yes
- No

What is your gender identification?

- Male
- Female
- Transgender Male
- Transgender Female
- Gender Variant/Non-Conforming
- Not Listed
- Prefer not to answer

What is your academic level based on year?

- Freshman (1st year)
- Sophomore (2nd year)

- Junior (3rd year)
- Senior (4th + year)
- Graduate Student

APPENDIX D

**FOOD?
SCAN HERE!**



https://www.instagram.com/okstate_freefood/

APPENDIX E

OKSTATE Free Food Survey

Thank you for filling out our quick form, this helps us know how effective our social media was in increasing awareness of food assistance resources.

1. Please enter your OkState email to be entered into a drawing for a \$10 OSU dining card.
2. Are you a current student at Oklahoma State University?
 - Yes
 - No

Awareness of Resources

3. Please check all of the resources you were aware of PRIOR to following OKSTATE Free Food.
 - Pete's Eats
 - Our Daily Bread Mobile Market
 - Pete's Pantry (SU Basement)
 - Pete's Pantry (SU 2nd Floor)
 - Pete's Pantry (Bennett Hall)
 - Pete's Pantry (NRDW 2nd Floor)
 - OSU Night at Our Daily Bread
 - None of the Above
4. Please check all of the resources you were aware of AFTER following OKSTATE Free Food.
 - Pete's Eats
 - Our Daily Bread Mobile Market
 - Pete's Pantry (SU Basement)
 - Pete's Pantry (SU 2nd Floor)
 - Pete's Pantry (Bennett Hall)
 - Pete's Pantry (NRDW 2nd Floor)
 - OSU Night at Our Daily Bread
 - None of the Above

Resource Usage

5. Which of the following resources did you use PRIOR to following OKSTATE Free Food?
 - Pete's Eats
 - Our Daily Bread Mobile Market
 - Pete's Pantry (SU Basement)

- Pete's Pantry (SU 2nd Floor)
 - Pete's Pantry (Bennett Hall)
 - Pete's Pantry (NRDW 2nd Floor)
 - OSU Night at Our Daily Bread
 - None of the Above
6. Which of the following resources did you use AFTER following OKSTATE Free Food?
- Pete's Eats
 - Our Daily Bread Mobile Market
 - Pete's Pantry (SU Basement)
 - Pete's Pantry (SU 2nd Floor)
 - Pete's Pantry (Bennett Hall)
 - Pete's Pantry (NRDW 2nd Floor)
 - OSU Night at Our Daily Bread
 - None of the Above

Feedback

- 7. How did you hear about our page?
- 8. What do you like about our page?
- 9. What do you think could be improved?

APPENDIX F

Question	Interview 1	Interview 2	FG 3	Interview 4	Interview 5	Interview 6
Food Insecurity Definition	Community is unable to provide enough food	Can't afford a balanced diet	P3: Can't eat what they want, P4: Don't have resources to get healthy food	Has issues getting food supply (money or transportation)	Can't get food they need	Don't have ability or access to obtaining food
Threats	Academic	Struggle to pay for groceries	P3: More likely to dropout. P4: Can't concentrate	Won't be able to have healthy brain to study		
Prevalence	50%	20%	P3: 20%, P4: 25-30%	30%	30%	20%
Times of increased risk	Mid semester to finals	Holiday season (reduced funds)		Always there, between paychecks	Near end of semester	End of fall semester (season change)
Causes	Food is expensive, access (location), lack of variety	Having funds, working while going to school is a lot	P3: First time independent P4: not knowing what resources are available	Lots of expenses, groceries low priority	Lack of parental support	Embarrassment of getting or asking for help
At risk groups	Upperclassmen can manage not eating more, and look for ways to save money. People with ED could be at risk	Agree with upperclassman, freshman meal plans, unpaid internships	P3: Agree, freshman have meal plan, upperclassman more finances, P4: Cultural, asking for help could make you an embarrassment, LGBTQ at risk	Agree with upperclassman, sophomore almost passed out, agree minorities, may not come from best background, people from low-income families at risk	Freshman should be included, (anecdote), still figuring out living on own. Low-income families and students without parental support at risk	Agree with upperclassmen out on their own, freshmen have meal plans, minorities use the pantry the most. Boys could be at risk, not willing to get food. People living alone, isolation and mental issues.
Food Resources	Our Daily Bread, Pete's Eats	No knowledge	Our Daily Bread	Our Daily Bread	First Christian Church	Pete's Pantry, Our Daily Bread and Mobile Market
Student Usage	Pete's Eats runs out of food, but not many know about it, ODB not many use, too much paperwork for international students	Lack of awareness	P3: low awareness, don't want people to know they are struggling P4: Transportation Issues, doesn't run on weekends	Many haven't heard of it, maybe transportation, doesn't run on weekends, not much campus promotion	Lack of awareness, little usage	Pantry is used, others have low awareness, and access, and embarrassment since students work mobile market. Too public, move to private location
Outreach	Flyers: yes	Flyers: no	Flyers: sometimes,	Flyers:, yes	Flyers: no	Flyers: Yes, but not

	Bulletin Board: No A-Frames: neutral TV: Neutral Social Media: yes Other: Emails	Bulletin Board: No A-Frames: yes TV: Sometimes Social Media: yes	yes Bulletin Board: No A-Frames: neutral TV: Neutral Social Media: yes Other: Emails	Bulletin Board: not as much A-Frames: no TV: no Social Media: yes Other: hand out something to direct to social media	Bulletin Board: No A-Frames: sometimes TV: Neutral Social Media: yes, Instagram Other: Emails	for everyone Bulletin: Yes A-Frames: Yes TV; no Social Media: Yes Other: Maybe student organizations
Other Info	Free meals, special events	Put on events to reduce shame and stigma of food assistance	P3: Resource center on campus, not too busy areas, P4: tabling with graphics or stats to reduce stigma	More awareness on people's struggle to reduce shame	Grandma's pantry, increase awareness	Food pantry in every dorm with simple stuff, make people feel like people and find where the minority students are.

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