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Food Insecurity in Community College Students in the Central Valley of California

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Leah Carter

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Abstract

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MPH, RD, Loma Linda University, 1995

BS, Cal Poly San Luis Obispo, 1992

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

Many college students struggle with having enough money to pay for the costs of college and basic necessities, such as adequate food, which leads to food insecurity. Food insecurity results in a more challenging time focusing on studying and less success in school. This study addressed the lack of a profile of a food-insecure California community college student at Hiker's Community College (HCC; pseudonym) in the Central Valley of California. The purpose of this quantitative study was to determine the profile of a food-insecure student and to determine relationships between food insecurity and ethnicity, gender, being a first-generation college student, being a non-traditional student, and being a single parent at HCC by using the USDA Six-Item Short Form survey module. Maslow's humanistic theory of motivation was the theoretical framework used to guide this study on food insecurity and college students. A quantitative correlational design was used as the basis for this study. A binary logistic regression analysis was conducted, including using a stepwise approach, to analyze the data. Results showed no statistical relationships between the independent variables and food insecurity. However, the results found 59% of HCC students were food insecure, which is a high percentage of students who do not have adequate food and nutrition. Of all student respondents, 81% were first-generation students, and 75% were females. This study contributes to positive social change by informing college leaders of the high prevalence of food-insecure students, which supports the need for intervention.

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Chapter 1: Introduction to the Study

The cost of a college education has increased dramatically over the years. As a result, college students sometimes struggle with having enough money to support themselves while going to college, and students sometimes must sacrifice basic living needs such as food. Food insecurity occurs when there is unwanted reduced food intake or disrupted eating patterns (U.S. Department of Agriculture, Economic Research Service [USDA ERS], 2020). In a study of 34 colleges, 48% of students were food insecure, and a second study found 36% of students in 66 colleges were food insecure, both of which are higher than the national average of 12% of households being food insecure (Meza et al., 2019). A systematic review of food insecurity studies and college students found 32.9% of U.S. students were food insecure (Bruening et al., 2017). The consequences of food insecurity are far-reaching and can influence all aspects of a person's life. When students do not have enough food to eat, their daily lives are disrupted, academic success is lower, and their psychosocial health is impacted (Meza et al., 2019). Therefore, educational leaders must begin considering food insecurity as a component that may contribute to academic success. Studies have been conducted in recent years on food insecurity in college students in general. However, there needs to be more in-depth research on college students in different regions of the country, on different types of college students, such as community college students, and on what factors and demographic characteristics are associated with food insecurity.

The goal of this study was to develop a list of characteristics food insecure students have in common. This list of common characteristics will serve as a student

profile that may reveal which community college students may be at risk for being food insecure. Once a profile of a food-insecure student is identified, colleges can offer referrals and support services for students to help prevent them from experiencing food insecurity and the associated consequences. Helping support students' basic need for food can help promote their academic success—a goal of higher education. Higher education leaders will benefit from knowing the results of this study so they can implement change in their colleges. Chapter 1 provides an overview, purpose, and background of this study on food insecurity and community college students. The framework, nature, and scope of the study, assumptions, limitations, and significance are also described in this chapter.

Background

In the United States, food insecurity is a growing problem; one out of seven households is food insecure (Martinez et al., 2016). With so many households experiencing food insecurity and many colleges reporting a higher rate of food insecurity among college students, the University of California created the UC Global Food Initiative in 2014 to determine the scope of food insecurity within the UC campuses (Martinez et al., 2016). In 2015, the University of California's 10 campuses conducted a Student Food Access and Security Study and found that 48% of undergraduates and 25% of graduate students were food insecure, and they found a higher number of older students, first-generation students, and ethnic minorities were food insecure (UC Global Food Initiative: Food and Housing Security at the University of California, 2017).

Students who are food insecure are less successful academically because they are less able to focus on school (Martinez et al., 2016). As a result, colleges have a vested

interest in identifying and helping prevent food insecurity of students, thus helping to improve students' academic success (Frank, 2018; Henry, 2017). Colleges, students, and society will benefit from having college students who are food secure because students will be more likely to complete their academic programs. Studies show students are less likely to complete their programs of study when they are food insecure (Vasquez et al., 2019). Students will also benefit by avoiding the harmful physical and emotional stress of being food insecure. Society will benefit from having a more educated workforce and community. Since food insecurity is related to poor health outcomes, an additional benefit to society will be a healthier college student population (Martinez et al., 2019).

There is a gap in the literature regarding food insecurity in community college students and the support needed to help prevent food insecurity in at-risk students (Vasquez et al., 2019), especially for California community college students (Ilieva et al., 2019), which this study will address. More research is needed on community colleges students and food insecurity since community colleges tend to enroll more disadvantaged at-risk students, including students of color (Vasquez et al., 2019). Community colleges are affordable public higher education institutions that offer certificate and 2-year degree associate degree programs. The California community college system is the largest higher education system in the country, with an enrollment of over 2.1 million students at 115 colleges (California Community Colleges Chancellor's Office, 2020). Given the breadth of students served by California community colleges, the profile of a food-insecure California community college student must be identified, especially considering under 40% of community college students complete their program within 6 years (Mann, 2018).

Problem Statement

There is a lack of knowledge of the profile of a food-insecure community college student and the relationships between ethnicity, gender, being a first-generation college student, being a non-traditional student, being a single parent, and food insecurity in students at Hiker's Community College (HCC; pseudonym) in the Central Valley of California. Food insecurity is common among students in California, particularly among community college students and students with low incomes (Institute for College Access & Success, 2018). In the Central Valley of California, poverty rates are among the highest in the nation. According to the University of California Student Food Access and Security Study, approximately 42% of students in the University of California System are food insecure (Martinez et al., 2016). Similarly, Ortiz et al. (2019) found over half of students attending a Central Valley university were food insecure, with minorities affected at a greater rate. Rates of food insecurity are higher in the Central Valley, presumably because rates of poverty are higher. Colleges are taking steps to help address food insecurity in students; however, identifying the students most at risk remains a challenge; therefore, many students remain hungry (Institute for College Access & Success, 2018). Having basic needs met, such as enough food to eat, contributes to collegiate success because students can focus on school and complete school in a timely manner (Institute for College Access & Success, 2017). But lack of money for all costs associated with attending college, including lack of money for food, contributes to fewer students enrolling in college and graduating from college (Institute for College Access &

Success, 2018). Understanding the profile of a food-insecure student will enable leaders at HCC to identify students in need of support, which will address a gap in practice.

Purpose of the Study

The purpose of this quantitative correlational study was to determine the profile of a food-insecure community college student and any relationships between food insecurity and ethnicity, gender, being a first-generation college student, being a non-traditional student, and being a single parent at HCC in the Central Valley of California. Food security was the dependent variable, and ethnicity, gender, being a first-generation college student, being a non-traditional student, and being a single parent were all independent variables. These variables were chosen because they were each significant predictors for food insecurity in other studies, as described in the literature review. For example, Spaid and Gillet-Karam (2018) found that ethnic minorities, women, non-traditional students, and single parents had high rates of food insecurity in college students in Maryland. My study determined if these variables were predictors in community college students in the Central Valley of California, a very different location. If HCC has a profile of food-insecure students, college leaders can target supportive services to food-insecure students. Surveys were emailed to the total non-dual enrollment student population at HCC to investigate the problem in this study. By using an ordinal logistic regression test, relationships between study variables were analyzed to identify the profile of food-insecure students.

Research Question and Hypothesis

Research Question: Is food insecurity related to ethnicity, gender, being a first-generation college student, being a non-traditional student, or being a single parent in HCC students?

H_0: There is no relationship between food insecurity and ethnicity, gender, being a first-generation college student, being a non-traditional student, or being a single parent in HCC students.

H_a: There is a relationship between food insecurity and ethnicity, gender, being a first-generation college student, being a non-traditional student, or being a single parent in HCC students.

Theoretical Foundation

Abraham Maslow created a humanistic theory of human motivation in the 1970s to describe the positive potential of people (Beers, 2020). According to Maslow's theory, behavior is influenced by a hierarchy of five categories of needs: physiological, safety, belongingness, esteem, and self-actualization (Farmer, 1984; Kretchmar, 2019). These lower-order physiological needs, such as food, must be met before higher-order needs can be achieved (Kretchmar, 2019). Based on this theory, eliminating hunger can improve students' physical and emotional health and potentially their academic performance (Smith, 2018).

The humanistic theory of motivation was used as the framework of this study because meeting students' physiological needs for food and water must be met before students can move on to achieve higher-level needs on Maslow's hierarchy of needs.

Achievement, including educational attainment, is considered in Maslow's esteem category of needs and can only be met after physiological, safety, and belongingness needs are met (Kretchmar, 2019; Smith, 2018). There has been other research on food insecurity and college students, which showed that college students who were food insecure had lower grade point averages (GPAs) than students who were food secure (Raskind et al., 2019). Studies have shown the need to identify food-insecure students and for colleges to provide supportive services to help promote academic success.

Nature of the Study

To identify if relationships exist between multiple variables, researchers should use a quantitative correlational design (Curtis et al., 2016). The nature of this study was quantitative and consisted of an anonymous survey that was sent to all non-dual enrollment students at HCC in the Central Valley of California. An ordinal logistic regression model was used to analyze the data to determine if relationships existed between food insecurity and ethnicity, gender, being a first-generation college student, being a non-traditional student, and being a single parent. Results of this study can inform community college leaders. The dependent variable was food insecurity. The independent variables were ethnicity, gender, being a first-generation college student, being a non-traditional student, and being a single parent. SPSS Version 27 was used to analyze the data.

Definitions

Community college: Colleges that offer 2-year associate degree programs as well as vocational programs (EducationUSA, 2015).

Ethnicity: Defined as either Asian, Black or African American, Hispanic/Latino, Native American or other Pacific Islander, or White (Office of Civil Rights, 2003).

First-generation College Student: A student whose biological parents have not completed a 4-year degree (Center for First-Generation Student Success, 2017).

Food insecurity: Reports of reduced quality, variety, or desirability of diet (USDA ERS - Definitions of Food Security, 2020).

Food security: High food security refers to no reported indications of food-access problems or limitations (USDA ERS - Definitions of Food Security, 2020). Marginal food security refers to one or two reported indications—typically of anxiety over food sufficiency or shortage of food in the house. Little or no indication of changes in diets or food intake (USDA ERS - Definitions of Food Security, 2020). *Low food security*: reports of reduced quality, variety, or desirability of diet. Little or no indication of reduced food intake (USDA ERS - Definitions of Food Security, 2020). Very low food security refers to multiple indications of disrupted eating patterns and reduced food intake (USDA ERS - Definitions of Food Security, 2020).

Gender: Defined as either male or female (National Center for Education Statistics, 2021).

Non-traditional student: A student who begins college more than a year after high school graduation, has family and financial responsibilities, such as being a single parent, works full time, has earned a GED, or attends college part time (National Center for Education Statistics, n.d.). In this study, a non-traditional student was defined as someone 25 and older.

Single parent: A person who is raising at least one child without a partner (U.S. Census Bureau, 2021).

Assumptions

Assumptions are critical conditions in the research design that are taken for granted and out of the researcher's control (Burkholder et al., 2016). In this study, the first assumption was that students would understand the survey questions and answer the survey questions accurately and honestly. Second, I assumed that respondents were representative of the entire student population at HCC. The third and final assumption was that Maslow's human theory of motivation is fundamentally true and applies to food insecurity in college students. Further, ordinal logistic regression tests have four assumptions that must be met in order to obtain valid results: the dependent variable must be an ordinal variable, there must be at least one categorical or continuous variable, no multicollinearity can exist between two independent variables, and there should be proportional odds that each independent variable has the same impact (Udo & Akwukwuma, 2019).

Additionally, as a registered dietitian, I am biased to believe food insecurity is related to many negative physical, mental, and social outcomes. In relation to this study, I had a preconceived belief that certain ethnic groups, being a woman, being a first-generation college student, and being a single parent are all factors that can relate to food insecurity. To reduce bias, I analyzed all data objectively and did not include subjective information.

Scope and Delimitations

The scope of a study describes the population being studied; therefore, the scope frames the population the results are applicable to and helps determine the title of the study (Burkholder et al., 2016). The setting for this study was a large community college in a large Central Valley city in California. The study site was in a poor agricultural and oil-based city that has one of the highest rates of poverty in the United States. The scope of this study was to identify the profile of a food-insecure community college student in the Central Valley of California. This college was chosen based on its large student population, high poverty rate in the country (20.5% versus 11.8% nationally), and low college education completion rate of only 16% of the population having a 4-year degree or higher (U.S. Census Bureau, 2020). Having a population that is educated can improve unemployment and poverty rates in the county. There were approximately 40,000 students at this college, 10,000 of which were high school dual enrollment students who were excluded from the study.

Delimitations define the boundaries of a study in terms of what will not be included in the study (Burkholder et al., 2016). In addition, the definition of the study population and the delimitations of the study must be in alignment. The delimitations of this study included health outcomes, grades, and graduation rates of students who were food insecure. Those items were excluded because the study would have been too large with those variables included. The study also excluded high school dual enrollment students because they are generally minors living with their guardians, which could skew the results. Understanding the psychological impact of food insecurity on college students

would be useful; however, adding a qualitative component to the study would have expanded the scope and time needed to complete the research beyond what this study intended.

Limitations

Limitations are uncontrollable weaknesses in research design that can influence study findings, help to present findings in the proper context, and can influence the research quality (Ross & Bibler Zaidi, 2019). The limitations of this study included using a standardized survey instrument where further clarification on questions was not able to be provided to respondents. Survey responses were anonymous to ensure confidentiality and encourage students to respond honestly. Additionally, the survey was only given to students at one community college in California, so the responses and results are not generalizable to all California community college students, especially for college students outside of the California Central Valley. Another limitation in this study was that only community college students were included and not 4-year university students. Determining correlations between research variables does not mean one variable caused another; it merely means a relationship exists. Therefore, it is important not to assume causation from correlational research. A significant limitation to food insecurity research is the lack of knowledge about why students are food insecure. Lastly, there is a difference between food insecurity causing lack of nutrition and variety of food choices versus food insecurity that causes a lack of having enough food to eat to meet basic physiological needs. This study followed the USDA definitions and does not offer explanations as to why food insecurity existed.

Significance

Multiple researchers have identified a gap in the literature regarding the prevalence of food insecurity in community college students (Ilieva et al., 2019; Vasquez et al., 2019). This study addressed a local problem by focusing on increasing knowledge in the field about the existence of food insecurity in community college students. Educators can benefit from this research because it provides an increased understanding of the characteristics of California community college students in the Central Valley of California who are food secure. The findings contribute to positive social change by identifying the high prevalence of food insecurity in community college students in the Central Valley and by providing a profile of high-risk college students most likely to be food insecure. Education professionals can take this information on food-insecure students and design interventions to help address food insecurity for college students.

Summary

Chapter 1 introduced the problem of food insecurity in college students in a community college in the Central Valley of California. The background and history of food insecurity and college students were provided in Chapter 1. Chapter 1 also outlined the research question and hypothesis, provided the theoretical foundation and nature of the study. Additionally, definitions, assumptions, scope and delimitations, limitations, and significance were addressed in Chapter 1. The purpose of this research was to determine the profile of a food-insecure community college student in the Central Valley of California and determine any relationships that existed between food insecurity and ethnicity, gender, being a first-generation college student, being a non-traditional student,

and being a single parent. The literature review in Chapter 2 provides greater in-depth analysis of the existing literature related to food insecurity and its impact and identifies future research needs.

Chapter 2: Literature Review

It is important to identify a profile of community college students most likely to be food insecure. The purpose of this research was to provide this profile of a food-insecure community college student in the Central Valley of California as well as determine the relationships between food insecurity and ethnicity, gender, being a first-generation college student, being a non-traditional student, and being a single parent. Chapter 2 includes a comprehensive review of the literature related to food insecurity and college students.

Literature Search Strategy

I used multiple databases to ensure a comprehensive search of sources when conducting the literature review on food insecurity and college students. The databases included EBSCO, Education Source, ERIC, Google Scholar, Medline, ProQuest, PubMed, SAGE Journals, Science Direct, and the Walden Library. The journals included the *American Journal of Health Education, American Journal of Public Health, Annals of Anthropological Practice, BMC Public Health, California Agriculture, Canadian Journal of Higher Education, Education, Journal of the Academy of Nutrition and Dietetics, Journal of Behavioral and Social Sciences, Journal of College Student Development, Journal of Family and Consumer Science, Journal of Health Psychology, Journal of Hunger and Environmental Nutrition, Journal of Nutrition Education and Behavior, Nutrients, Public Health Nutrition, and the South African Journal of Clinical Nutrition.*

To find adequate resources for the literature review, I continued to expand the key terms I used in my searches over the last 4 years of researching food insecurity. The final

list of key terms used in my search included: *academic success*, *community college*, *college student*, *ethnicity*, *first-generation college student*, *food insecurity*, *gender*, *higher education*, *hunger*, *lack of food*, *minority*, *single parent*, and *student success*. No date limits were used during my searches because of the need to ensure seminal works were included. In my final research, only peer-reviewed research under 5 years old was included, with the exception of seminal works. One technique used to identify additional sources was to review the bibliographies of each research article for relevant sources that could be included. After an exhaustive literature search and analysis, a comprehensive review of the literature on food insecurity and college students was conducted. The sources were sorted by topic, study variables, type of college student, and location in the United States. Each source was thoroughly evaluated before being included in the literature review.

Theoretical Foundation

Maslow was a psychologist who turned his observations of famous people into a theory widely used in education and social science fields (Mason, 2016). In the 1970s, Maslow developed the humanistic theory of human motivation to explain positive potential (Beers, 2020). Maslow believed a hierarchy of five categories of needs influences human behavior (Kretchmar, 2019). The five categories of needs include physiological, safety, belongingness, esteem, and self-actualization (Farmer, 1984). Maslow's humanistic theory of human motivation is based on the need to have the most basic human needs met before higher-level needs of belongingness, esteem, and self-actualization can be achieved (Kretchmar, 2019). The most basic physiological needs are

for food and water, which must be satisfied before people will be motivated or interested in satisfying any other needs and fulfill their potential (Maslow, 1943; Gialamas et al., 2017; Sarici Bulut, 2018). For example, if someone is chronically hungry, they cannot focus on anything but food, and this hunger drive not only changes their current view of their priorities, but it changes the way they look at the future because all that matters to them is having enough food to eat (Maslow, 1943). Experiencing hunger can even influence their sense of belonging, self-esteem, and ability to connect to people (Mason, 2016). Hunger can also contribute to the stressful and draining feeling of being overwhelmed and in survival mode (Gialamas et al., 2017). If the need for food (and shelter) is satisfied, the hungry person can begin having higher-level social goals, including education, which fulfills the desire to know and understand (Maslow, 1943). Without meeting basic physiological needs, functioning at an optimal level is challenging, and progressing up the hierarchy of needs toward self-actualization is difficult (Mason, 2016; Mcleod, 2020).

Based on Maslow's theory, students who experience food insecurity cannot focus on school and do not perform as well academically (Smith, 2018). According to Maslow's theory, education would be in the esteem category and cannot be met until physiological needs have been met. Considering a holistic approach to education can help improve student outcomes by ensuring students are not hungry (Mcleod, 2020). Lack of food can impact students' psychological health and well-being, which may negatively affect their academic achievement. Furthermore, food-insecure students may be embarrassed to ask for help; therefore, they do not seek available support resources.

Results have shown that almost half of the South African students surveyed preferred to go hungry instead of disclosing their lack of resources, and they would rather go hungry than receive food aid (Sabi et al., 2019). For this reason, many schools offer help to food resources to all students instead of singling out food-insecure students. These same South African students reported they missed classes or could not concentrate in class due to hunger, which led to a lack of focus, missed classes, and lack of participation in academic activities; therefore, students did not live up to their potential academically (Sabi et al., 2019). This is an illustration of the importance of satisfying basic needs as described by Maslow. Students cannot be expected to achieve academic success if they lack the basic necessity of food.

Using Maslow's hierarchy of needs as the framework for this study on food insecurity fits with the existing research on food insecurity that identifies basic needs as paramount before success in higher education can be achieved. Sabi et al. (2019) used Maslow's hierarchy of needs and Piaget's theory of cognitive learning as the construct for their study. Piaget's theory of cognitive learning states that teachers do not give knowledge; instead, learners construct knowledge depending on internal and external factors, such as physiological well-being and motivation (Berkeley Graduate Division, n.d.). Since many students have external factors that prevent them from having enough adequate food to eat, learning becomes secondary. Without the feeling of having physiological needs met, students will not be able to move to higher levels of achievement, nor will they have satisfaction until their basic needs are met (Mason, 2016). Raskind et al. (2019) also conducted a study using Maslow's hierarchy of needs to

determine if psychosocial health mediates a relationship between the GPA of college students in Georgia and food insecurity. Results showed food insecurity impacted academic performance and, therefore, student success. Therefore, Maslow's hierarchy of needs supported this study in determining a profile of food-insecure community college students in order to encourage student support for achieving food security, which can help improve academic success by allowing students to move past the physiological need for food and consider higher-level goals.

Literature Review Related to Key Concepts and Variables

Food Insecurity Defined

Food security occurs when there is not enough food to eat on a daily basis to live a healthy life. Food insecurity occurs when a household does not have enough food for each person to eat because of a lack of money or resources (USDA ERS, 2020). There are different levels of food insecurity. The USDA ERS (2020) categorizes food security and insecurity in four categories:

1. High food security: no reported indications of food-access problems or limitations.
2. Marginal food security: one or two reported indications—typically of anxiety over food sufficiency or shortage of food in the house. Little or no indication of changes in diets or food intake.
3. Low food security: reports of reduced quality, variety, or desirability of diet. Little or no indication of reduced food intake.

4. Very low food security: multiple indicators of disrupted eating patterns and reduced food intake. This is the most significant type of food insecurity and can have detrimental effects both physically and mentally. Hunger results from very low food security. Hunger is physiological condition that results from food insecurity and results in discomfort, weakness, illness, or pain.

Prevalence of Food Insecurity

In 2019, approximately 10.5% of households were food insecure, and 4.1% of households were very food insecure (Coleman-Jensen et al., 2020). The very food insecure households had at least one person who did not have enough food to eat due to a lack of resources. As another indicator of the prevalence of the need for food support, approximately 25% of Americans participate in one or more USDA food and nutrition assistance programs during any given year (USDA ERS, 2019). In California, 21% of K-12 students are food insecure (Smith, 2018). Given the high rate of household and K-12 student food insecurity in the United States, the likelihood of college students being food insecure is high due to their limited incomes and increased expenses of school and living.

Multiple studies have shown high rates of college students who are food insecure. In a study of students at eight universities in the United States, 19% of students experienced food insecurity, and an additional 25.3% of students were at risk of becoming food insecure with ethnic minorities, living off-campus, having parents who did not attend college, receiving a Pell grant, and not participating in a meal plan as commonalities of being a food-insecure student (El Zein et al., 2019). Further studies identified a food insecurity rate of 20%–50% of college students, which is higher than the

overall food insecurity rate of 14.6% in the United States (Freudenberg et al., 2019). Data from four surveys of over 30,000 2- and 4-year college students from 121 colleges in 26 states also indicated that 57%–67% of college students experienced some level of food insecurity, and for community college students, 11%–38% experienced very low food security with hunger (Broton & Goldrick-Rab, 2018). In 2016, due to the high cost of college and higher debt, 56% of community college students and 25% of 4-year college students were food insecure (Que & Baldridge, 2019). Research in 12 states with eight community colleges and 26 4-year colleges also showed that 48% of student respondents had experienced food insecurity in the 30 days before the survey; and ethnic students, as well as first-generation students, were more likely to be food insecure, and 56% of food-insecure students had a paid job, with 38% of them working at least 20 hours per week, and 75% of food-insecure students were receiving financial aid (Cady et al., 2016).

The highest rates of food insecurity have been reported among California community college students (Goldrick-Rab et al., 2017). Research has found that 58% of California community college students were food insecure (O'Neill, 2018). Out of the California State University's 27,805 students who completed the California State University Phase 2 survey, 41.6% were food insecure, despite working an average of 13.8 hours per week (California State University, 2019).

More recent research in 2020 suggested that out of the 469 colleges who responded, the colleges believed up to 80% of students were food insecure, and 86% of the colleges believed food insecurity was related to the reason students were not completing their degrees (Goldrick-Rab, 2020). Additionally, part-time students had a

food insecurity rate 11% higher than full-time students, and the longer students were in college, the higher the rate of food insecurity (Baker-Smith et al., 2020). The Hope Center conducted its fifth annual Real College Survey in the Fall 2019 semester at 227 colleges across the United States and had 167,000 student responses. The results showed, in the previous 30 days, 39% of students experienced food insecurity (Baker-Smith et al., 2020). Results from surveys from 2015–2019, which includes 411 colleges and over 330,000 students, also showed that 33%–48% of 4-year college students and 42%–56% of 2-year college students were food insecure (Baker-Smith et al., 2020). In 2019, the Government Accountability Office (GAO) conducted a review of 31studies that were completed on food insecurity in college students and determined that 2 million students would have qualified for the SNAP but did not receive benefits in 2016. Federal student aid is not enough to pay for all college expenses, creating more low-income students, and low-income students are more likely to have an additional risk factor for being food insecure, such as being a single parent or a first-generation student (U.S. GAO, 2019).

Consequences of Food Insecurity

Experiencing food insecurity leads to a multitude of problems, including academic failure, because it is hard to focus on education when people are physically hungry (Meza et al., 2019). First-year students have done worse academically if they were food insecure, regardless of their background, and they had more stress and anxiety, less money for everything, less time because of possibly working, and inadequate access to required school materials as well as computer and internet access to complete the assigned work (Woerden et al., 2019). Based on a study of California students, the

average GPA for food-insecure students was 3.17 compared to 3.32 for food secure students (California State University, 2019).

Despite these links between food insecurity and academic performance, it is often not recognized as a reason for lack of academic success. Students have felt that it was the college's responsibility to help ensure students had enough food to eat, and they felt frustrated and angry at their college for not supporting their need for food, which resulted in their lack of mental energy and lack of focus on school as well as their physical pain of hunger (Meza et al., 2019). For students to be successful in college, they need to have their basic physiological needs for food, water, rest, and health are met before they can focus on school or other priorities higher up on Maslow's hierarchy, which is why colleges should provide support for students' basic needs. Short-term and long-term solutions, such as increasing Pell grants, creating more on and off-campus jobs for students, providing meal plan subsidies, and teaching food education must be identified to prevent food insecurity in college students (El Zein et al., 2019).

The rising cost of college contributes to almost half of food-insecure college students that have student debt (Shipley & Christopher, 2018). Most students who experience food insecurity work at least part-time jobs, and 75% receive financial aid of some sort, but the cost of college has increased 439% between the 1980s and 2010, and consumer paychecks have not kept pace with that level of inflation thus contributing to food insecurity (Shipley & Christopher, 2018). Five trends that contribute to food insecurity among college students include the growing number of students who are financially challenged, the increasing cost of college, Pell grants pay for less of a

percentage of the educational cost (60% of community college costs compared to 100% in the past), more difficult to pay for college by working, and colleges have less money for student support (Freudenberg et al., 2019). As a result of the increasing costs of college, students are challenged to have enough money to pay for college and pay for their basic living expenses (Nazmi et al., 2019). About 26% of community college students who were food insecure earned incomes that were 85% higher than the poverty line (Goldrick-Rab et al., 2017). Students typically have a limited budget that must go toward housing, tuition, other living expenses, and food, thus leaving limited funds for adequate food, and first-year college students are often in charge of their own budget for the first time, which creates additional chances of becoming food insecure due to lack of experience managing money and shopping for food.

The most significant predictor of being food insecure in college is struggling for adequate nutrition before college and students' mental health. If students did not have adequate nutrition before college, they likely came from a food-insecure home, which increases the likelihood of being food insecure in college. However, even if college students were not food insecure before college, they can still be food insecure as college students, as evidenced by the prevalence of food insecurity in all U.S. households being 11.1% in 2015 compared to 43.5% of U.S. college students being food insecure, as identified in a systematic review of food insecurity in U.S. college students (Nazmi et al., 2019). A study done on University of California students found 57% of students were not food insecure when they lived at home as a child (Downing, 2017). In other words, 32.4% of U.S. college students were food insecure in college, but not in childhood;

therefore, just because students have enough food to eat before college does not mean they will have enough food to eat when in college. College students are adults; therefore, they are expected to support themselves with limited or no support. This illustrates the need to determine the profile of a food-insecure college student rather than assuming if a student were not food insecure in youth, they would not be food insecure as an adult college student.

Henry (2017) studied the impacts of food insecurity on college students at the University of Northern Texas and found food insecurity was associated with poor grades, poor concentration, lack of energy, and limited participation in outside-of-class activities, such as exercise and school functions. With students having poor grades because of food insecurity, they are less likely to meet their educational goals and more likely to have limited social experiences, which negatively impacts the overall collegiate experience and negatively impacts the mental health of students. Regardless, if the consequences of food insecurity are a nutrient deficiency or stress resulting from lack of money, food insecurity can affect students' ability to continue schooling (Cady et al., 2016).

Bruening et al. (2017) conducted a systematic review of studies conducted on college students and food insecurity and found that 32.9% of college students experienced food insecurity. Students who are food insecure have a hard time concentrating on school (Ilieva et al., 2019). Not only does food insecurity impact academic success, but it also increases rates of depression and decreases the chance of eating breakfast, consuming home-cooked meals, and receiving food from parents (Bruening et al., 2016). Additionally, students in the ten University of California

campuses who were food insecure had higher BMI levels and worse health because of fewer days of adequate sleep, lack of exercise, and low fruit and vegetable intake, which all lead to a high BMI and poor health (Martinez et al., 2019). The impacts of food insecurity clearly go beyond academic success. Experiencing food insecurity during college and the poor health behaviors and dietary habits learned during this time can last for a lifetime and increase the chance of chronic diseases and poor nutritional status. El Zein et al. (2019) found that students who had GPAs under 3.0 were twice as likely to be food insecure, showing that food-insecure students may perform worse in school due to the impacts of lack of food, which may result in anxiety, lack of sleep, fatigue, weakness, and disordered eating; therefore, policies and programs must be put in place to screen for students at risk for food insecurity to promote a healthier environment. Food insecurity is associated with obesity, diabetes, depression, poor nutrient intake, and poor self-reported health, as well as poor academic outcomes, such as lower GPAs and higher drop-out rates (Freudenberg et al., 2019). In rural Nova Scotia, Frank (2018) found that 38% of students were food insecure, and associations were revealed between food insecurity and living arrangements, money for school and food, poor overall health, poor mental health, high stress, and poor academic performance. These outcomes affect multiple areas of student lives and can have long-term consequences. Students who were food insecure had lower academic success and had worse health outcomes (Bruening et al., 2017; Maynard et al., 2018; O'Neill & Maguire, 2017). Since lifestyle habits are established when young, being food insecure can lead to continued poor lifestyle behaviors, which sets students up for a lifetime of poor health outcomes, both mentally and physically. Meza et al. (2019)

investigated how food insecurity impacts students at a large public university in California by conducting interviews with food-insecure students. Food insecurity affected student relationships; gave feelings of hopelessness and undeserving of help, frustration with the college for not helping enough, and impacted their academic performance because they were hungry and mentally unfocused. Besides being less likely to complete courses and degrees, there are also lasting physical and mental effects of food insecurity in college students (Que & Baldridge, 2019). Given the high rate of food insecurity in California Community College students, food-insecure students must be identified so resources can be given to food-insecure students.

Supporting Student Needs

The amount of financial aid debt, exogenous financial shock, and use of food assistance programs were related to food insecurity; therefore, basic skills training and education are needed to help minimize food insecurity in college students living off-campus (Knol et al., 2018). Colleges should identify resources to help support students' need for access to adequate food intake. Sometimes resources are available, but students are not aware of the resources or are too embarrassed to access the resources. Sharing information through social networks and education campaigns is vital to increase awareness, acceptance, and utilization of available food resources for students (Ortiz et al., 2019). Students at UCLA reported their food needs were not met from the UCLA food environment, and they wanted more financial and food literacy life skills, which could help address food insecurity (Watson et al., 2017). Teaching students how to cook foods at home and how to shop smartly can help decrease food insecurity. Both short-

term and long-term solutions must be identified to help support students' basic needs to increase the chances of student learning and student success (Nazmi et al., 2019). I conducted an assessment with this study to determine the prevalence of food insecurity at HCC. Policy changes should happen at local, state, and federal levels to include college students in the list of eligibility criteria for services (O'Neill & Maguire, 2017). Some colleges have set up food pantries, outreach and education programs, and campus food vouchers with the help of student advocates who conduct outreach and education to students on food insecurity (Freudenberg et al., 2019). Woerden et al. (2019) calculated the lost revenue from students dropping out of school was 50 million dollars per year; therefore, figuring out strategies to support food insecure students will increase the finances of colleges since food-insecure students are more likely to drop out of school.

Fisher and Crawford (2020) described a school that went from a school in crisis to a distinguished school because of their focus on students' physiological needs, which showed students school staff cared about them personally, and then the staff was able to focus on each of the other steps in Maslow's Hierarchy. This study was not performed at a higher education institution, but the outcomes are likely to be the same. Using Maslow's Hierarchy of Needs as a supporting theoretical framework, Tichy (2017) studied a charter school to help determine how schools can help support at-risk students so students can progress up Maslow's Hierarchy of Needs. Until society focuses on how to grow students and offer protective factors, Maslow believed students could not progress up his Hierarchy (Tichy, 2017). Therefore, supporting students' basic needs can lead to improved educational outcomes.

A USDA-funded health promotion study, Get FRUVED, consisted of data from participants from eight U.S. universities in eight states. The data indicated that to improve the academic performance and health of students, colleges should screen for food insecurity and implement programs to encourage a healthy college experience (El Zein et al., 2019). To make college more affordable for students and to equalize the college experience for all, a comprehensive assessment of the costs and funding of college should be conducted along with initiating federal efforts to combat food insecurity in college students (Nazmi et al., 2019).

Students attending community colleges typically have greater support needs than students attending other types of schools; however, community colleges generally offer fewer food assistance resources to students (Goldrick-Rab, 2018). Students attending community colleges have not been studied in-depth, possibly because the cost of attending a community college is cheaper; however, community college students are highly food insecure, even though they receive financial aid and tend to work at least part-time (Broton & Goldrick-Rab, 2018). Instead of considering supporting students' basic needs a social support initiative, administrators should consider the effort a push to increase student success (Goldrick-Rab, 2018). One strategy community colleges have implemented to increase student success is the guided pathway structured model of offering specific program pathways for students to help with motivation and real-world applicability (Mann, 2018). Food is considered a level 1 physiological need, which must be met before students can move to the next level of safety of having a secure job, and then to level 3 of love and belonging, which can include the desire for a better job or

higher level of knowledge; this is where education comes in on Maslow's Hierarchy of Needs, and level 4 is the esteem category, which is where accomplishing a goal of completing a degree fits (Schulte, 2018).

There are many actions schools can take to provide support for students by doing simple things, such as offering a listing of currently available resources and providing referrals for students. Prior to 2011, there were only two studies done on food insecurity in college students; therefore, colleges were not aware of the basic needs of their students (Goldrick-Rab et al., 2017). With the cost of education and the costs for basic needs increasing more than ever, food insecurity is a more significant issue than ever before and must be dealt with to further student success and to support the Precautionary Principle that says health professionals must take action when there is enough compelling evidence of the health benefit of taking action (Freudenberg et al., 2019). According to the Hope Center report, colleges must change their thinking about basic needs security and begin engaging with the community and private organizations, as well as governmental programs to help prevent students from experiencing basic needs insecurity so that students can focus on learning, which can ultimately increase completion rates (Baker-Smith et al., 2020). College leaders and community members must take responsibility for ensuring that lack of food is not a reason students do not complete college (Que & Baldridge, 2019). Cady et al. (2016) suggested colleges have food pantries, food recovery programs, meal donations, help increase access to benefits, such as SNAP, and create community gardens and farmers' markets on campus.

USDA Six-Item Short Form Survey Tool

The USDA Six-Item Short Form Survey is a standardized survey instrument used to identify and measure food insecurity in households. This tool is widely accepted and utilized in food insecurity studies. According to a systematic review of food insecurity in U.S. college students, there were eight studies that met inclusion criteria and were included in the study; six of those eight studies used the USDA Six-Item Short Form Food Security Survey (Nazmi et al., 2019). The advantage of using this Short Form is students are more likely to understand the questions and complete the survey. The downside of using this survey tool is that the survey instrument has not been validated for use with college students. However, this is the most valid and commonly used tool that currently exists.

First-Generation Students

A first-generation college student is one who is the first person in his family to attend college or is a student whose biological parents have not completed a 4-year degree (Center for First-Generation Student Success, 2017). Given the variance in definitions, when comparing data on first-generation students, it is important to understand how first-generation students were defined in each study. An additional challenge for first-generation students is the potential lack of cultural capacity for attending college (Center for First-Generation Student Success, 2017). Being a first-generation college student does not mean a student is poor, just as being poor does not automatically mean a student is a first-generation student; however, many poor students are first-generation college students (Goward, 2018). This is an important distinction

since most studies classify all first-generation students in the same way. If first-generation students have adequate support and resources, they are more likely to graduate even though they are first-generation students. First-generation students are less likely to graduate, and if poverty is also an issue for first-generation students, the success rate is even lower (Goward, 2018). The highest rate of food insecurity was 65.9% of Black students who were also first-generation students (California State University, 2019).

Among community college students in the U.S., 29% are first-generation college students (Center for First-Generation Student Success, 2020). Camelo and Elliott (2019) studied academic achievement and food security at a public university in the U.S. and found first-generation college students, Black students, and Hispanic students were more likely to be food insecure and have lower GPAs. Since community colleges have a greater number of minority students and first-generation students, community colleges are more likely to have a high number of food-insecure students. Many community college students do not complete their programs of study or earn a degree which is a problem for society, the economy, and employers in need of a trained workforce. Davidson and Morrell (2020) found 25% of their study participants at a northeast university to be food insecure, with first-generation students and those receiving financial aid most likely to be food insecure. These are students who have a high need for support.

Single Parents

A single parent is someone who is raising at least one child without a partner. In community colleges in the U.S., 15% of all students are single parents (Center for First-Generation Student Success, 2020). Spaid and Gillet-Karam (2018) conducted a mixed-

methods study on community college students in Maryland to investigate food insecurity and the relationship to concentration levels and energy as determinants of student success. Women, single parents, and minority women were more likely to experience food insecurity. According to Spaid and Gillet-Karam (2018), multiple studies have found women, especially minority women and single parents, were more likely to be food insecure.

Since there was no national survey or effort to determine the level of basic needs insecurity in college students, the Hope Center coordinated a survey of community college students to figure out students' basic needs security. The results were included in a Report titled Hungry to Learn and had results from 33,000 students from 70 different community colleges throughout 24 states. The results of those surveys showed almost 67% of these 33,000 racially and economically diverse community college students were food insecure, with 33% of the students being highly food insecure, predominantly minority students, and 63% of single parents were food insecure (Goldrick-Rab et al., 2017). The Hope Center survey results found a 16% higher rate of food insecurity in parenting students and a 23% higher rate of food insecurity in students who had been in foster care (Baker-Smith et al., 2020).

Ethnicity and Gender

Of all Hispanic undergraduate students in the U.S., 56% are enrolled in community colleges, and 44% of Black students are enrolled in community colleges, plus community college students are more likely to be low-income (Ilieva et al., 2019). Some geographic areas have community colleges with even higher percentages of minority

enrollment. Martinez et al. (2018) studied the prevalence of food insecurity and associated risk factors; age, ethnicity, childhood food insecurity, and receiving financial aid, and found students who were food insecure had higher rates of difficulty concentrating, lower academic performance, and had a lack of money to purchase food, especially healthful food. Ilieva et al. (2019) surveyed minority students at a Hispanic Serving Community College in New York and found 74% of students had very low food security, and 26% had low food security; however, very few students used food assistance, and only 20% of students even knew there were resources on campus to help with food insecurity. As a result of being food insecure, students were not as able to focus on school and were less likely to complete their degrees (Ilieva et al., 2019). According to Payne-Sturges et al. (2018), African Americans who were housing insecure were more likely to be food insecure, increasing concerns about student success. Broton et al., (2018) found students who were food insecure as children had a 40% chance of being food insecure as college students, and 35% of racial/ethnic minorities experienced food insecurity.

Black households experienced a 21.2% rate of food insecurity, and Hispanic households had a 16.2% rate, while the national average of household food insecurity was 11.1%. Students of color had higher rates of food insecurity (Bruening et al., 2017). Men of color are more likely to experience food insecurity, especially if they have children, because oftentimes, the men will ensure their kids have enough to eat before they will eat (Vasquez et al., 2019). This practice can hinder academic success for men of color. Public colleges show a graduation rate of 37.5% for Black men, regardless of their

income level (Goward, 2018). According to the Hope Center's Real College survey in 2019, 54% of Black students, 47% of Hispanic or Latinx students, and 60% of Indigenous students were food insecure in comparison to 36% of white students; with females, non-binary, and transgender people experiencing more food insecurity at much higher rates than males; and gay, lesbian, or bisexuals had a higher rate of food insecurity than heterosexuals (Baker-Smith et al., 2020).

In households with children headed by a single woman, 27.8% of those households were food insecure in 2015 compared to 15.9% of households with children headed by a single man and compared to the national average of 11.1% of households experiencing food insecurity (USDA ERS, 2019). In addition, women living alone experienced a food insecurity rate of 14.2% compared to 12.5% of men living alone. Food insecurity in college students will follow the same pattern.

Racial and sexual undergraduate minority students experienced food insecurity at a higher rate, as did undergraduate students whose families were lacking in money and students who did not have secure housing (Willis, 2019). A national basic needs security survey was given to college students at 123 two- and 4-year colleges in the U.S. Students at 2-year colleges had higher rates of food insecurity as did African Americans, LGBTQ students, veterans, former foster youth, and convicted criminals (Goldrick-Rab et al., 2017). Because being poor impacts food security, student success is also affected. Goward (2018) suggests including social class as one of the diversity initiatives at colleges since poverty can impact many variables associated with student success.

Non-Traditional Students

A non-traditional student is a student outside of the typical 18-24-year-old age fresh out of high school. According to the National Center for Education Statistics (n.d.), a non-traditional student meets any of the following criteria: is enrolled in college on a part-time basis, does not start college immediately after high school, works full-time, is self-supportive financially, has at least one child, is a single parent, or does not have a high school diploma. Non-traditional students tend to be ethnic minorities, women, and students with parents who have less education than parents of traditional students (National Center for Education Statistics, n.d.). One characteristic of a non-traditional student is one who works while attending school. In community colleges throughout the US, 62% of all full-time students work, and 72% of all part-time students work while attending school (Center for First-Generation Student Success, 2020). A study of college students and their basic needs insecurity was conducted and found one-third of the students who were food insecure worked and received financial aid (Goldrick-Rab et al., 2017). When students must work while going to school, they will have less time to focus on school, thus could be less successful academically. Students who attend community colleges are more likely to be racially and economically disadvantaged and are more likely to need financial assistance. The results of a national survey of college students revealed students over age 25 were more likely to experience food insecurity (Goldrick-Rab et al., 2017).

In the fall of 2017, Spaid and Gillet-Karam (2018) surveyed over 200 Maryland Community College students on food insecurity and student success and found more

women than men experienced food insecurity; especially minority women, women over 20, and women who received Pell Grants, plus they found more of the food insecure students were single parents. Receiving Pell Grants or federal financial aid is not the only indicator of food insecurity for anyone, nor is receiving a grant a complete solution to food insecurity. Many food-insecure college students receive financial aid but do not receive public assistance, such as SNAP or cash aid (Broton et al., 2018).

Summary and Conclusions

Food is a basic physiological need, and in the absence of this basic need, it becomes difficult to focus on meeting higher levels of needs. Those of color, women, single parents, first-generation college students, and non-traditional students are more likely to be food insecure. Food insecurity creates a roadblock for community college students to be able to complete their degrees (Goldrick-Rab et al., 2017). Lack of food is a problem that must be addressed before food insecure students will be able to focus their energy on obtaining a higher education degree. And before food insecurity on college students can be addressed, the prevalence of food insecurity and the profile of a food-insecure student must be identified. Figuring out the profile of a food-insecure student will enable colleges to provide referrals and resources to students at risk of being food insecure, and colleges can advocate for policy changes regarding the affordability of college (Payne-Sturges et al., 2018).

Community College students in the Central Valley of California must be surveyed to figure out the profile of a food-insecure student. Once surveys are analyzed, a profile of those most likely to be food insecure will be determined, which will address the gap in

knowledge, and then the college can create a network of support for these students. With greater support, food-insecure students will have the resources they need to prevent hunger. If fewer students are food insecure, more students will be able to achieve a higher level of needs, including focusing on a higher education degree.

Chapter 3: Research Method

The purpose of this quantitative study was to determine the profile of a food-insecure college student in the Central Valley of California and to determine whether relationships existed between food insecurity and ethnicity, gender, being a first-generation college student, being a non-traditional student, and being a single parent in students at HCC in the Central Valley of California. In this chapter, I describe the method used to collect data, the design and approach of the study, the survey instrument used, method of sampling, target population, statistical tests, and the variables that were studied. Self-reported rates of food insecurity were used and measured from the results of the USDA Six-Item Short Form (USDA ERS, 2012). The results of this study provide data for community colleges to be aware of the prevalence of food insecurity and to know students at risk for food insecurity. Currently, there is limited data on the profile of food insecure community college students in the Central Valley.

Research Design and Rationale

The research design of this study was a quantitative correlational design. A quantitative design was chosen because I tested for relationships between variables in my hypotheses, and the resulting data were analyzed statistically (Burkholder et al., 2016). As part of quantitative research, correlational designs are commonly used when identifying relationships between variables (Burkholder et al., 2016). The dependent ordinal variable was food insecurity, and the independent categorical variables were ethnicity, gender, being a first-generation college student, being a non-traditional student,

and being a single parent. There were not any time or resource constraints with this quantitative correlational research design.

By figuring out the characteristics of students who are likely to be food insecure, colleges will have data that can be used to proactively identify students who may be at risk for food insecurity. Colleges can use this data to target at-risk students by providing needed support for students' basic needs. By supporting students' basic needs, colleges will ultimately be supporting student success because students can focus on school instead of where they will get their next meal. The results of this research can advance knowledge in the field of education and student success, as well as advance public health knowledge of the impacts of food insecurity going beyond physical and mental health issues.

Methodology

Population

The study was conducted with community college students at HCC, found in a large agriculture city in the Central Valley of California. HCC has a student population of approximately 40,000 students, of which 10,000 are high school dual enrollment students. Dual enrollment students are students who attend college and high school at the same time. Since dual enrollment students are minors and more likely to be supported by their parents, they were excluded from this study. The target population consisted of the remaining 30,000 students at HCC.

Sampling and Sampling Procedures

The target population of this study included 30,000 non-dual enrollment HCC students. A total population sampling technique was utilized to survey the large student population at HCC. Total population sampling is a sampling technique used when a research design calls for selecting an entire group that has something in common (Burkholder et al., 2016).

Students at HCC received an email explaining the purpose and benefit of the study, and they were asked to complete the anonymous survey. Student names were not collected in this research. The survey was conducted at one point in time and did not involve an experiment, intervention, or follow-up. The survey questions consisted of demographic questions and questions on food security. To determine food insecurity levels, the USDA Six-Item Short Form questions were asked (USDA ERS, 2012). Some questions had multiple answers to choose from, and some questions had dichotomous yes/no answers. The survey was sent to all 30,000 non-dual enrollment students at HCC.

A G*Power analysis states the number of participants needed to make sure survey results are genuinely due to the results and not due to a sample size being too small (Faul et al., 2007). I conducted a priori G*Power analysis for a two-tailed regression with a power of 0.8, an alpha of 0.05, and a medium effect size, which indicated a needed sample size of 250 participants minimum. This study used all 318 valid student responses from the spring 2020 semester, even though the Priori G*Power analysis said only 250 respondents were required.

Procedures for Recruitment, Participation, and Data Collection

An anonymous survey was emailed to students from the student email listserv at HCC. Students received an email request asking them to complete the survey. The emailed survey began with an informed consent statement which students had to agree to before they were allowed to begin the survey. The following demographic data were asked on the survey: ethnicity, gender, first-generation college student, non-traditional student, and single-parent status. Students were also asked six questions on their level of food insecurity. The answers to the survey questions were collected electronically through SurveyMonkey's confidential system. Once students completed the survey, they received a notification they completed their expectations for the study, and no further work was needed. After 1 week, the 250 required responses had not been received, so students received a second email asking them to complete the survey. There was no intervention, experiment, or treatment included in this study, nor were archival data used in this study.

Instrumentation and Operationalization of Constructs

In a review of 31 studies, the U.S. GAO (2019) found that being a first-generation student increased the likelihood of being food insecure, as did being low income, being a single parent, receiving SNAP, having a disability, being a former foster youth, and being homeless. Women, minority women, and women over 20 years of age, even though these women were more likely to receive a Pell Grant, were most likely to be food insecure in the 16 community colleges that were studied (Spaid & Gillet-Karam, 2018). The results of the Real College Survey of 33,000 students at 411 colleges across the U.S. showed that

racial/ethnic minorities are more likely to be food and housing insecure (Baker-Smith et al., 2020; Broton et al., 2018; Bruening et al., 2017; Spaid & Gillet-Karam, 2018; Willis, 2019). Non-traditional students, students who are over 25 years of age, as well as women and minorities, are more likely to receive a Pell Grant, and receiving a Pell Grant makes it more likely students will be food insecure (Goldrick-Rab et al., 2017; Spaid & Gillet-Karam, 2018). As a result of ethnicity, gender, being a first-generation college student, being a non-traditional student, and being a single parent being risk factors for being food insecure in other studies, they are the variables that were evaluated in this study.

The standardized USDA Six-Item Short Form Survey instrument was created by the National Center for Health Statistics and Abt Associates, Inc. The USDA survey was utilized to assess the level of food insecurity in HCC students (USDA ERS, 2012). This tool is a subset of the USDA 18-Item Form that was created by the USDA in 1995 and last revised in 2012. The Six-Item Short Form is considered an acceptable substitute for the 18-item form and has the advantage of lowered respondent burden (USDA ERS, 2012). The limitations of this tool include being less precise than the 18-item tool and does not identify the worst levels of food insecurity (USDA ERS, 2012). However, in the general population, the short form was shown to correctly identify 99% of food insecurity in households without children and 97.7% in households with children (Blumberg et al., 1999). The USDA publishes this survey tool on its website and allows for free use without permission needed. This form is a highly utilized tool to assess food insecurity in college students because of its simplicity. There have been six other studies on food insecurity in college students that have used the USDA Six-Item Short Form Food

Security Survey and tested the reliability and validity of the tool (Nazmi et al., 2019). The survey questions and operational measures are listed below in Table 1.

Table 1

Description of Operations Measures for Questions

Dependent Variables	USDA Six-Item Food Security Survey Questions	Response Category	Response Code	Type of Variable
Food insecurity	Q1: The food that I bought just didn't last, and I didn't have money to get more." Was that often, sometimes, or never true for you in the last 30 days?	-Often true -Sometimes true -Never true -DK	Yes = 1 Yes = 1 No = 0 No = 0	Ordinal with three groups
	Q2: I couldn't afford to eat balanced meals." Was that often, sometimes, or never true for you in the last 30 days?	-Often true -Sometimes true -Never true -DK	Yes = 1 Yes = 1 No = 0 No = 0	
	Q3: In the last 30 days, did you ever cut the size of your meals or skip meals because there was not enough money for food?	-Yes -No	Yes = 1 No = 0	
	Q3A: If yes to Q3 above, in the last 30 days, how many days did this happen?	____ Days -DK	≥3 = 1 <3 = 0 No = 0	
	Q4: In the last 30 days, did you ever eat less than you felt you should because there was not enough money for food?	-Yes -No -DK	Yes = 1 No = 0 No = 0	
	Q5: In the last 30 days, were you ever hungry but did not eat because there was not enough money for food?	-Yes -No -DK	Yes = 1 No = 0 DK = 0	
Ethnicity	What is your ethnicity?	-Asian -Black or African American -Hispanic/Latino -Native American or other Pacific Islander -White -Unknown	1 2 3 4 5 6	Categorical (Nominal)
Gender	What is your gender	Male Female Nonbinary	1 2 3	Categorical (Nominal)
First-generation College Student	Do either of your parents have a 4-year college degree?	Yes No	1 0	Categorical (Dichotomous)
Non-traditional Student	What category best describes your age?	18-24 25 or older	1 – Yes 0 - No	Ordinal
Single Parent	Are you raising a child without a partner?	Yes No	1 0	Categorical (Dichotomous)

USDA Six-Item Short Form Scoring

Each variable was scored based on answers to the survey. Responses of often or sometimes on questions 1 and 2 and yes responses on questions 3, 4, and 5 were coded as yes and were assigned a value of 1. All other answers were recorded as no and were assigned a value of 0. On Q3A, responses of three days or more were coded as yes and were assigned a value of 1, and fewer than three days were coded as no and were assigned a value of 0. The total of yes responses to the six questions provided a raw score on the USDA Six-Item Short Form Survey Scoring Scale (USDA ERS, 2012). Food security status was based on the scoring listed in Table 2. The scoring results of the USDA Six-Item Short Form Survey can be considered an ordinal variable with three groups or a binary variable with two groups. The groups were based on the USDA scoring results for an ordinal variable with high, low, or very low food security groups. If the binary variable option is chosen, the two groups are food insecure and food secure. This study uses the option of using three groups.

Table 2

USDA Six-Item Short Form Survey Scoring Using an Ordinal Variable With Three Groups

Raw Score	Food Security Status	Group	Food Security Definitions*
0-1	High or marginal food security (raw score 1 may be considered marginal food security.)	Group 1	High food security: no reported indications of food-access problems or limitations Marginal food security: one or two reported indications -typically of anxiety over food sufficiency or shortage of food in the house. Little or no indication of changes in diets or food intake

2-4	Low food security	Group 2	Low food security: reports of reduced quality, variety, or desirability of diet. Little or no indication of reduced food intake
5-6	Very low food security	Group 3	Very low food security: reports of multiple indications of disrupted eating patterns and reduced food intake

SPSS version 27 was the software used to conduct statistical analyses of the data once the results from the student surveys had been received. I screened the data to ensure all survey questions had been answered, and then the results were congregated and set up correctly for statistical analyses.

Research Question and Hypothesis

Research Question: Is food insecurity related to ethnicity, gender, being a first-generation college student, being a non-traditional student, or being a single parent in HCC students?

H_0: There is no relationship between food insecurity and ethnicity, gender, being a first-generation college student, being a non-traditional student, or being a single parent in HCC students.

H_a: There is a relationship between food insecurity and ethnicity, gender, being a first-generation college student, being a non-traditional student, or being a single parent in HCC students.

Statistical Tests

An ordinal logistic regression test was performed to assess the relationship between one ordinal dependent variable and multiple independent categorical variables (Frankfort-Nachmias & Leon-Guerrero, 2018). Ordinal logistic regression tests are used to predict the impact independent variables have on an ordinal dependent variable and to

determine any interactions between the independent variables (Frankfort-Nachmias & Leon-Guerrero, 2018). Ordinal logistic regression tests are multiple binomial logistic regression tests run at the same time using cumulative logits with each regression test predicting the probability of being categorized in each category, with each category having an equal odds ratio; referred to as a proportional odds model (Udo & Akwukwuma, 2019).

Using SPSS version 27, an ordinal logistic regression test was performed to determine any relationships between food insecurity and ethnicity, gender, being a first-generation college student, being a non-traditional student, and being a single parent. The dependent ordinal variable was food insecurity. The independent categorical variables were ethnicity, gender, being a first-generation college student, being a non-traditional student, and being a single parent. The test explained the relative contribution of each independent categorical variable in relation to the variance. There were no time or resource limitations for this study.

Assumptions Made When Running an Ordinal Logistic Regression Test

According to Udo and Akwukwuma (2019), to determine if data fits an ordinal logistic regression test, four assumptions are made; two of which the design of the study must meet:

1. The dependent variable is an ordinal variable.
2. At least one of the independent variables must be continuous or categorical.

Two assumptions that SPSS can test for:

3. No multicollinearity can exist between two or more independent variables, meaning the variables cannot be highly correlated.
4. There should be proportional odds that each of the independent variables has the same effect. The GENLIN procedure was used to test for the assumption of proportional odds.

Threats to Validity

External

External validity occurs when a dependent variable is measured under natural and normal conditions (García-Pérez, 2012). The external threats to validity included volunteer and self-selection bias; perhaps students who fill out surveys have something in common that could influence the outcome of the study. The results of this study are only generalizable to other community college students in the Central Valley of California. Community college students in other areas of California or the U.S. may have different outcomes due to having a different student population. Students at 4-year universities may have different results as well.

Internal

Internal validity of a study is obtained when researchers control for confounding factors and are confident in the accuracy of their conclusions (García-Pérez, 2012). One threat to internal validity in this study is the history effect. As a result of the COVID pandemic, many people have lost jobs and may be more likely to be food insecure compared to before the pandemic. Many of the jobs lost during the pandemic were

service industry jobs, and many college students were employed in the service industry (Owens et al., 2020).

Construct and Statistical Conclusion Validity

Construct validity is an ongoing process that researchers engage in to assess the validity of a measurement instrument that is used to measure a construct, such as a survey to measure food insecurity (Burkholder et al., 2016) Content validity, criterion validity, convergent validity, and divergent validity are included in the assessment of construct validity, which is why construct validity cannot be determined in one study (Burkholder et al., 2016). To ensure construct validity, researchers should use clearly established definitions and measurement types (García-Pérez, 2012).

The primary threats to construct validity are the history effect of the COVID pandemic, and the USDA Six-Item Form has not been validated in college students specifically, despite being widely used with college students. However, the USDA Six-Item Short Form is considered a good alternative to the USDA 18-Item Form. Statistical conclusion validity means study conclusions were based on proper data analysis that holds up to scrutiny (García-Pérez, 2012). The threat to statistical conclusion validity could have been if too few students completed surveys and results were provided as if there was statistical significance.

Ethical Procedures

Human Participants

HCC students were asked to complete an anonymous survey that was emailed to students at their college emails. The Walden IRB and the IRB at HCC approved the

student survey (Walden IRB approval number 05-05-21-0739144). There were no ethical concerns with conducting this study because the study consisted only of an anonymous survey at one point in time. There were no ethical concerns related to data collection because the surveys were anonymous. The study site is where I work; however, there were not any conflicts of interest or potential for gain from doing this anonymous student survey.

Treatment of Data

All information obtained in the survey was anonymous; therefore, there was not any confidential data to protect. All data obtained from this study will be stored on a password-protected computer for at least 5 years and then will be permanently deleted. Results from this study were shared with the dissertation committee and the IRB of Walden and HCC.

Summary

This chapter describes the methods and research design that were used in this study. The research study consisted of a quantitative correlational design using a total population sampling technique to conduct a survey that identified the prevalence of food insecurity and any relationship between the independent ordinal variables and food insecurity. An ordinal logistic regression test was performed to evaluate any relationship that existed between the dependent ordinal variable food insecurity and the independent categorical variables of ethnicity, gender, being a first-generation college student, being a non-traditional student, and being a single parent. This research contributed to the knowledge of the prevalence of food insecurity in community college students and also

gave needed data for community college administrators to identify students at risk for food insecurity.

Chapter 4: Results

The purpose of this quantitative study was to determine the profile of a food-insecure college student in the Central Valley of California and determine any relationships between food insecurity in HCC students and ethnicity, gender, being a first-generation college student, being a non-traditional student, and being a single parent. Data collection methods, a statistical analysis of the data, survey results, and key findings are explained in this chapter.

Data Collection

Participants were not surveyed until after approval was received from the Walden University Institutional Review Board and HCC Institutional Review Board. On May 6, 2021, using the college student listserv, an email request was sent to 30,000 HCC students asking them to complete a survey on whether they had experienced food insecurity via a link to the survey on SurveyMonkey. Students had 2 weeks to complete the survey and were reminded to complete the survey after 1 week. At the end of the survey period, 438 students had responded, with 120 incomplete responses, leaving 318 valid survey responses. There were no discrepancies in data collection from the original plan. The G*Power analysis indicated a need for 250 student responses, but instead of choosing 250 of the 318 valid responses, all 318 responses were used in the survey. No covariates existed in the study. No treatment or intervention was included in the study.

Descriptive and Demographic Statistics

The entire HCC student body was included in the request to complete the survey, so no bias existed in selecting the participants. There were 318 HCC students who

completed the survey. All students were current students at HCC, a community college in the Central Valley of California. The ethnic breakdown of the student respondents was 18 (6%) Asians, 21 (7%) Blacks, 183 (58%) Hispanic/Latino, 10 (3%) Native Americans, and 86 (26%) Whites. A comparison of internal documents at HCC shows the ethnic breakdown of this study was representative of the average actual ethnic breakdown of the college as a whole.

Of the 318 students who responded, 79 (25%) were males, and 239 (75%) were females. Females were represented at a higher rate in this study compared to the national average of 57%; however, females reply to surveys more often than males (Goldrick-Rab et al., 2017). A large-scale food insecurity study that was conducted on 33,000 students at 70 community colleges in 24 states also had a high percentage of female respondents compared to males, with 72% of their respondents being female (Goldrick-Rab et al., 2017). Females make up 60% of the total student body at HCC. Females represent more than half of the student population in colleges across the United States (Marcus, 2017).

My results showed that there were 259 (81%) students who were considered first-generation college students since neither of their parents had a 4-year degree, and there were 59 (19%) students who were not first-generation college students. Of all students at HCC, 69% of students were first-generation students. Perhaps a higher percentage of first-generation students completed my survey because they actually experienced food insecurity and wanted their voices to be heard.

Of the 318 students, 156 (49%) were non-traditional students based on their age being 25 years and older, and 162 (51%) were traditional students since they were under

25 years of age. Of all HCC students, 32% were non-traditional students. Older students may see the value in participating in surveys, so they might be more likely to complete surveys. Plus, older people may have more responsibilities and expenses, thus making them more likely to experience food insecurity, which may make them more likely to answer a food insecurity survey.

There were 36 (11%) students who responded that they were single parents, meaning they were raising at least one child without a partner, and 282 (89%) students who were not single parents. Raising a child/children requires more money; therefore, some of the single parent's resources must be spent on the needs of the child/children, leaving less money to support the needs of the student parent.

Of the 318 students who responded to my survey, 189 (59%) experienced food insecurity according to the USDA survey criteria, meaning they did not have enough food or enough healthy food to eat. The HOPE Food Insecurity Survey of community colleges in 24 states also found 59% of students from schools in the West were food insecure (Baker-Smith et al., 2020). One potential factor not analyzed was whether students were part-time or full-time students. Only 30% of HCC students were full-time students, which could influence the level of food insecurity of students, especially considering The Hope Center Survey found that part-time students and students who took longer to graduate were more likely to be food insecure (Baker-Smith et al., 2020).

Data Analysis

Research Question and Hypothesis

Research Question: Is food insecurity related to ethnicity, gender, being a first-generation college student, being a non-traditional student, or being a single parent in HCC students?

H_0: There is no relationship between food insecurity and ethnicity, gender, being a first-generation college student, being a non-traditional student, or being a single parent in HCC students.

H_a: There is a relationship between food insecurity and ethnicity, gender, being a first-generation college student, being a non-traditional student, or being a single parent in HCC students.

Ordinal Logistic Regression Assumptions

An ordinal logistic regression test was performed to determine any relationship between food insecurity and ethnicity, gender, being a first-generation college student, being a non-traditional student, and being a single parent. Food insecurity was the dependent ordinal variable. Ethnicity, gender, being a first-generation college student, being a non-traditional student, and being a single parent were the independent categorical variables. In order for an ordinal logistic regression analysis to be performed, four assumptions must be met to ensure valid results (Udo & Akwukwuma, 2019):

1. The dependent variable must be an ordinal variable.
2. At least one of the independent variables must be continuous or categorical.
3. No multicollinearity can exist between two or more independent variables.

4. There should be proportional odds that each of the independent variables has the same effect.

For the first assumption, my dependent variable was an ordinal variable with three groups. The three groups were high/marginal food security, low food security, and very low food security. For the second assumption, my data included five independent categorical variables: ethnicity, gender, being a first-generation college student, being a non-traditional student, and being a single parent. For the third assumption, all my independent variables were categorical, so they could not be collinear. Finally, for the fourth assumption, the Genlin procedure was used to test for the assumption of proportional odds. The *p* value must be greater than 0.5. The main assumption of proportional odds was not met by my data as assessed by the Test of Parallel Lines; $X^2(8) = 19.185$, $p=.014$. My data violated this main assumption of the ordinal logistic regression model by having non-proportional odds. Consequently, the ordinal logistic regression analysis would not provide valid data, so it could not be used in my study. According to the seminal work of Bender and Grouven (1998), when ordinal data violates the assumption of non-proportional odds, separate binary logistic regression tests can be run, but doing so is not as efficient as conducting an ordinal logistic regression test. However, the USDA states the U.S. Household Food Security Survey Six-Item Short Form survey is reliable and valid if the dependent variable is binary rather than ordinal (USDA ERS, 2012). When reporting the survey results by using a binary analysis, the categories of low food security (raw score of 2-4) and very low food security (raw score

of 5-6) should be combined as one group of food insecure (raw score of 2-6) and the second group should be food secure (raw score 0-1; USDA ERS, 2012).

Additional Statistical Test of Hypothesis

Since my data failed the main ordinal logistic regression assumption by having non-proportional odds, an ordinal logistic regression analysis could not be used with my data due to a lack of validity. And since the USDA allowed for reporting survey results in a binary format instead of ordinal, I transformed the data to match the requirements of the USDA by collapsing the three groups into two groups. The two groups were food insecure and food secure. According to the USDA ERS (2012), "For some reporting purposes, the food security status of households with raw score 0-1 is described as food secure, and the two categories 'low food security' and 'very low food security' in combination are referred to as food insecure" (p. 4). With having two groups for the dependent variable instead of three, a binary logistic regression analysis was the appropriate statistical test to use. I used the transformed data that was compliant with the USDA standardized survey requirements and performed a new data analysis using a binary logistic regression analysis. The binary logistic regression was performed to answer the research question below.

Data Transformation

The data was transformed to coincide with the USDA requirements for binary data. The scoring results of the USDA Six-Item Short Form Survey can be considered a binary variable with two groups, with the groups being based on the USDA scoring results for food insecure and food secure. Group 1 included those with a raw score of 0–

1, who were considered food secure, and Group 2 scored between 2–6 and were considered food insecure.

Binary Logistic Regression Analysis

A binary logistic regression predicts the chance that an observation or result will fall in one of two categories of a dependent variable based on independent variables that are continuous or categorical (Frankfort-Nachmias & Leon-Guerrero, 2018). After transforming the data to include two groups for the dependent variable in the binary logistic regression, the two groups were food insecure and food secure.

According to Udo and Akwukwuma (2019), For a binary logistic regression to be valid, there following seven assumptions must be met:

1. There must be a dichotomous dependent variable. My dependent variable consisted of two groups, food secure and food insecure.
2. At least one independent variable must be measured on a nominal or continuous scale. All of my independent variables were categorical.
3. All nominal independent variables must be mutually exclusive, and the categories of the dependent variable should be independent. My study had five independent variables, and they were all mutually exclusive. Ethnicity, gender, being a first-generation college student, being a non-traditional student, and being a single parent were all mutually exclusive, so they could not be in two categories.
4. There must be at least 15 cases per independent variable. My study had 318 responses in each of the five categories of independent variables.

5. Assumption of linearity. The continuous independent variable and the logit transformation of the dependent variable should have a linear relationship. This is not applicable in this study since there were no continuous independent variables. All of my independent variables were categorical.
6. No multicollinearity can exist. This did not apply to my data because, in order to have a correlation, there must be continuous variables, and my data did not have a continuous variable.
7. No significant outliers can exist. Since all variables are categorical, no outliers existed.

The first four assumptions were met by my choice of study design and the types of measurements made. The main assumption of binary logistic regression analysis is the assumption of linearity, which states for every one-unit increase in continuous independent variables, the log odds (logit) of the dependent variable will increase by a consistent amount (Udo & Akwukwuma, 2019). Since my data only included nominal independent variables, the assumption of linearity does not apply to my data. The Box-Tidwell procedure is not applicable to my data since there were not any continuous independent variables in my data. There were not any significant outliers or unusual points in the data. There was not any multicollinearity because there were not any significant correlations between independent variables (Udo & Akwukwuma, 2019).

Results

The results of the binary logistic regression data analysis are described in this section. The demographic makeup of the 318 students who completed the survey is listed below in Table 3.

Table 3

Categorical Variable Coding

Variable		Frequency	%
Ethnicity	Asian	18	6%
	Black	21	7%
	Hispanic/Latino	183	58%
	Native American	10	3%
	White	86	27%
Gender	Male	79	25%
	Female	239	75%
First Generation College Student	Yes	259	81%
	No	59	19%
Non-traditional Student	Yes	162	51%
	No	156	49%
Single Parent	Yes	36	11%
	No	282	89%

According to the Classification Table Prediction, without considering any independent categorical variables, 59% of the time, it can be correctly assumed students were food insecure. There were 189 food-insecure students and 129 secure food students in my study. The Omnibus Test of Model Coefficients shows how well the model predicts categories when there is no independent variable (Frankfort-Nachmias & Leon-Guerrero, 2018). If the Omnibus Test results show statistical significance, the *p* value will be <.05, which represents a poor-fitting model for the data. The Omnibus Test was a good model for my data since the data was not statistically significant, as indicated by a *p* value of .296. The binomial logistic regression model was not statistically significant.

$x^2(8) = 9.579$, $p = .296$. The Nagelkerke R Square value explains the amount of variability of the dependent variable, which can be explained by the model (Frankfort-Nachmias & Leon-Guerrero, 2018). The model (Nagelkerke R^2) showed 4% of the variance in food insecurity was explained by the five independent variables, a minimal effect size.

Of the five predictor variables, none were statistically significant, as shown in Table 4. When there were no significant predictors, I reran the binary logistic regression analysis using a stepwise enter of the variables to see if there were any significant predictors. The results were unchanged. Since none of the predictor variables had statistically significant results, the null hypothesis was accepted. There was no relationship between the dependent variable of food insecurity and the independent variables.

Table 4

Variables in the Equation

Variable	B	SE	Wald	df	Sig.	Exp(B)
Ethnicity-Asian	-.375	.543	.476	1	.490	.687
Ethnicity-Black	-.087	.498	.030	1	.862	.917
Hispanic/Latino	-.195	.285	.469	1	.493	.823
Native American	-1.037	.846	1.503	1	.220	.355
White	1.439	1.329	1.172	1	.279	4.216
Gender	.151	.275	.300	1	.584	1.163
First-generation student	.411	.310	1.757	1	.185	1.509
Non-traditional student	.414	.241	2.948	1	.086	1.512
Single parent	-.195	.401	.235	1	.628	.823

Although each of the categorical independent variables, ethnicity, gender, being a first-generation college student, being a non-traditional student, and being a single parent, were found to be predictors for food insecurity in other colleges, this was not true for HCC students in the Central Valley of California (Baker-Smith et al., 2020; Broton et al.,

2018; Bruening et al., 2017; Goldrick-Rab et al., 2017; Spaid & Gillet-Karam, 2018; U.S. GAO, 2019). Perhaps my study did not find statistical significance between food insecurity and the independent variables because there is something unique about the student population or environment in the Central Valley of California, such as having only 30% of students as full-time students, having a high percentage of minority students or because of having 81% of student respondents who were first-generation students. Additionally, the issue of food insecurity is so complex that a profile of a food-insecure student is difficult to determine.

Sensitivity refers to obtaining true positive results, meaning results that were predicted correctly by the model (Frankfort-Nachmias & Leon-Guerrero, 2018). The positive predictive value refers to the percentage of cases that were accurately predicted by the model. The positive predictive value for my data was 100 x (17 ÷ (20+17)) = 45.9%, which means 45.9% of food insecure students were correctly predicted. Specificity refers to obtaining true negative results, meaning results where the model accurately predicted that the characteristics would not be present (Frankfort-Nachmias & Leon-Guerrero, 2018). The negative predictive value refers to the percent of accurately predicted cases that did not have the observed characteristic compared to the total cases that were predicted not to have the characteristic. The negative predictive value for my data was 100 x (169 ÷ (169 + 112)) = 60%, meaning that 60% of the time, the model correctly predicted cases of students not having enough food to eat.

Summary

My data failed the non-proportional odds assumption of the ordinal logistic regression analysis, thus disallowing the use of an ordinal logistic regression test. Since the USDA allowed for classifying the survey results into two groups, food insecure and food secure, a binary logistic regression test with a stepwise approach was used to determine any relationships between food security and ethnicity, gender, being a first-generation college student, being a non-traditional student, and being a single parent. There was no statistical significance found between the independent variables of ethnicity, gender, being a first-generation college student, being a non-traditional student, and being a single parent, and food insecurity. Therefore, the null hypothesis was accepted. There was no relationship between food insecurity and ethnicity, gender, being a first-generation college student, being a non-traditional student, or being a single parent in HCC Students. However, the study results identified 59% of the student population as food insecure. Additionally, 75% of respondents were females, and 81% were first-generation college students. Discussion, conclusions, recommendations, and social change impacts are described in Chapter 5.

Chapter 5: Discussion, Conclusions, and Recommendations

This quantitative study was conducted to determine the profile of a food-insecure community college student and to determine any relationships that existed between food insecurity and ethnicity, gender, being a first-generation college student, being a non-traditional student, and being a single parent at HCC in the Central Valley of California. Since my data violated the proportional odds assumption in the originally planned ordinal logistic regression analysis, the ordinal logistic regression analysis could not be performed. The correction for a failure of the proportional odds assumption is to perform a multiple binary logistic regression analysis. If there is a violation with the non-proportional odds assumption, separate binary logistic regressions tests can be performed, even though doing so is not as efficient (Bender & Grouven, 1998). The USDA stated that their survey is reliable and valid if participants are separated into two groups instead of three. Therefore, the options were to do multiple binary logistic regression tests or perform a binary logistic regression. Since the USDA allows the survey results to be categorized into two groups, I chose a binary logistic regression analysis.

A binary logistic regression was performed to determine the effects of ethnicity, gender, being a first-generation college student, being a non-traditional student, and being a single parent on the likelihood the students were food secure. The null hypothesis was accepted since there were no relationships between food insecurity and the independent categorical variables of ethnicity, gender, being a first-generation college student, being a non-traditional student, and being a single parent. To verify the lack of relationships, a stepwise binary logistic regression analysis was also conducted. Ethnicity, gender, being

a first-generation college student, being a non-traditional student, and being a single parent were not predictors of food insecurity in HCC students. Although no statistical significance was found, it was valuable to know that 59% of HCC students were food insecure, 81% of all students were first-generation college students, and 75% of respondents were females. The study results will be shared with community college administrators so they will have the information needed to develop and target support services for those students.

Interpretation of the Findings

Out of the 318 students who responded to the survey, 59% were food insecure. This result is consistent with other research in the field showing California Community College students have the highest rates of food insecurity (Goldrick-Rab et al., 2017). For example, Que and Baldridge (2019) found that 56% of community college students were food insecure.

Of the five categorical independent variables, gender, ethnicity, first-generation student, non-traditional student, and single parent, they were not significant predictors of food insecurity. Some other studies on food insecurity found each of the variables to be predictors, but none of the studies reviewed in this paper found all variables to be predictors. Additionally, each study had a different makeup of independent variables, and some had different definitions of some of the variables. Future studies should be conducted on a consistent set of independent variables to strengthen the understanding of predictor variables.

Even though there were not any significant predictors of food insecurity, identifying a high prevalence (59%) of students who were food insecure is important to know in order to recognize the prevalence of food insecurity and the importance of taking action to provide support for students. Considering that Maslow's hierarchy of needs says people must have their physiological need of food met before they can progress to higher-level needs, such as achievement, having 59% of HCC students as food insecure means they were stuck in the physiological needs level and could not progress to academic achievement until their basic need of food is met (Kretchmar, 2019). Having so many food-insecure students could have a significant negative impact on collegiate student success, providing additional motivation to college leaders to identify and help support food-insecure students.

Knowing there were so many food-insecure students in the community college in the Central Valley should trigger additional research to determine why there was such a high number of food-insecure students in community college students in the Central Valley of California. Research should also be done to identify what can be done to provide support. Addressing food insecurity could improve student success as well as support students' need for food.

Realizing 81% of all students were first-generation students is useful to understand when developing resources for student support and success because first-generation students may have needs beyond other students. A college education is associated with greater financial security (College Board Communications Office, 2017). Therefore, having such a high percentage of first-generation college students could mean

these students come from families that make less money, thus contributing to the overall high rate of food insecurity at HCC. Further research would need to be conducted to determine if this is valid.

With 75% of all HCC student respondents being female, and with Goldrick-Rab et al. (2017) having 72% of their 33,000 student respondents being females, additional research should be done to evaluate if females are more likely to respond to surveys in general or if females are more likely to respond to surveys specifically on food insecurity, and why.

There may have been other predictors of food insecurity in this population; however, they were not examined. For example, income and employment status may have been predictors of food insecurity, but income and employment status were not studied. Other variables, such as being a Pell Grant recipient, were also not addressed but should be in future studies. It is important to note I looked at commonly evaluated demographic data that students do not have control over, meaning that I chose variables that are used in many studies, and they are variables people cannot change; ethnicity, gender, being a first-generation college student, being a non-traditional student, and being a single parent. These variables were found to be predictors in other studies; however, not every study found all of these variables as predictors in every study. Additionally, those studies were conducted in multiple types and sizes of colleges throughout the U.S. This study was only conducted on the very specific population of community college students in the Central Valley of California. Future studies should be conducted specifically in

California due to the high cost of living in California, which could make it more likely for students to be food insecure.

HCC students persevere and still obtain an education despite being food insecure and despite HCC offering a food pantry and referrals for help. There may be consequences to being food insecure that should be identified, and there may be reasons why HCC students are more likely to be food insecure. Food insecurity is a complex multifactorial problem that makes identifying precise predictors hard to determine.

Limitations of the Study

A standardized survey instrument was used for this study, so the survey could not be customized for the study population. The survey was conducted at a Central Valley Community College; therefore, the results only apply to HCC. The nature of the study was correlational, so causation was not determined. Students were sent an email request to complete an online survey. Some students do not read emails from the college. There is an inherent survey completion bias in those that are willing to take their time to complete a survey. Potentially, students impacted by food insecurity may have been more likely to complete the survey than students who were not impacted. Having 75% of females complete this survey could be reflective of this potential limitation. The survey was only given in English, which could have been difficult for students for whom English is a second language. This survey was completed during the global COVID-19 pandemic, which could have influenced students' level of food insecurity. The survey was conducted on students from a community college in the Central Valley of California;

therefore, the results are only applicable and generalizable to community college students in the Central Valley.

Recommendations

There was no advantage to using the ordinal three-group option of categorizing food security. In fact, there was a disadvantage. By considering the USDA survey results as an ordinal variable with three levels of groups of food insecurity, students who fall in the middle category of low food insecurity are at a disadvantage because they would be classified separately, therefore, may not be seen as having as much of a need as compared to students classified as high food insecurity; therefore, students in the middle category of low food insecurity may not get as much help as students in the higher level of food insecurity. Students who are food insecure at any level deserve to have help. From a social justice and public health perspective, no level of food insecurity is acceptable; therefore, all food-insecure students should receive needed support. To ensure all food-insecure students are recognized as needing help, I recommend conducting future studies using the USDA allowed option of having two groups instead of three so as to identify food insecure versus food-secure students.

By conducting this study, I hope to have created a template that others will use in future studies on food insecurity. Future studies can look at the same predictors in the same location to see if the results are duplicated, and they can examine other predictors in the same location. Additional locations should also be studied. Studying first-generation students in greater depth can generate a greater understanding of the specific needs of this population. I also recommend considering other independent variables, such as insurance,

employment status, income, family support, homelessness, being a Pell Grant recipient, receiving SNAP, low income, GPA, the poverty rate of the community, cost of living, the percentage of the population with at least a bachelor's degree, and consequences of food insecurity. According to Goldrick-Rab (2018), community college students have a higher need for support than other students; therefore, studying multiple areas of basic student needs may be useful. Adding a qualitative component to the research can provide additional information to help understand the complex issue of food insecurity and the resulting consequences. The issue of food insecurity is complex, making a profile of a food-insecure student hard to define. The relationship between variables should also be studied. For example, the relationship between gender and being a single parent should be studied to determine if there are multiple factors that determine the likelihood of being a food-insecure student. Students' past histories should be examined as well. Further research into college students in the Central Valley of California should be conducted to determine if there are additional factors specific to this population that could increase their rate of food insecurity. The size of the college, rural versus urban settings, and poverty rates of the surrounding population should also be studied. Lastly, additional studies of the types mentioned above should be conducted that utilize a stratified sampling technique in order to ensure there are equal proportions of students representing each variable.

Implications for Social Change

Identifying that 59% of students were food insecure sent a strong message of the need for community college students in the Central Valley to have greater access to

adequate food so their basic needs can be met and help improve student success. This study contributed to social change by identifying the high percentage of students who do not have enough food to eat, thus promoting the need for college leaders to develop programs and resources to support students' basic need of having an adequate amount of food. Community colleges must strive to provide needed assistance to their students in order to further student success and support students' basic needs. From a public health and human rights perspective, all food-insecure students need help and support, not just those who have are severely food insecure. This is why the USDA survey results should be considered two groups instead of three groups when further studied so as to capture all food-insecure students. Further study should be done to identify potential causes for food insecurity and ramifications from being food insecure. Knowing 81% of all students were first-generation college students shows the importance of studying this specific population to help understand what special needs they may have in order to be successful in college. The results of this study should motivate college leaders to take action and create support for food-insecure students and first-generation students. Some ways students can be supported include establishing a food pantry, providing cafeteria meal vouchers, referral to SNAP and the WIC program, providing help with applying for a Pell Grant and scholarships, offering cooking, shopping, and budgeting classes, and providing referrals to foodbanks.

Conclusion

Using Maslow's Hierarchy of Needs as the theoretical framework, I conducted a quantitative correlational study on Community College students in the Central Valley of

California. The purpose of the study was to determine the relationship between food insecurity and ethnicity, gender, being a first-generation college student, non-traditional student, and being a single parent. A binary logistic regression analysis was performed on the data. Results found 59% of students were food insecure, 81% of all students were first-generation college students, and 75% of all students were females. Knowing the prevalence of food insecurity is essential information for college leaders to have when developing support services and designing outreach services for students.

This study on food insecurity in community college students in the Central Valley was helpful to determine the prevalence of food insecurity in this population and to identify that 81% of all food-insecure students were first-generation. The categorical independent variables were not significant predictors of food insecurity in this population, so the null hypothesis was accepted. The non-significant findings may be a reflection of the complex nature of determining a single profile of a food-insecure student and why a multitude of studies have had varying results with what was significant for identifying a food-insecure student. Knowing 59% of students were food insecure is critical information to be aware of in order for college leaders to have the needed knowledge to realize the importance of providing basic needs support and outreach targeted to food-insecure students. Student success efforts should include basic needs support for food-insecure students and first-generation college students. Having the majority of community college students experience food insecurity is not an acceptable human rights situation and can have long-lasting impacts that should be further studied.

Addressing basic food needs in college students not only benefits students but benefits a college's student success rate, as well as positively impacts communities at large.

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Appendix: Student Survey

Survey Questions and answers in SurveyMonkey: (The first five questions are taken from the USDA standardized food insecurity survey (USDA Six-Item-Short Form). The last five questions are demographic questions.

Q1: The food that I bought just didn't last, and I didn't have money to get more." Was that often, sometimes, or never true for you in the last 30 days?

-Often true

-Sometimes true

-Never true

-DK

Q2: I couldn't afford to eat balanced meals." Was that often, sometimes, or never true for you in the last 30 days?

-Often true

-Sometimes true

-Never true

-DK

Q3: In the last 30 days, did you ever cut the size of your meals or skip meals because there was not enough money for food?

-Yes

-No

Q3A: If yes to Q3 above, in the last 30 days, how many days did this happen?

____ Days

-DK

Q4: In the last 30 days, did you ever eat less than you felt you should because there was not enough money for food?

-Yes

-No

-DK

Q5: In the last 30 days, were you ever hungry but did not eat because there was not enough money for food?

-Yes

-No

-DK

Q6: What is your ethnicity?

-Asian

-Black or African American

-Hispanic/Latino

-Native American or other Pacific Islander

-White

Q7: What is your gender?

-Male

-Female

Q8: Do either of your parents have a 4-year college degree?

-Yes

-No

Q9: Are you raising a child without a partner?

-Yes

-No

Q10: What category best describes your age?

-18-24

-25 or older