

Food Insecurity Among College Students: An Assessment of Prevalence and Solutions

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Abstract

This study examines the prevalence of food insecurity within the University of Colorado Boulder student population. Food insecurity can have consequences for physical and mental health. In order to address the prevalence of food insecurity on campus, I used an online survey to collect data to determine the level of food security of 339 respondents, along with a variety of demographic variables. I found that 54% of the respondents were food insecure. Students that received financial aid were the most likely to be food insecure. These results suggest that food insecurity is a problem for a large amount of students studying at CU Boulder. Food assistance programs for students could address this issue; respondents suggested three types of program that they reported would be useful to them: on-campus food assistance, on-campus education programs, and off-campus food and grocery assistance. My study leads me to recommend that CU should have staff on campus who are dedicated to helping students locate food assistance resources in the state, and CU should offer meal plan assistance that is based on financial aid.

Preface

The topic of food has always interested me. From cooking it, to growing it, to watching food travel shows, I love it all. I have also been curious and passionate about diet and nutrition and why people eat in the ways that they do. In the end all of these topics can relate back to the food that is available to each person and how they utilize it. As a lover of food, it is devastating to know that globally there are millions of people who do not have enough to eat every day, let alone food that they would choose to eat if given other options. Upon finding out from Alyssa Willet at the Volunteer Resource Center that she has personally encountered students who could not afford food, I knew I had to investigate this.

I would like to thank Alyssa Willet and the entire food security committee for their encouragement and passion for helping students in need. Every meeting inspired me to make sure my research is helpful towards a meaningful cause.

I would also like to thank my entire thesis committee, Peter Newton, Dale Miller, and Veronica House for helping me achieve my goal of performing real research and writing a thesis. As an undergraduate, I never had expectations that I would perform work of this level. I would like to give a special thank you to Pete for continuously encouraging me and really helping me move forward throughout this entire process.

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INTRODUCTION

My research examines the food security of the CU Boulder student population. Food security, specifically for students, is quite a complicated topic. Often times food assistance programs are challenging to qualify for, and being a student holds many financial burdens that are not entirely taken into account when students apply for food assistance programs. As college prices rise, financial assistance in the form of scholarships and grants have not been able to keep up. With the average college student graduating with over \$30,000 of student debt, finances on college students are harder than ever. Unfortunately, for many young adults, food often falls to the side when budgeting. Diet is directly related to health, and with the lack of food or food that has the nutrients to sustain a well-rounded diet, students can see adverse effects to their health immediately and later on in life. I have found many studies on food security, yet only a few that are directly related to college students.

For my honors thesis I determined if and how much of the student body is food insecure. My research addressed this topic in more depth, which will help CU Boulder have a better understanding of student needs that are possibly not being addressed. I am personally passionate about public health and the topic of food, which makes this research the perfect avenue for me to explore if and how students are affected by food insecurity. With conclusive findings that there is food insecurity within the student population, then CU Boulder and the community can be more informed and equipped to address the problem.

Alyssa Willet from the Volunteer Resource Center has started a project on the topic of food security on campus. She has personally funded students who were in need of groceries

and had no way of obtaining them without financial help. There have been other staff and faculty members that have had similar experiences with students as well. Clearly, even if it is on a small scale, there is need for food assistance at CU Boulder. As a member of the committee for this project, I hope to supply the committee with relevant data in order for us to understand what direction to take our actions. Instead of making decisions based off of cases on other campuses, Alyssa and the committee can make decisions specific to CU Boulder. There are many different options for addressing the problem of food insecurity, but they are dependent on a variety of factors. With specific data, addressing this problem will be able to be done much more efficiently than blindly implementing solutions that are based off of assumptions about the CU Boulder student population. I am also in contact with staff at the food bank, Community Food Share. They are interested in seeing data specific to students, as this information is not readily available through their own data or data provided by Boulder County. With this data, Community Food Share will have a better understanding of the food assistance needs of local populations in Boulder County. They can then make decisions about their own programs or food allocation based on my findings. Overall this research will be useful to a variety of on-campus staff and faculty along with off-campus or county-based programs, as well.

BACKGROUND AND SIGNIFICANCE

Food security exists “when all people, at all times, have physical and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life” (Rome Declaration on World Food Security, 1996). This definition was agreed between the 185 countries that attended the World Food Summit in 1996; however, food security does vary based on international, national, regional, and local context. The

specific definitions that the USDA of the United States or FAO of the United Nations use are different than the definitions created by other organizations. For the purpose of analyzing food security within the United States, I will be looking at the USDA and FAO definitions that apply to food security in the United States. Food insecurity is not just a problem of being hungry. It encapsulates a much broader spectrum of wellbeing within it. According to the FAO, food security is split into four categories: availability, access, utilization, and stability. These categories correlate to the areas of people's lives that can affect their ability to provide themselves with food. Availability refers to the food that is available to a person based on the physical amount of that food (whether it is supplied in a grocery store or grown by that person); access refers to the economic factors that cause a person to be able to or not able to buy food; utilization refers to the ability of a person to utilize their food through cooking practices to make sure they are eating enough calories, nutrients and micronutrients. Lastly, stability refers to the consistency of availability, access, and utilization over time. As defined by the FAO, when one or more of these conditions are not met, then an individual is considered food insecure. The FAO recognizes two types of food insecurity: chronic and transitory. "Chronic" food insecurity is defined as when the proper access to food is unavailable over an undefined period of time and usually occurs in communities where there is inadequate access to productive or financial resources and poverty is a deep rooted issue in the community as well. "Transitory" is defined as when the proper access to food is intermittent and occurs when there is a sudden inability to produce or access enough food. Transitory often happens due to sudden unexpected changes in household income or food prices that are due to temporary causes (An Introduction to the Basic Concepts of Food Security, 2008). It has been estimated that 795

million people globally are not food secure (Knowles et al. 2015). Food security can be affected by a plethora of factors, including proximity in location to food that is available and nourishing, vulnerability of farmers to natural disasters, and the economic ability to afford food. With a rapidly growing global population, the challenge of ensuring food security is becoming more difficult and pressing than ever.

Food insecurity – defined as the inability to access enough food at all times to live an active healthy lifestyle (Coleman-Jensen et al. 2016), became globally recognized as an issue affecting millions of people in the mid-1990s. During this time period, many nations decided that food insecurity was an issue that required attention immediately. This is also the point at which the definition of food security began to take a turn away from focusing on just food access. The definition started to encompass nutrition as well and the idea of malnutrition being a huge global concern that is directly related to food security (Pinstrup-Andersen et al. 1997). The current definition now includes food preferences and food safety as well. It is important to take into account cultural and social considerations for food security as there is not one diet of food that is the solution for all people.

Additionally, food insecurity began to be assessed based on individual households, instead of a larger scale that encapsulated domestic trends of food supplies. One problem often faced when analyzing global food security is the lack of data in food production and food trade for many developing and poverty-stricken nations, especially when there is a gap between the individual and nation-wide level of food production – such as is the case in some large developing countries, including Brazil and India. In such countries, there are many unaccounted-for sustenance farmers or small scale farmers that provide for themselves, but

are not considered when looking at national statistics related to food production (Measuring Food Insecurity and Hunger, 2005). It is hard to have a deep understanding of the need for food assistance in areas where there could be unaccounted-for food sources. Measuring domestic food supplies will also fail to address food security because it does not address the issue of cost and access. Just because an area has enough food theoretically for the amount of people living there does not mean those people can afford the food, and therefore they might not be accessing the food at all (Webb et al. 2006).

Another factor that makes food security hard to assess is that food security is ever changing globally based on people's situations. There is year to year variations in food prices, household incomes, weather and domestic food production (Pinstrup-Andersen, 2009). In nations where food security is a common issue and food insecurity is quite constant there are many health factors that remain constant as well. Indeed, poor health and food insecurity are directly related. Hunger leads to nutrient deficiencies which lead to stunted development and immune deficiencies. Immune deficiencies within a population make that population more vulnerable to disease. When disease enters that population the lack of immunity allows it to spread infectiously, and then people within that community do not have the immunity to natural fight of the disease (World Hunger Series, 2007). For example, 57 percent of deaths caused by malaria are attributable to undernutrition, and 80 percent of chronic diseases occur in low-income and middle-income countries where more of the population experiences food insecurity compared to high-income countries (World Hunger Series, 2007).

There are many circumstances in which people may be food insecure, and many pathways that may lead to that situation. However, some groups are at greater risk of food

insecurity than others. One example would be from a 2012 study, which indicated that those most likely to experience food insecurity were single-female households with children (36.8% of this demographic were food insecure), Black and Hispanic American households (25.1% and 26.2%, respectively), and low-income households with income under 185% of the federal poverty guidelines (34.5%) (McGuire et al. 2012). Some of the factors that contributed to food insecurity for these groups included: poverty, high housing and utility costs, unemployment, medical and health costs, mental health problems, lack of education, transportation costs, and substance abuse (Holben. 2010).

The consequences of food insecurity can be extremely detrimental to the parties involved. Health consequences of food insecurity can include poor cognitive, social, and emotional development among young children; suicidal ideation among adolescents, depressive symptoms and, among adults, and increased risk of diet-related chronic disease and associated effects (Knowles et al. 2015); and malnutrition (Saunders & Smith, 2010).

Malnutrition, defined as “excess or imbalance of a wide range of nutrients that results in a measurable adverse effect on body composition, function and clinical outcome” (Saunders & Smith, 2010), can negatively affect multiple parts of the body. Malnutrition can generally have adverse effects on the immune system, which will lead to complications when recovering from wounds or illness. Lastly, malnutrition can have psychosocial effects of many kinds that are often depictive of mental illness and often mistaken for mental illness (Goldrick-Rab & Kendall, 2014).

Specifically, for college students, the risk of being food insecure is elevated compared to the national average. Although studies across the nation have found correlations in their own

data, there has yet to be an exact determined reason that holds true throughout the entire country as to why college students are more at risk of food insecurity. Additionally, national food security research is scarce among college campuses, but those that have the statistics support the claim that food insecurity is quite a problem across campuses across the nation. For example, a 2013 study done in New York found that 39.2% of college students from CUNY campuses across the state experience food insecurity (Freudenberg et al. 2013). Whether this is due to the financial burdens of school, the inability to properly manage finances, the spatial accessibility of affordable food or a plethora of other factors, this shows a high number of students that experience food insecurity in comparison to the national average. Unfortunately, research has shown that this is not singled out to only the study in New York.

In one study done at a university in Ohio, the researchers looked at food insecurity through surveys and found that food insecurity was prevalent as well on their campus. The Ohio study began with a survey given out to a variety of classes to encompass the general population. The survey defined food insecurity as “not having enough money to buy enough food.” Another indicator they used was asking students if they had to stretch their food budgets by eating cheaper and less nutritious food or if they had to cut back on the amount of food they would normally eat. Of students who responded to the survey, 48% had experienced this situation in the past 12 months. The university decided, based on this statistic and faculty experience, that there was need for an on-campus food pantry (Twill et al. 2016).

Responding to the now confirmed problem of food insecurity, the university funded the food pantry through on-campus fundraisers and events. For example, the committee working on starting up the food pantry hosted an event that had an entrance fee of two canned goods.

Once put into place the food pantry was able to be accessed by any current student, regardless of their financial situation. Students using the pantry were required to fill out a short intake form, show proof of enrollment and show a photo ID. Students were allowed to access the pantry up to three times in a 30-day period. Students were allowed to take only enough food for themselves, regardless of household size or situation. In the case that students needed food for other members of their household, they received information about alternative off-campus programs (Twill et al. 2016).

As for the 2013 study done in New York, the entire population of City University of New York (CUNY) was taken into account. The study looked at a variety of public health issues within the student population. The study was done to show correlations between the health of the student population and education. Food security was one of many issues looked at through surveys. The study was done initially because of the low retention rates of CUNY. Considering college graduates are less likely to smoke, have low birth-weight babies, be obese or die prematurely than those who did not graduate, in some cases there is a clear correlation between health and college education (Leung et al. 2012). The New York study specifically looked at public health because those who drop out of college do not have equal health opportunities to those who graduated (Freudenberg et al. 2013). If health issues have the potential to cause students to drop out, then they should be addressed by the university – especially health issues such as food insecurity, where a student might feel that they cannot afford to choose paying for school over paying for food.

Since the research found that such a high population of students were dealing with health issues, *Healthy CUNY* was created as the overarching program to create initiatives and

implement programs to help students. Among the implemented programs, the one addressing food insecurity was in the form of on-campus centers that screened students for the majority of federal benefits, including food assistance benefits. The goal of this was for students, who otherwise would not have known about the federal benefits, to receive benefits in order to help them stay in school (Freudenberg et al. 2013). By alleviating one financial stress, it is possible that student would be able to allocate more money towards their education.

In 2009 a study done at University of Hawaii at Manoa was conducted in a similar manner with similar results. Food security was assessed based on a survey that was given to students in randomly chosen classes. The survey included questions based on food security, spending patterns, and demographics. The results showed that approximately 45% of students were reported to be at risk of food insecurity or were food insecure. Of the 45%, 21% were considered food insecure (Chaparro et al. 2009). There were a few main correlations found within the study. Off-campus students living on their own (not living with family members) were at a higher risk of food insecurity. The area where University of Hawaii at Manoa is located has some of the highest housing costs in the nation (Chaparro et al. 2009). (This problem has the potential to be very similar in Boulder. According to Forbes, Boulder is currently about 20% above the national average in cost of living.) The food insecurity results in Hawaii also aligned with the state poverty rates. Native Hawaiians were found to be significantly more likely to be food insecure than the Japanese student population, just as native Hawaiians have a much higher poverty rate than the Japanese population in Hawaii (Chaparro et al. 2009). This allows the assumption to be made that poverty and food insecurity are directly related, and other studies have found similar results, as well. Although programs

were not implemented at the conclusion of this study, the study gave the University access to important information that was not previously known. Nationally, this study was one of the first to address the topic of food security on college campuses. Since its publishing it has been used many times in similar research reports across the nation and internationally.

In 2015 the Wisconsin Hope Lab released a study they had done through surveys of over four thousand students from 10 community colleges across the nation. Similar to other studies, one of the main themes of this study was the effect of school costs on struggling college students. If a student is considered a dependent, and their family has an income in the lowest income quartile, then the family is expected to pay roughly 40% of their yearly income for one year of community college. Students that are independents in the lowest income quartile are expected to pay well over 100% of their yearly income to afford a year of community college (Goldrick-Rab & Kendall, 2014). With four-year universities being exponentially more expensive than community college, the financial burden on a low-income family or low-income independent student would be unthinkable for most four-year universities. Of the colleges involved in this study, most of the colleges had rates of poverty within the student population that reflected the rates of poverty in the surrounding community. However, even with similar rates of poverty, the rates of food insecurity were more drastic in the college student population, indicating that there is more than just poverty to be blamed for the cause of food insecurity.

Overall, the survey responses indicated that 52% of the respondents were marginally food insecure over the last 30 days previous to taking the survey. Of that 52%, 19% were categorized as having low food security and 20% were categorized as having very low food

security. The two most common answers from the survey were that students felt the amount of food they bought was not enough and did not last them, and that they could not afford to buy balanced meals (Goldrick-Rab & Kendall, 2014). Another important correlation made by the study was between mental health and food security. The survey used questions to briefly screen respondents for common mental health issues. The responses showed that over 50% of participants who were considered to have very low food security also showed signs of clinical depression and severe anxiety. The stress that comes from being food insecure can lead to these type of symptoms. Not to mention that the continuation of food insecurity perpetuates the symptoms. This becomes a cycle that is extremely hard for students to break unless they become food secure (Goldrick-Rab et al. 2015). Similar to this cycle, many students give up applying for programs because they believe that they will not receive aid. In the survey students were able to provide personal responses and many wrote about how navigating state websites for assistance programs is extremely difficult. Some students said they had applied for aid multiple times and could not understand why they kept getting denied (Goldrick-Rab & Kendall, 2014). These students become discouraged, and with many of them having families or multiple jobs on top of school, it becomes too much of a hassle for them to even try to apply for aid programs.

The conclusion of the study states that current national research is not sufficient to know if the problem of food insecurity for college students is new or old, but indicators show that this has been a problem for college students for quite a while. Unfortunately, because of the lack of research until recently, there are still many colleges and community colleges across the nation that are lacking food assistance programs to help students in need. The

recommendation that these researchers felt would be most beneficial is to make sure students have proper guidance and access to the programs around them. Community colleges need to provide education and guidance, in the form of specific staff, for students to know about and know how to apply correctly for all of the available financial and food assistance options. There are even emergency aid programs (although not everywhere) that can help students by providing cash reimbursements in emergency situations (Goldrick-Rab et al. 2015).

Even in one of the wealthiest areas of its region, a food pantry has opened up on the George Washington University campus in Washington D.C. The price for this university is \$68,000 a year and it is located in a well-to-do neighborhood. After performing a survey similar to the previous cases, researchers found that even at a school like this, 48% of the respondents had experienced food insecurity during that year. The university decided to open an unmarked food pantry that any student can access without providing personal information except for their student ID number and email address. Within one month of opening there were roughly 150 students accessing the pantry, and the university received nothing but thankful and positive feedback from the students who needed the assistance (Cornish & Miller, 2016). This example, combined with the other cases, shows that food insecurity can happen anywhere. It can happen in the most poverty stricken areas and the most well-off areas, and it can happen so at the same rate. The financial burdens affecting students are troublesome for students of all-income levels, and the stress associated with these burdens are just as much of a problem as well. Combine the stress, lack of financial stability and lack of food, and there is an entire population of students who are not able to perform academically to their fullest or perform to their fullest in other areas of their lives. Without any changes this cycle will continue to exist,

especially on campuses like the University of Colorado where data and information on this topic were completely unknown prior to my research.

One of the principal national responses to address food insecurity in the US is the Supplemental Nutrition Assistance Program (SNAP), formerly known as food stamps. SNAP is a program designed to give monthly financial assistance to those in need of food. SNAP benefits are given to the person in the form of a debit card that can be used at most grocery stores on most products (the precise regulations vary from region to region). The Food Stamp Act of 1964 was the first official legislation to make food assistance a permanent part of the federal government. Ten years after the program was created, there were 15 million US citizens using the food assistance program and the program was growing rapidly (Supplemental Nutrition Assistance Program, 2014). Since then, successive governments have changed the program in multiple ways.

Today, the qualifications to receive SNAP benefits are mostly dependent on income per household: the net monthly income of a one-person household must be at or below \$1287 a month. For each additional dependent in a household, an extra \$451 a month is added to the minimum household income to qualify for SNAP. There are also deductions that can be taken from a monthly income depending – for example – on a person's medical expenses, if a person is homeless, if they are paying child support. There are also requirements for able-bodied adults to be working more than 20 hours per week to qualify for these benefits. A person that is not able-bodied is required to show proof of disability to be exempt from the work requirements (Supplemental Nutrition Assistance Program, 2016).

There are several reasons that it may be particularly difficult for college students to qualify for SNAP benefits. First, the work requirements make it extremely hard for most students to qualify for SNAP benefits. Most full-time college students spend at least 40 hours a week on school, and so do not have time to work a minimum of 20 hours per week. A key exception to this rule is college students who are working a job through the work-study program at their university. However, due to the limited number of work-study positions at each university, this is not a viable option for every student who cannot afford sufficient food. Second, there are additional limitations for international students: even if an international student meets the work requirements they would not meet the residency requirements for SNAP, since a student visa will not allow you to qualify for SNAP. Third, there are limitations associated with access and transportation. For example, in some places it is a requirement to go into the office for an interview in order to finish the process to receive the SNAP benefits. However, some campuses are distant from the nearest office and not easily accessed by public transit, which can make it extremely difficult to register for SNAP without a personal car. A fourth barrier to accessing the SNAP program include the social stigma that can be associated with applying for welfare benefits, especially on campuses where the majority of students are perceived as wealthy. Most college students are still at a stage in their lives where they are particularly vulnerable to judgement from their peers. If students feel that they will be judged negatively based on their financial situation, they might be much less likely to reach out when they are in need. In aggregate, these limitations make SNAP benefits unattainable by many college students in need.

Here, I examine the issue of food insecurity within the student population at CU Boulder. Through analyzing the issues associated with food insecurity and looking at how food insecurity has affected other schools nationally, it is clear that a lack of food security can have major effects on students' lives. However, the previous research also shows that there is hope for program implementation to help those in need. After reporting on the prevalence of food insecurity at CU and analyzing my results, I suggest future solutions and current feasible ways to address the issue at hand. With the help of previous research and the knowledge gained from my research, I hope to create attainable goals for CU to implement in order to help those in need.

METHODS

USDA FOOD SECURITY SURVEY

Food security can be measured at the level of individuals, households, or wider populations. Of these, the household level is a common unit of analysis. In such cases, if one member of a household does not qualify as food secure then the whole household is deemed food insecure (Rabbitt, n.d). The USDA defines the food security of households based on a set of questions concerning a wide variety of topics around food security (Coleman-Jensen & Smith, 2016). Specifically, the USDA has a U.S. Six-Item Short Food Security Survey that has been widely used among researchers to assess the food security of given populations, and The USDA website (Coleman-Jensen & Smith, 2016) provides a descriptive step-by-step guide on how to perform a survey using their six questions and how to assess the results; I used this survey for this study.

The questions ask about the amount of food bought, the type of food bought, if any member of the household has skipped meals due to lack of food, and whether a household member chose low-nutrition food over other options due to cost. All of the questions refer to the respondent's experiences within the past 12 months. An example of the type of question would be, based on the statement " '(I) couldn't afford to eat balanced meals.' In the past 12 months was this often, sometimes, or never true for you in the last 12 months?" or the question "In the last 12 months, were you ever hungry but didn't eat because there wasn't enough money for food?" Based on the answers to these questions, in addition to other questions, the household can then be categorized at a level of food security. The responses to the survey questions code to an affirmative answer ("often true", "sometimes true", "almost every month", "some months but not every month", or "yes" depending on the question) or a non-affirmative answer ("never true", "no", or "only one or two months"). Those with no affirmative answers are considered highly food secure and those with one affirmative answer are considered marginally food secure. Those with 2-4 affirmative answers are considered to have low food security, and those with 5-6 affirmative answers are considered to have very low food security. The categories of low food security and very low food security are both considered food insecure by USDA standards. These six questions allow researchers to easily assess food security in a relatively simplistic manner, compared to other much longer surveys. The coding for affirmative vs non-affirmative responses allows the data to be clear and concise without much room for ambiguity or subjectivity on whether a respondent is or is not food secure. The six specific questions used to verify food security or insecurity were questions 12-17 (Appendix A).

In the definition of household by the USDA, the household members are dependents of the head of the household. Many students live with roommates that are not considered dependents. I therefore slightly modified the USDA questions to address the respondent as themselves and not their household; for example, replacing (I/we) with just (I). This was done in order to look at students on an individual level. In addition, if food assistance were to be provided to students it would be on an individual level. This means that if a student did have a household dependent, they would still only receive assistance for themselves and not their dependent.

DEMOGRAPHIC AND FINANCIAL AID VARIABLES

In addition to the USDA food security questions, the survey that I developed for this study included a set of additional questions, in order to assess any patterns of food security in relation to other key variables. The survey therefore also collected data on the respondents' gender, race, whether they have children, living arrangement, academic level, GPA, financial aid, current job and what type of food assistance they would like to see at CU (Appendix A).

FOOD INSECURITY SOLUTIONS

It is also important to understand how students feel about food assistance programs, if any programs were to be implemented on campus. My survey included questions that allowed students to indicate what they feel would be most beneficial for CU Boulder students if CU Boulder did provide food assistance. The purpose of these questions was to generate insights into the nature of programmatic support from the university that students would find most useful. These questions included questions 18-20 (Appendix A).

SURVEY DESIGN AND DISSEMINATION

An email link to access to the survey was disseminated via email bulletins to students enrolled at CU Boulder, between December 5, 2016 and February 5, 2017. The first distribution of the survey was through the Buff Bulletin Board, which reached roughly 32,000 students. The survey was then additionally distributed through listservs from various campus organizations such as the Volunteer Resource Center and the Environmental Center, which reached subsets of students. The survey was also distributed directly to some students via email through class lists by faculty that I directly asked - the classes included graduate students and undergraduate students in ENVS and PWR classes. Although some students were more exposed to opportunities to complete the surveys than others, there was no intentional bias in this exposure relative to the outcome of interest (i.e. food security).

The survey and study design were approved by the Institutional Review Board of the University of Colorado Boulder. The survey was designed such that all respondents, whether food insecure or not, could respond to the questions. No students were pressured to take the survey, so data was only obtained from students who voluntarily chose to take the survey. Respondents had the option to skip questions if they did not feel comfortable answering all the questions, but wanted to answer some of them. An incentive was offered in the form of bookstore gift cards that were awarded randomly to two of the respondents that completed the survey and who elected to enter their email addresses into a drawing. Those email addresses were discarded after the gift card winners were awarded. The first question of the survey was a consent agreement, to fully inform respondents about the purpose and scope of the survey. I used Qualtrics software to administer the survey and collate the results.

DATA ANALYSIS

The data was checked to make sure all respondents agreed to the consent agreement and completed the survey. Incomplete surveys were included as well as long as the respondent submitted the survey (allowing it to be used for the research). The data was uploaded to the statistical analysis program, Rstudio, via a CVS file. With the help of students from the Laboratory for Interdisciplinary Statistical Analysis (LISA), the data was formatted to run in Rstudio in order to perform the analysis.

The first analysis performed was finding the number of affirmative responses to the six food security questions by each respondent; this enabled me to assign respondents into the categories of high food security (zero affirmative responses), marginal food security (one affirmative response), low food security (two, three or four affirmative responses), and very low food security (five or six affirmative responses). From there the respondents were grouped into food secure (i.e. high and marginal food security) or food insecure (i.e. low or very low food security) based on those results. I then conducted three analyses. First, I fitted linear models of each independent variable (i.e. the demographic and financial variables) individually to the dependent variable (the category of food security that each respondent was assigned to). We used t tests with significance level $P < 0.05$ to give us initial indications about which independent variables were valuable predictors of food security. We coded some survey questions into categorical variables to reduce the total number of categories acting as predictors for food security indicators in order to have more precise categories. My sample size was sufficient for normal asymptotic assumptions; however, I still followed the methodology of the USDA six question short survey by dichotomizing the scale of food insecurity into the two

categories of food insecure and food secure, with food insecure being two or more affirmative answers to the six specific food security questions.

Second, I conducted a logistic regression analysis to determine which variables are most influential on food insecurity. The multivariate analysis was used to support some of my claims about important features in the data that were found using the linear models. Since the small sample sizes rendered asymptotic assumptions questionable when data were analyzed using the four food security category outcome, I again dichotomized the dependent variable into food secure (high food security and marginal food security) and food insecure (low food security and very low food security). For both models, Rstudio alphabetically chooses a response to be the reference class. In this case the other demographic characteristics in each category were compared to the reference class. The significance of the P value for each characteristic was in comparison to the reference class. Using the recommendation from Rstudio, I am considering a P value statistically significant if it is $<.001$.

The third analysis performed with the qualitative data recorded from question 20 (What other food assistance programs would you find useful for CU Boulder to offer to students?) I recorded the responses and sorted them into lists based on common themes. I mapped the frequency of these themes in a bar chart, and extracted representative quotes from the data to illustrate the types of solutions that respondents proposed.

RESULTS

Three hundred and thirty-nine students responded to the survey, representing about 1% of the student population that had access to the survey (CU Boulder student population = 32,000). Four surveys were incomplete. This explains why the total response number does not

add up to three hundred and thirty-nine for every question. Additionally, for some questions the answer “not applicable” was an option; this response does not count as a response in Qualtrics or Rstudio. On the one to six scale of affirmative responses to the six food security questions, there is a spread of respondents that fall into each category of this scale (Table 1). One hundred and eighty-four respondents, or 54%, are categorized as food insecure according to the USDA analyzation of the Six-Item Short Form Food Security Survey (Table 1). These are the respondents that answered two or more of the questions in the affirmative. Of the students in the food insecure categories (two through six), the greatest amount of students answered six of the six questions in the affirmative. Of the two categories of food insecure (low food security and very low food security) there was a slightly higher percentage of students that had very low food security.

Table 1 Student totals for each level of food security as defined by the USDA

Number of the six food security questions answered in the Affirmative	Level of food security	Number of respondents
0	High food security (Food Secure)	106
1	Marginal Food Security (Food Secure)	49
2	Low Food Security (Food Insecure)	39
3		32
4		18
5	Very Low Food Security (Food Insecure)	19
6		76

The demographic characteristics and their relation to food insecurity show some significant and nonsignificant correlations (Table 2). There was a much higher percentage of female respondents, 77%, than male. Overall the greatest indicator of food insecurity was answering “yes” to the question “Do you receive financial aid that DOES require repayment?” This indicator had a p value of $<.001$ (Table 2). Being in the 5th year of school was almost statistically significant as an indicator of food security, while none of the other characteristics were statistically significant according to the linear models (Table 2). Although not statistically significant, in relation to current job, the highest percentages of food insecurity were found in the students that were working part-time more than 20 hours a week (36 food insecure out of 47), students that were working a work-study job (23 food insecure out of 31) and students that were working full-time (6 food insecure out of 11) (Table 2).

Table 2 Distribution of demographic characteristics by food security status using linear models: college students at the University of Colorado Boulder

Demographic characteristic	Total number of respondents	Number of food insecure respondents	Percentage of respondents that were food insecure	P value
Gender				
Female (Intercept)	260	143	55%	
Male	72	35	49%	0.331
Other	6	5	83%	0.327
Ethnicity				
American Indian or Alaska Native (Intercept)	2	2	100%	
Asian	61	35	57%	0.156
Black or African American	14	11	79%	0.444

Hispanic or Latino	52	32	62%	0.195
Native Hawaiian or Pacific Islander	2	2	100%	0.67
White	186	87	47%	0.093
Prefer Not to Respond	9	5	56%	0.183
Other	13	10	77%	0.3
Have Children				
Yes	5	2	40%	0.637
No (Intercept)	334	182	54%	
Living Arrangement				
On-Campus	103	50	49%	0.38
Off-Campus Alone	16	8	50%	0.499
Off-Campus with Roommates	179	107	60%	0.638
Off-Campus with Parents	23	10	43%	0.381
Off-Campus with Spouse and/or Children	11	4	36%	0.37
No Current Arrangement (Intercept)	1	1	100%	
Other	6	4	67%	0.843
Year in School				
1st year (Intercept)	76	38	50%	
2nd year	68	36	53%	0.015
3rd year	58	33	57%	0.012
4th year	75	38	51%	0.161
5th year	13	10	77%	0.001
Graduate Student	49	29	59%	0.184
GPA				
0.00-1.99 (Intercept)	8	7	88%	
2.00-2.75	35	26	74%	0.943
2.76-3.49	141	80	57%	0.181
3.5-4.00	154	71	46%	0.044

Receives Financial Aid that DOES NOT Require Repayment				
Yes	189	105	56%	0.781
No (Intercept)	150	78	52%	
Receives Financial Aid that DOES Require Repayment				
Yes	148	104	70%	<.001
No (Intercept)	189	78	41%	
Current Job				
Part-time under 20 hours a week	148	73	49%	0.585
Part-time over 20 hours a week	47	36	77%	0.11
Part-time work-study	31	23	74%	0.236
Full-time (Intercept)	11	6	55%	
No job	101	46	46%	0.307

By using a multivariate logistic model, I was able to determine if certain conclusions still hold true when multiple characteristics were compared against each other. Receiving financial aid was the sole variable that was a statistically significant predictor of food insecurity (Table 3). There were not any other demographic characteristics that showed changes in their significance compared to the linear models. There were no other significant characteristics to take into consideration for food insecurity. The p value for 5th year students was not quite as strong of an indicator in the multivariate logistic model as it was in the linear model. Although many of these demographics should still be taken into consideration when reviewing the results, the strongest indicator by far for both models was answering “yes” to whether you receive financial aid that requires repayment.

Table 3 Multivariate logistic model predicting the likelihood of being food-insecure by demographic factors: students at the University of Colorado Boulder

Demographic Characteristics	Estimate	Standard Error	t value	P value
Intercept	6.887	2.93	2.351	0.0194
Gender				
Male	-0.55	0.299	-1.84	0.067
Other	0.461	0.962	0.479	0.632
Race				
Asian	-2.232	1.65	-1.353	0.177
Black or African American	-1.593	1.729	-0.921	0.358
Hispanic or Latino	-2.2	1.645	-1.336	0.183
Native Hawaiian or Pacific Islander	-1.317	2.213	-0.595	0.552
Other	-1.7	1.74	-0.977	0.329
Prefer not to respond	-2.763	1.802	-1.533	0.126
White	-2.778	1.624	-1.711	0.088
Have Children				
Yes	-0.418	1.39	-0.302	0.762
Living Arrangement				
Off-campus alone	-0.214	2.239	-0.096	0.924
Off-campus with parents	-1.357	2.215	-0.613	0.541
Off-campus with roommates	0.216	2.175	0.099	0.921
Off-campus with spouse and/or children	-0.521	2.386	-0.218	0.827
On-campus	-0.845	2.196	-0.385	0.701
Other	0.69	2.361	0.292	0.77
Year in School				
2nd year	0.142	0.479	0.296	0.767
3rd year	-0.145	0.548	-0.265	0.791
4th year	-0.768	0.562	-1.366	0.173
5th year	-0.023	0.812	-0.028	0.978

Graduate student	-0.043	0.604	-0.071	0.944
GPA				
2.00-2.75	-0.306	0.888	-0.344	0.731
2.76-3.49	-0.802	0.811	-0.989	0.324
3.5-4.00	-1.43	0.815	-1.754	0.081
Receives Financial Aid That DOES NOT Require Repayment				
Yes	-0.071	0.251	-0.285	0.776
Receives Financial That DOES Require Repayment				
Yes	1.083	0.255	4.244	<.001
Current Job				
No job	-1.155	0.789	-1.464	0.144
Part-time over 20 hours a week	0.496	0.821	0.604	0.546
Part-time under 20 hours a week	-1.15	0.765	-1.503	0.134
Part-time work-study	-0.12	0.863	-0.139	0.889

The solutions that respondents suggested that they thought may be useful for CU Boulder to offer to students fell into three broad themes: 1) on-campus food assistance through the use of discounted or free meal plan offerings; 2) on-campus education offered to assist students in food and food assistance education; and 3) off-campus food assistance through the help of groceries or coupons (Fig. 1). The majority of respondents (49/73) suggested solutions that fell into the first of these categories (on-campus food assistance); 17 and seven respondents, respectively, suggested solutions that fell into the on-campus education and off-campus themes (Fig. 1). The full list of responses can be found in appendix B.

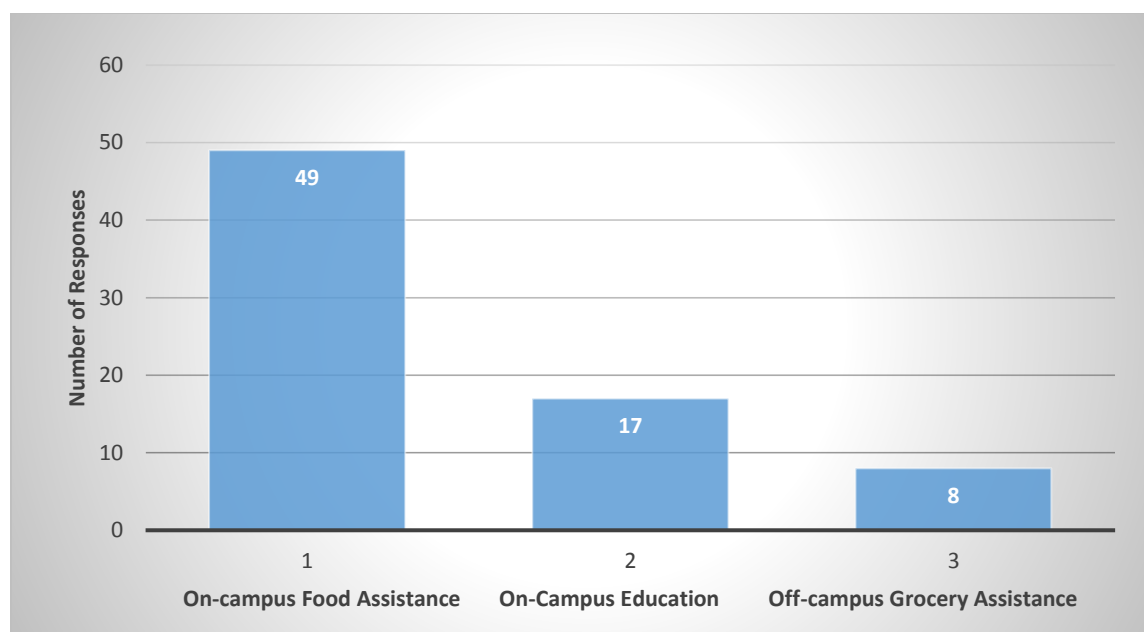


Figure 1. Respondent suggestions of solutions to food insecurity that could be offered by CU Boulder

DISCUSSION

Food insecurity was prevalent among the CU Boulder students that we surveyed. 54% of respondents were categorized as having either low or very low food security, with 28% categorized as very low food security. If our respondent sample was representative of the campus-wide population of students, this suggests that there may be seventeen thousand food insecure students on the college campus (total student population: 32,000). Thus, there is a clear issue of food insecurity on the CU Boulder campus. Similar studies at other schools in the US have all also found food insecurity among the student body. At CUNY, 45% of respondents fell into the category of food insecure or at risk of food insecurity (according to their standard of measurement) (Freudenberg et al. 2013). At the University of Hawaii Manoa, the rate of food insecurity was 21% with another 24% being at risk of food insecurity (Pia Chaparro et al. 2009). Additionally, 59% of students at Western Oregon University had experienced some form of

food insecurity within the past year (Cady, 2016). Finally, 14% of students at an unnamed university in the southeast were found to experience food insecurity at a given point in time (Cady, 2016). Considering the national average for household food insecurity is 12.7% according to the most recent 2015 USDA calculation, there is a clear finding that college students are at a higher risk of food insecurity than the average household in the US. Many of these studies found it difficult to pinpoint the exact factors that are causing such a high rate of food insecurity among college students.

FOOD SECURITY AND FINANCIAL AID

Receives Financial Aid that DOES Require Repayment	Total Number	Number of Food Insecure	Percent Food Insecure	P Value
Yes	148	104	70%	<.001
No (Intercept)	189	78	41%	

(Figure taken from table 1 for reference)

The most significant indicator of food insecurity in our study was if students received financial aid that required repayment. Students that answered yes to this question were shown, according to the linear and multivariate models to be twice as likely to be food insecure than those not on financial aid. According to the University of Colorado Office of Financial Aid website, roughly fifteen thousand students received financial aid during the 2014-2015 school year. Assuming that some form of this aid required repayment, this population gives us a better insight to the possible number of food insecure students.

Assuming that a good portion of this aid comes from student loans, this indicator makes logical sense just based on the fact that a student taking out a student loan would need

financial assistance for college related spending. This indicator directly relates to the idea that college has become extraordinarily expensive therefore causing financial stress on students. If students are struggling to pay for school, then they are likely to be struggling to pay for food as well.

A recent study done at the University of Ohio found that seven out of 10 college students feel stressed about their personal finances. The findings come from the National Student Financial Wellness Study, which surveyed 18,795 undergraduate students at 52 colleges and universities across the country. Of the students surveyed, 64% of used loans to help pay for college, which is similar to what other studies have found (Grabmeler, 2015). Roughly 60% of students said they worried about having enough money to pay for school, while 50% said they were concerned about paying their monthly expenses (Grabmeler, 2015). If the same students that are worried about paying monthly expenses are the students who are taking out student loans, then it is logical that financial aid would be directly related to personal finances. Food is a large part of monthly expenses, so students who struggle to pay those day-to-day expenses may be at risk of food insecurity.

Overall, the relationship of financial aid and food security may be linked to personal finances. The majority of students taking out loans that require repayment probably do so because they do not have the money themselves nor do they have a source for the money such as money from family members. Students from low-income families who do not have that financial support from their family often experience financial hardships in college (Cady, 2016). In order to make ends meet these students are more likely to choose paying a different expense over buying food (Broton and Goldrick-Rab 2016).

FOOD SECURITY AND YEAR IN SCHOOL

Year in School	Total Number	Number of Food Insecure	Percent Food Insecure	P Value
1st year (Intercept)	76	38	50%	
2nd year	68	36	53%	0.015
3rd year	58	33	57%	0.012
4th year	75	38	51%	0.161
5th year	13	10	77%	0.001
Graduate Student	49	29	59%	0.184

(figure taken from table 1 for reference)

Although not quite statistically significant, another indicator of food insecurity is the respondent's current year in school. 5th year students were more likely to be food insecure than students in other years in college. In a University of Ohio study, food security was related to performance in school (Twill et al. 2016, Grabmeler, 2015). The findings from this University of Ohio study indicated that financial burdens such as student loan debt and normal life expenses were causing high stress levels in college students. In fact, 32% of students reported that they had to put school on hold or neglect their schoolwork due to dealing with financial burdens and roughly three out of 10 students said they reduced their class load because of financial burdens and dealing with those burdens. An additional 16% of students said that they took a break from their college or university because of financial burdens and 13% transferred to another institution (Grabmeler, 2015). The explanation for this result could be that students who are in their 5th year of college, are students who could not afford to allocate as much time to school as those who graduated in four years.

As demonstrated in my data and other studies, financial factors are indicators of food security and performance in school. This means that the financial hardships are causing students to cut back on the time they are able to allocate to college, and the hardships are causing students to be unable to afford food. Therefore, students who are unable to fully commit to school due to needing to work full-time jobs in order to pay for their lives, may be food insecure. Students who are required to focus their energy into other parts of their lives often put school to the side. The stress of financial struggles can absolutely be overwhelming as well and therefore causing students to do poorly in college or even drop out (Grabmeler, 2015, Goldrick-Rab & Kendall, 2014, Fruedenberg et al. 2013). Either way, when students are doing poorly or are unable to make a full-time commitment to school, it would make sense that students experiencing these types of hardships are students in their 5th year that possibly need more time to fulfill graduation requirements.

FOOD SECURITY AND OTHER INDICATORS

Most of the demographic characteristics on which I collected data did not have any significant correlation to level of food security. It is possible that financial aid and the respondent's current year in school are overwhelmingly the most important variables, and that other factors are comparatively unimportant relative to these. It is also possible that there are other factors involved in food security that I did not measure. For example, in the University of Hawaii study, a survey explored whether individual spending habits could be a cause of food insecurity (Pia Chaparro, 2009). Some authors have suggested that food security in college students can be related to poor financial budgeting and spending monitoring among college students (Fruedenberg et al. 2013). Budgeting is a skill often learned over time, and many

students have not had prior experience with budgeting and personal finances before college. A future iteration of this study at CU Boulder could attempt to collect data on individual spending habits, and on financial budgeting and spending monitoring skills.

As discussed earlier, finances have a large impact on food security in different ways. Although it is logical to hypothesize that students who do not have enough funding for school and their daily lives take out student loans, this is not always the case. There are students who do not want to take out loans despite their current situations. It is unfortunate to see how expensive college has become. For example, students from families earning an average of just \$20,000 a year may spend at least \$8,000 for one year of community college and more than \$12,000 a year at a public university, even adjusting for grants (Broton & Goldrick-Rab, 2016). Whether it is strictly college costs or costs associated with college, there are financial factors that I was not able to take into account with my study that could be causing food insecurity.

It is also possible that the cause could be completely specific from person to person. When working with a derived measure, relying on correlates for answers is not always consistent (Webb et al. 2006). Without knowing the exact lifestyle or personal details of each student, it is hard to say that any of the demographics had the same correlations from student to student. It is also difficult to define specific indicators of food insecurity when there are aspects of food insecurity that I could not define in a simple survey. For example, in the United States the feeling of uncertainty in regards to food security can have significant effects on peoples' lives (Webb et al. 2006). A person could be food secure at the time of taking a survey, but struggling with finances. Whether it is the stress of finances associated with food or the stress of getting to and from a grocery store, this person could easily be at risk of food

insecurity, but I would not be able to tell from my simple survey. These factors suggest that the common USDA surveys (such as the one I used) on food security could use restructuring all in order to obtain more accurate results overall.

FOOD SECURITY AND WORK

Although the variable of hours worked per week did not relate directly to food security, it is an important factor for certain students. Students can only qualify for SNAP benefits if they are working more than 20 hours per week or are working a work-study job. Of the respondents that are currently working and food insecure, 65 of them responded that they were either working part-time more than 20 hours a week, full-time or working a work-study job. That is a total of 65 students who are food insecure that could be qualifying for SNAP benefits based on their jobs. I did not ask questions about if students were already taking advantage of SNAP benefits or had tried to access SNAP benefits in the past. This means there could be students in these categories that are already on SNAP or do not qualify for other reasons; however, for the students who are not accessing SNAP who need assistance, this is an extremely important issue to address.

STUDENT OPINIONS ON SOLUTIONS

The responses where students proposed solutions that they would like CU Boulder to introduce were easily separated into three specific categories. This shows that many of the respondents had similar ideas on how they believe CU could be assisting students. Although students may not always be the best judges of which approaches or solutions would be most effective or viable, an important contribution of these data is that – because the ideas were

suggested by students, including many food-insecure students – they indicate responses that CU students would not feel embarrassed or ashamed to use. They are responses that would allow those who need food assistance to receive help without the stigma often associated with other food, financial, or any other assistance programs. The responses are also solutions that students believe may be feasible for CU Boulder to implement.

The first category, with the most responses (N = 49), was on-campus food assistance in the form of free or discounted food options. Most of the responses were directly stating that CU Boulder should offer free or reduced cost meal plans for the on-campus dining halls. For example, “free meal swipes” was one of the most common responses within this category. Oregon State University enacted a policy to address a similar concern after the University started requiring first year students to live on-campus. The university now offers dining center meals to low-income, high-need students for less than \$3.00 per meal (Cady, 2016).

The category with the second most responses (N = 17) was on-campus education. This theme included responses such as “Helping people figure out how to make cheap/healthy meals” and “Knowledge about food stamp programs.” As exemplified by the two previous responses, many of the responses in this category were either regarding information about cooking on a budget or information about food insecurity and assistance programs for those who are food insecure.

The third category of responses (N = 8) that shared a common theme was off-campus grocery/food assistance. Some of the responses that fell into this category were “coupons for food nearby” and “Discounts for CU students at grocery stores”. These responses often

included a request for coupons to grocery stores. Local grocery stores in Boulder range widely in price, and so it is understandable that this would be a common desire among students. For example, students that live in one of the main student areas just off campus have quite limited access to grocery stores – one of the closest, Alfalfas, is an organic grocery store with higher prices than most other grocery stores. The closest restaurants to campus can also be just above the price-point for students struggling with finances, which is why coupons to these restaurants would be desirable as well to students.

LIMITATIONS

Due to the nature of my survey dissemination, I am unsure if my data is truly representative of the CU Boulder student population. One limitation to consider is that, although the survey was equally advertised to all students, there was not an equal distribution of students who took the survey. I am suggesting that the survey could have been more intriguing to students who felt that they were struggling with food security. One of my goals was to get a variety of students on all spectrums of food security to take the survey. However, students who are food insecure could have felt that by taking the survey they were helping themselves or other students in similar situations. The prevalence of food insecurity did turn out to be quite high, even in comparison to statistics from other schools. In addition, the survey was sent out through email listservs of certain campus organizations and certain class lists. This was a more direct approach to reaching students; however, this was a more targeted method and not every student received this direct email.

RECOMMENDATIONS

On the basis of the analyses presented in this study, I conclude that the student group that CU Boulder should be targeting, if CU wishes to address food insecurity on campus, is the students that qualify for financial aid and are taking out student loans. These students were the most at risk of being food insecure. There are a few ways by which CU could go about addressing this recommendation.

One option would be to offer a support office or staff that are dedicated to supporting these students. A recent initiative started by the organization Single Stop helped to provide community colleges across the country with on-campus Single Stop offices. These offices provide free services to students to help connect them with government services that they may qualify for. The goal of Single Stop is to provide students with any opportunities for government support that will allow them to thrive and continue on to graduation. A recent analysis of Single Stop on community college campuses found that students using Single Stop were at least three percentage points more likely to move on to their second year of community college when compared to students of similar situations at colleges that did not provide the same services (Bradley 2016).

Although this program has yet to expand to four-year universities, the services that it provides could still be offered at four-year universities. If there were staff available and trained to help students in this manner, then at least the students in need would have someone to go to. Just the applications alone for SNAP can be quite intimidating, not to mention the applications for every other government program that a student may qualify for. Dedicated staff that can help students find the resources and help students fill out the proper paperwork

would be extremely helpful to students who feel overwhelmed by the process. Often times these are the students who are already stressed out about finances and academics and might not have the time to find and apply for government programs.

In order to reach our target group, student on financial aid and students who are taking out loans, CU could offer these Single Stop type services through the financial aid office. Considering most students have to interact with financial aid at some point or another during college, this office would be efficient at reaching a large mass of students, including students who might be food insecure for reasons not related to the target group. This would accomplish the goal of targeting the students in need, as found by the survey results, and students in general who would also be interested in using this service.

A second possible food assistance program would be an on-campus food pantry. CU Boulder is currently one of two schools in the entire PAC 12 that does not already have an on-campus food pantry. A proper cost-benefit analysis would need to be done in order to understand the full feasibility of this option; however, there are resources such as the College and University Food Bank Alliance, commonly known as CUFBA, that are will to give knowledge and resources to universities interested in starting a food pantry. There are currently over 300 colleges and universities nationwide that are members of CUFBA with food pantries of varying shapes and sizes. Considering the number of organizations in Boulder alone that offer food assistance services, the food pantry could actually have quite a low start-up cost. With the help of organizations such as Boulder Food Rescue and Community Food Share along with the help of the community, CU could easily obtain enough food for at least a soft opening of the food pantry. There could also be fundraisers at CU or in the community to raise awareness and funds

for the food pantry, as other universities have done in order to start their on-campus food pantries.

In order to address the solutions that many of the respondents brought up in their surveys, we would need to take a closer look into the dining services at CU Boulder. Meal plans are a set number of meals that each student receives a week regardless of how many meals the student actually eats that week. It seems extremely wasteful that, for example, a student who has 20 meals a week might only use 15 of them, allowing the last five to be wasted in a sense. Although this process does not mean that any actual food is thrown out, it is still food that has been paid for and not consumed. The major question to look at would be how the dining services decides the amount of food to prepare each day. If the dining services prepare meals based on the total number of student meal plans, then this could be leading to actual food waste in the case that every student is not using all of their meal swipes. In this case it would be wasteful financially and physically, especially when there are students who cannot afford a sufficient amount of food for themselves for the whole week. If it were possible to allow the students in need to use the meal swipes from other students, who would otherwise waste them, then this solution seems low-cost and productive. Students in need would receive food, while the food would not go to waste.

For the students who were interested in education classes and grocery assistance, these two could easily be intersected. Grocery shopping is the first step to cooking meals for yourself, and, from my personal experience, it is quite normal for college students to struggle with both. CU has already offered a few food education classes at the C4C on different topics such as cooking plant-based meals or cooking on a budget. These classes seem like the type of classes

that the survey respondents would be interested in, but it is possible that the respondents were not aware of these classes or were unable to attend them. A further analysis of these classes, such as looking at the number of attendees or opinions of the attendees, would be useful to see if CU should continue the classes as they have been, or change them completely in order for students to get the most out of them. If the classes were to be changed one suggestion would be for the classes to have two sections. The first section being how to grocery shop cheaply, with examples and price breakdowns, while the second part of the class is then how to get the most out of the groceries with recipe examples. If a further analysis of the student population finances showed that financial planning is a difficulty for many students, then the first part of the class could focus on budgeting and financial planning as well. It is also possible that offering coupons and recipes in a paper or digital format would be helpful. This would allow students to access the coupons and recipes at their leisure if they are unable to come to the classes.

Moving forward, CU should try to address what solutions would work best in order to help the students in need of food assistance. A full cost-benefit analysis of each feasible solution would need to be conducted in order to fully understand which options could work best. Considering it was not until this year that the problem had even begun to be addressed, there is still much room for research and growth on this topic. Any further research into this topic would be beneficial to CU to have a better understanding of the relationship between students and food security than just what my research could provide. One of the most important steps moving forward is educating the CU Boulder community on possible resources and options for those in need until CU can directly provide the food assistance. In the end it is

my hope that with this research and additional research and analyses, all CU students can receive the help they need to prosper and live up to their full potential.

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Appendix A – Survey Questions

Principal Investigator: Emilie Adamovic

Key Personnel: Pete Newton

Thank you for your participation!

This research will help us improve our understanding of student food security at the University of Colorado Boulder. It will give us insight to whether food insecurity is an issue for CU Boulder students, and how we can take action to improve the quality of life and education for CU Boulder students.

It is entirely your choice whether or not to participate in this survey.

If you agree to take part in this survey, you will be asked a series of questions, related to demographics and food security. The survey will likely take 3-5 minutes to answer. The researcher will have access to your responses, however, the responses will not be traceable to your email or any other form of your identity.

If you participate in this study fully, you will have the option of being entered into a prize draw to win one of two \$50 gift certificate.

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Risks associated with this study are minimal, but include the chance of emotional discomfort due to the subject content of some of questions.

-

You have the right to skip questions during the survey if you choose. You can end your participation at any time with no negative consequences.

-

Your identity will in no way be connected to the information received in the survey, or information used in the research project in its entirety.

-

If you should have questions or concerns before, during, or after your participation, please contact Emilie Adamovic at emad8093@colorado.edu or Dr. Peter Newton at peter.newton@colorado.edu.

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If you have questions regarding your rights as a participant, any concerns regarding this project or any dissatisfaction with any aspect of this study, you may report them -- confidentially, if you wish -- to the Institutional Review Board, 3100 Marine Street, Rm A15, 563 UCB, (303) 735-3702.

agree (1)

disagree (2)

Q1 What gender do you identify as?

Male (1)

Female (2)

other (3) _____

Q2 Ethnicity origin (or Race): Please specify your ethnicity

White (1)

Black or African American (2)

American Indian or Alaska Native (3)

Asian (4)

Native Hawaiian or Pacific Islander (5)

Hispanic or Latino (6)

other (7) _____

prefer not to respond (8)

Q3 Do you have children?

yes (1)

no (2)

Q4 What is your current living arrangement?

on-campus (1)

off-campus alone (2)

off-campus with roommates (3)

off-campus with parents (4)

off-campus with spouse and/or children (5)

no current arrangement (6)

other (7) _____

Q5 What academic level are you?

1st year (1)

2nd year (2)

3rd year (3)

4th year (4)

5th year (5)

graduate student (6)

Q6 What is your GPA?

0.00-1.99 (1)

2.00-2.75 (2)

2.76-3.49 (3)

3.5-4.00 (4)

Q7 Do you receive financial support through student loans or any other funding that DOES NOT require repayment?

Yes (1)

No (2)

Q8 If yes, how much in the past 12 months?

(USD) (1) _____

Not applicable (2)

Q9 Do you receive financial support through student loans or any other funding that DOES require repayment?

Yes (1)

No (2)

Q10 If yes, how much in the past 12 months?

(USD) (1) _____

Not applicable (2)

Q11 Besides being a student, do you currently hold a part-time or full-time job?

part-time under 20 hours a week (1)

part-time over 20 hours a week (2)

part-time work-study (3)

full-time (4)

no job (5)

Q12 Based on the statement "The food that (I) bought just didn't last, and (I) didn't have money to get more." In the last 12 months was this

often true (1)

sometimes true (2)

never true (3)

Q13 Based on the statement "(I) couldn't afford to eat balanced meals." In the past 12 months was this

often true (1)

sometimes true (2)

never true (3)

Q14 In the last 12 months, did (you/you or other adults in your household) ever cut the size of your meals or skip meals because there wasn't enough money for food?

yes (1)

no (2)

Q15 If yes to the above question, how often did this happen?

almost every month (1)

some months, but not every month (2)

only 1 or 2 months (3)

not applicable (4)

Q16 In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food?

yes (1)

no (2)

Q17 In the last 12 months, were you ever hungry but didn't eat because there wasn't enough money for food?

yes (1)

no (2)

Q18 If provided with on-campus food assistance in the form of free groceries, would you use this?

yes (1)

maybe (2)

no (3)

Q19 If provided with on-campus food assistance in the form of free cooked meals, would you use this?

yes (1)

Maybe (2)

No (3)

Q20 What other food assistance programs would you find useful for CU Boulder to offer to students?

Q21 Are you familiar with the SNAP program, formerly known as food stamps?

yes (1)

maybe (2)

no (3)

Q22 If you knew that you were qualified for food assistance through SNAP, would you use this?

yes (1)

Maybe (2)

No (3)

Q32 Would you like to enter your email address in order to be in the drawing to win a \$50 CU Boulder Bookstore giftcard?

yes (1) _____

no (2)

Appendix B – Responses to the Question: What other food assistance programs would you find useful for CU Boulder to offer to students?

On-Campus Free or Discounted Food Options

"Even if it's not free, groceries on campus would be really convenient if offered at a reasonable price."

"Meal swipes"

"discount meal cards/meals for student employees"

"Dining with student jobs"

"Free lunches for those who cannot afford to buy food when on campus."

"Lower cost for meals at the UMC"

"A limited amount of meal swipes per semester to use for on-campus dining"

"Free meal swipes"

"Cash at cafés for quick food during a busy scheduled day where there is no time to eat an actual meal, but I can't afford snacks to eat throughout the day"

"the option to not have a meal plan for freshman, and corresponding decrease in the financial tuition burden."

"campus money that is able to be spent at places like Subway and Papa John's at the UMC"

"Free meal swipes"

"fractional meal swipes"

"Meal plans to those will financial aid."

"Food bank"

"campus cash cards to spend at food courts"

"cheaper meal plan deal if you go in late to the CU dining services after all the food left would just be thrown away."

"Voucher program for on-campus or nearby establishments. Students who have long days on campus might struggle bringing enough food to campus for their whole day and purchasing items on campus might be beyond their budget. "

"meal plans not being required for dorm residents"

"Providing energy bars"

"A food program at a discounted price would be great!!"

"cheaper meal swipes"

"affordable meal plan"

"free fruit"

"Free meal swipes "

"Discounted C4C food"

"A free cafeteria pass to students with financial needs"

"Cheaper meal plans!!"

"Meal plans, buff cash"

"certain amount of free meal swipes per semester"

"Free take home meals that can be heated up later"

"Pantry, grocery vouchers"

"Discounted groceries"

"Lower cost meal plans"

"Cheaper meal options."

"Food during exams. Even if not free at cheaper rates"

"Less expensive dining options in the cafes, not just in main dining halls."

"Partnership with dining halls on campus"

"i think just having cheaper options for food would help a lot like under \$8 meals "

"Allow students without meal plans to use leftover meal plans/swipes."

"free meal plans"

"With all the food they throw away, they could use to give to students who really need it"

"2-3meals in dining halls/week"

"More affordable meal plans for non-freshmen"

"Meals based on their financial needs."

"Food bank"

"free or fee reduced dining hall access"

On-Campus Education

"Outreach programs for students with these problems. Many are unwilling to reach out for themselves so having a system that will give students who are known to be financially at risk will receive the necessary help and resources"

"Knowledge about food stamp programs"

"cooking Classes"

"A dinner to cook and eat in a big group once a week"

"Helping people figure out how to make cheap/healthy meals"

"Meal plans and what is good for a healthy diet"

"Nutrition classes"

"Cooking on a budget classes"

"classes about how to eat healthily on a budget"

"more comprehensive cooking classes"

"Classes on how to cook healthy and inexpensively"

"adviser for my daily meal plan"

"cooking classes/workshops to teach students how to prepare healthy meals on a budget"

"Discounts at grocery stores"

"Tips on what foods provide sufficient nutrients but are cheap and how to cook them, such as beans and lentils"

Off-Campus Grocery Assistance

"coupons for food nearby"

"Groceries"

"free food or groceries coupons"

"coupons for healthy food options in nearby grocery stores"

"Discounts/ coupons for food"

"Coupons"

"Discounts for CU students at grocery stores"

"Having some discounts for students to be able to use like King Soopers more or other grocers"