
A Mixed-Method Approach of Exploring the Ways Food Access
Impacts the Quality of Life of College of Agriculture and Life Science
Students at Virginia Tech

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Dissertation submitted to the faculty of the Virginia Polytechnic Institute and State University in
partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

In

Agricultural and Extension Education

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April 19th, 2023

Blacksburg, Virginia

Keywords: Food Access, Quality of Life (QoL), First-Generation, International, Rural, Urban,
Agriculture Students

A Mixed-Method Approach of Exploring the Ways Food Access Impacts the Quality of Life of College of Agriculture and Life Science Students at Virginia Tech

Lana DeeAnn Petrie

Abstract Academic

Food insecurity has been documented on college campuses. Exploring the barriers that factor into food access can provide insight into how to combat food insecurity in higher education. Furthermore, exploring how these barriers play a role in students' Quality of Life (QoL) can help improve a student's success while in school. Little research has been done on food access and its impact on QoL, and research is completely absent in regard to its effects on agriculture students specifically. As the desire for degrees increases, students from more diverse backgrounds are attracted to college. Many students from underrepresented populations experience barriers to attaining a degree that other students may not. First-generation students, being the first in their family to attend college and have little to no knowledge of how to navigate the challenges of degree attainment., International students experience living in a completely different culture and having to adjust to a new country and a new educational environment.

This mixed-method study focused on how food access barriers impact the QoL of first-generation, international, rural, and urban College of Agriculture and Life Science students at Virginia Tech. The study involved a concurrent phase (1) of a cross-sectional survey consisting of multiple choice and open-ended questions. The sequential phase (2) of the study constructed interview questions from themes found in phase 1 and then were used to interview students. Once interviews were completed, phase 1 and phase 2 results were then compared to provide a

broad view of how food access impacts QoL for agriculture students. The results from the study showed an adjusted R square explained .277 or 27% of the variance in the dependent variable QoL to be affected by the independent variables. The independent variables of food access, first-generation, Asian, and undergraduate classification of senior were shown to be significant in the first stepwise linear regression model. In the 6 stepwise linear regression models that examined the QoL of students based on department/schools, each model was found to be significant and have food access as significant predictor variable. An additional 6 stepwise linear regression models were completed to examine the significant independent variables from the department/school QoL scores models. The QoL scores explored were Asian, Hispanic/Latino, first-generation, international, rural, and undergraduate senior status and all showed food access as a predictor value to impact QoL. In addition, lack of awareness of resources, lack of options that are affordable and available, demanding schedules, running out of meal plan money, lack of acknowledgment of food access concerns, and environment impacted students' ability to access food. Students also voiced that lack of access to food impacted their QoL in the following ways: concentrating in class, studying, attending social events, maintaining a positive physical and mental health status.

The impact of food access is a multidimensional problem that was shown to impact the QoL of CALS students at Virginia Tech. Preventing hunger and overcoming food access barriers are not problems to solve overnight. Finding solutions will take time and dedication from leadership, faculty, staff, and students. In addition, just because you may not be experiencing low food access doesn't mean you never will or that your friends are not going through the situation. Demonstrating love, empathy, and kindness when talking about hunger will be needed to lead the fight against this all-too-prevalent problem.

A Mixed-Method Approach of Exploring the Ways Food Access Impacts the Quality of Life of College of Agriculture and Life Science Students at Virginia Tech

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Abstract Public

“I often feel like when I'm running on fumes when I haven't eaten something nourishing. Depending on my commute to campus, I park and still have to walk/bike to get to my final destination. I often worry about falling faint when I'm operating on limited sleep and food. I even feel impacted by my ability to focus on class or work. On another side, I often focus so much on my daily tasks that I forget to eat entirely.”

One of the most basic needs an individual requires to complete daily life tasks is food, according to the theory of Maslow's Hierarchy of Needs (MHoN). Food insecurity is a prevalent concern for both higher education professionals as well as the college students who are experiencing the problem. Students face barriers that hinder their ability to access the quantity and quality of food they need to be successful in school. Food access is a multidimensional problem that can involve accessibility to food, the availability of food, affordability to purchase food, and awareness of resources. It is crucial to better understand how food access can have an impact on students' Quality of Life (QoL) (physical health, psychological health, social relationships, and environment) as well as the student's success in school. This understanding will advise higher education institutions on what their role can be in tackling the barriers students face when accessing food. This should improve the QoL of students thus creating better

outcomes for academic success at their institutions. Leadership, faculty, and staff can work to address the problem of hunger on campuses by listening to the voices of students on this ever-evolving problem. The issue is complex, but, ultimately, for students to be successful, their basic needs will need to be met. As such, supporting a student's access to food is absolutely essential.

Dedication

“To my family and the people that helped me get here.”

Acknowledgments

The first acknowledgement I would like to make is to the participants in my study. I couldn't have done this without your willingness to participate in the survey and interviews. Your voices matter. Second, I would like to recognize my advisor Dr. Rick Rudd. You took a chance on a first-generation high school graduate aspiring to get a Ph.D. and I am so thankful for that. Next, I would like to acknowledge my amazing Ph.D. committee members, Drs. Sanders, Crowder, and Misyak. They helped guide me through my Ph.D. journey, and I wouldn't have reached this point without their support. I hope all my emails didn't overwhelm you too much. At least I included cute pictures of Rosie in most of the emails. Thirdly, I would like to thank my bonus family, the Petrie's, for always supporting me in my journey and, more importantly, being the best babysitters for Rosie! Next, I wouldn't be where I am today without the support of my family. My parents always believed I could succeed in anything I put my mind to. They took care of me during my really sick years of pancreatitis and gave up a lot in order to do that. They pushed me to keep going and keep my dreams big. I owe them more than they could ever know. If I didn't include my sister Pamela, she would probably never talk to me again. My sister carved the path of higher education for us both since our parents didn't go to college. She continues to support me in all my endeavors and is one of my biggest cheerleaders in life. Lastly, my little Rosie Ruth and David. When I found out I was pregnant in my first semester in my Ph.D. journey, I was so excited and terrified. I wanted to still be able to chase my dreams of a Ph.D. and also have a family. Rosie, I am so thankful to have you as a daughter. You crack me up every day and run me ragged, but I wouldn't change it for the world. David, you have been nothing but supportive and loving through this journey. From taking Rosie to parks so I could finish homework or writing, to helping proofread my papers at night when Rosie went to bed. If I

hadn't had you through this journey as a parent and Ph.D. student, I don't know how I would have made it. You have always been my best friend.

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List of Abbreviations

QoL: Quality of Life

MHoN: Maslow Hierarchy of Need

CALS: College of Agriculture and Life Sciences

Chapter 1

Introduction

Food access has been defined in general terms as having adequate resources to obtain appropriate foods for a nutritious diet (Gibson, 2012; The United States Agency of International Development (USAID), 1992). But, in recent years, the definition of food access has expanded exponentially in literature. A better understanding of food access can be achieved by considering food accessibility, availability, affordability and awareness (Usher, 2015). When describing food access, these terms give a more comprehensive understanding of how one obtains food.

Food accessibility, availability, affordability, and awareness provide a multi-dimensional insight into food access and the barriers affecting one's ability to get food. Accessibility refers to the proximity of the individual to the food source and their ability to physically get to the source to obtain food (Usher, 2015). Food availability refers to whether food is consistently and physically obtainable in the desired quantities for an individual (Cason & Boege, 2020). For example, is the food they have access to available in sufficient quantities and is the food healthy and nutritious? Caspi et al., (2012) describes affordability as the cost of food and people's perceptions of whether the cost is worth it. In addition to food price, the concept of affordability necessarily includes the individual's income and the distribution of income within the household. The inability to pay for the food one needs or wants will impact whether one has food access worries. While the first three terms describing food access have become popular in literature (Dong et al., 2022; Cason & Boege, 2020; Caspi et al., 2012, Usher, 2015), the fourth term, awareness, is being explored as a new concept when addressing a multi-dimensional look into food access. Resources available to individuals go unused due to the lack of awareness of programs in the communities (Peterson et al., 2022; Ortiz et al., 2020).

Food Access

For a student to succeed in college, having their basic needs met, such as food, water, and shelter, is critical. As Maslow (1943) states,

“Undoubtedly, these physiological needs are the most pre-potent of all needs.

What this means specifically is that in the human being who is missing everything in life in an extreme fashion, it is most likely that the major motivation would be the physiological needs rather than any others.” (p. 5)

Furthermore, when one is hungry, the motivation to do other daily activities will be negated until their physiological need is met. Access to food is associated with food security (citation). Food access should not just be thought of as not having enough money to purchase food; one should consider the many layers that contribute to an individual's low or high food security (Usher, 2015). Choosing fruits, vegetables, lean meats, dairy, nuts, legumes, and seeds are healthy choices; however, these foods are often unavailable on campus or too expensive to purchase, providing that what is made available to students on campus matters (Mello Rodrigues et al., 2019). Similarly, Ilieva et al. (2019) discussed that students often purchased meals out of the vending machine compared to buying campus food because of the expensive prices on campus. Students will sometimes have to result to the more affordable option they can afford if living on a small budget.

Earning a college degree is a means for upward mobility (Leung et al., 2021). For a student to succeed and achieve upward mobility, examining how food access impacts degree completion is important. Leung et al. (2021) found that students experiencing food insecurity while in college is associated with higher prevalence of food insecurity in early to middle adulthood. Students experiencing food insecurity are more likely to have a low GPA, poor

academic performance, low graduation rates, poor mental health, and poor physical health while in school (Hall et al., 2019; Patton-Lopez et al., 2014; Payne-Sturges et al., 2018; Regan, 2020).

Camelo & Elliott (2019) stated,

“Food insecurity is not only a public health problem, it is a barrier to academic achievement among college students in the US. Successful completion of a college education increases the chances that individuals will secure paid employment that provides for their basic needs and leads to upward mobility.” (p. 316)

Nazmi et al. (2019) discussed how a comparison of U.S. households and U.S. colleges and universities showed that college students have higher food insecurity than households in the United States. Additionally, Payne-Sturges et al. (2018) stated, “Food insecurity among college students has the potential to negatively impact student success on campus as well as their health, but very little data exist.” In today’s society, students have more of a risk for food insecurity because of rising tuition costs, childcare costs, groceries, rent, and utilities (El Zein et al., 2019; Henry, 2017).

As mentioned, higher education plays a role in how one's overall health and quality of life are shaped. If a student is lacking resources or access to basic necessities, the impact can be both short and long-term, influencing their outcome in life. According to the Substance Abuse and Mental Health Service Administration (SAMHSA) (2020), one of the most common mental disorders in the U.S. is major depression. DeRoma et al. (2009) found a negative relationship between depression and academic performance in college students. While Reeder et al. (2020) discovered if a student was low in food security, they were 4.52-times greater odds of having depression.

An estimated 21 million adults, 8.4% of the U.S. population, have suffered from at least one major depressive episode. The age group with the highest number affected by an episode was between the ages of 18-25. A student may experience poor mental health because of worrying where their next meal is coming from. Another example would be a student without easy food access taking the time to purchase groceries over completing homework or studying for a test. Not having access to food can cause multiple negative consequences on mental health for a student and have short-term and long-term effects (Anderson et al., 2022).

Literature has shown that a person's environment will influence dietary consumption (Eertmans et al., 2001; Smith & Epstein, 1991). College students will often consume a higher intake of energy-dense, nutrient-poor foods because they are cheaper and more convenient options available to them on campus (Sogari et al., 2018; Whatnall et al., 2021). Blondin et al. (2016) discussed the importance in understanding the relationship between diet and health for young adults in college in order to create programs, policies, and behavior change strategies to improve quality of life. In addition, Pilato et al. (2022) found that making small healthy adjustments in a college student's diet such as increasing hydration, eating more fruit and fish, and eating less fast food may improve cognitive performance.

Reflexivity Statement

The researcher chose the agriculture participant population based on having a background in agriculture and wanting to explore the connection between food access among agricultural students pursuing degrees to be in the agricultural sector providing food to people. In addition to examining the agricultural student population at Virginia Tech, the researcher additionally examined first-generation, international, rural, and urban demographics of students and how this

relates to food access. The researcher identifies as a first-generation high school graduate that lived in a rural community in Tennessee and experienced food access concerns while in college.

Problem Statement

Russell (2016) quotes graduate student Esther Zapata as saying,

“We have stated that you're a child, and we want you to go to college. Therefore, we are going to feed you between the ages of kindergarten all the way to your senior year of high school. Once you leave high school, you fall out of the system. Go to college—go hungry.” (para. 5)

The Hope Center for College, Community, and Justice (2021) showed that 39% of students at a two-year institution experience food insecurity, while 29% of students at a four-year institution were impacted. If a student has insufficient food or is without food, this can deplete the energy needed to perform well in school, thus leading to poor academic performance (Thoelke, 2021). Other studies have shown a strong correlation between food insecurity and adverse effects on mental and physical health (Leung et al., 2021; Martinez et al., 2020; Payne-Sturges et al., 2018). Studies have shown a strong correlation between food insecurity and negative effects on mental and physical health (Leung et al., 2021; Martinez et al., 2020; Payne-Sturges et al., 2018; Regan, 2020). In a study involving academic outcomes, Patton-López et al. (2014) found that students with a GPA higher than or equal to 3.1 were 60% less likely to have experienced food insecurity.

Moreover, Reagan (2020) stated that, “As a transient population generally, including students living off-campus, college students are often not included in official poverty calculations.” In addition, according to the United States Census Bureau (2019), students living on campus in the resident halls cannot be measured for poverty because of the population being transient, thus, not accounting for food insecure college students. When students on campus are

not considered in calculations of poverty estimates, they get overlooked, thus creating an environment that is unaware of hunger and food access concerns.

A college student dealing with low food accessibility, affordability, availability, and awareness will likely experience low food security. Food is a vital necessity that students must have to survive and thrive. Exploring how accessibility, affordability, availability, and awareness impact the QoL of students attending college can provide a better understanding of the battles and barriers they face.

Purpose

The purpose of this research study is to explore how food access impacts the quality of life of first-generation, international, rural, and urban students in the College of Agriculture and Life Sciences at Virginia Tech. Research continues to shed light on the hidden problem of food insecurity on a college campus, but additional measures can be sought to explore exactly how factors of food access availability, affordability, accessibility, and awareness can impact students' QoL.

Manuscript #1

Supporting all students: Exploring how food access contributes to the Quality of Life for students in the College of Agriculture and Life Sciences

Purpose Statement

This quantitative research study explored how food access can have an impact on QoL of students in the College of Agriculture and Life Sciences. The researcher conducted a survey constructed of multiple choice QoL and food access questions. The research contributes to the literature by exploring how a student is impacted by food access in four areas: accessibility,

awareness, availability, and affordability. The researcher further explored how the four areas of food access have an impact on students' QoL.

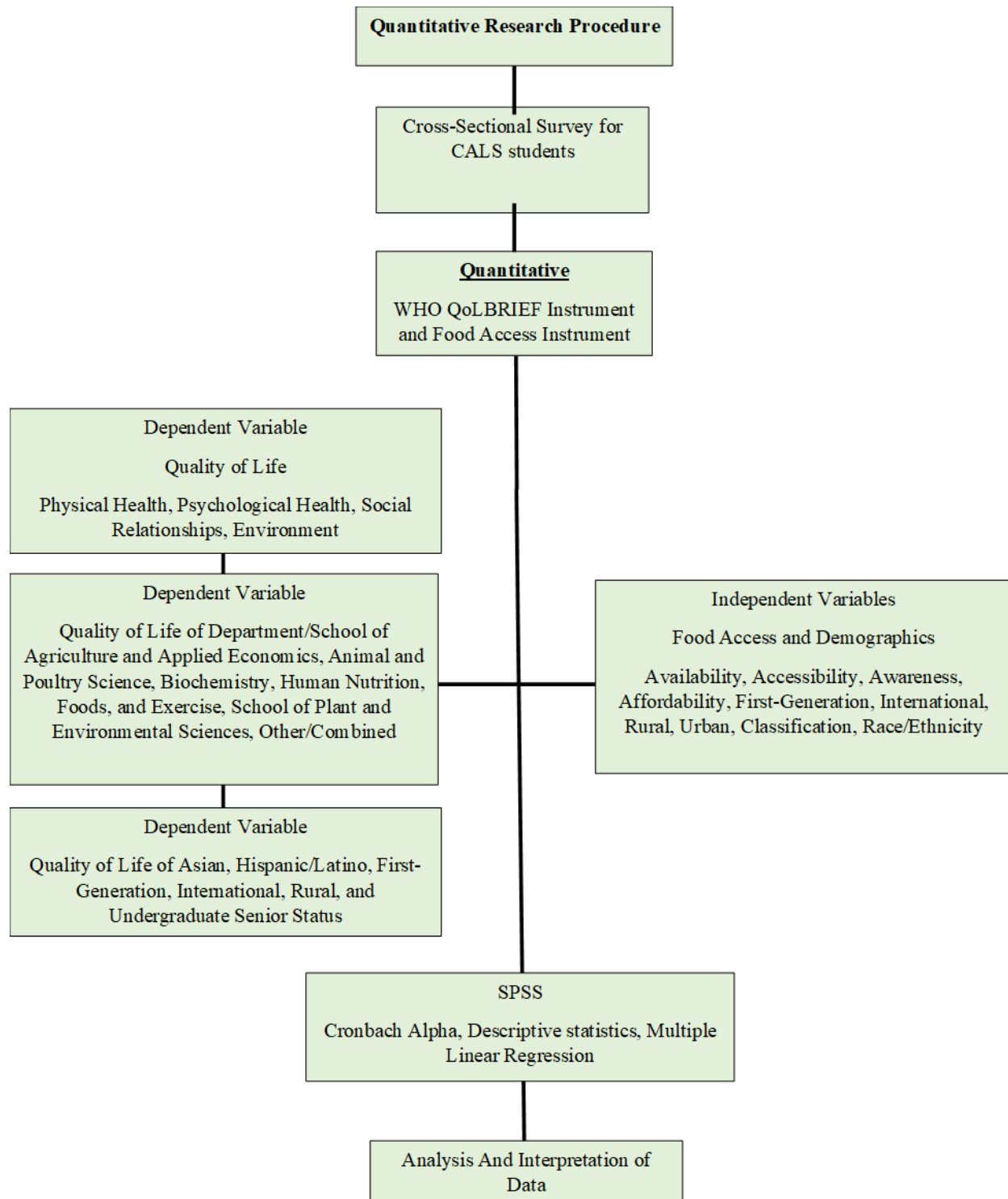
Research Question

How does food access impact the quality of life for first-generation, international, rural, and urban students in the College of Agriculture and Life Sciences at Virginia Tech?

Objectives

- ❖ To determine the QoL of first-generation, international, rural, and urban students in the College of Agriculture and Life Sciences at Virginia Tech.
- ❖ To determine food access of first-generation, international, rural, and urban students in the College of Agriculture and Life Sciences at Virginia Tech.
- ❖ To describe how food access contributes to QoL for students in the College of Agriculture and Life Sciences at Virginia Tech.

Figure 1.1 Quantitative Procedure Diagram



Manuscript #2

“I eat less because I do not have consistent access to food, and this decreases my quality of life”: How does food access and quality of life interact with one another for College of Agriculture and Life Science students.

Purpose Statement

This qualitative research study aims to explore how food access can have an impact on the QoL of students in the College of Agriculture and Life Sciences (CALS) through examining open-ended question responses. Literature has shown how food access impacts cognitive (physical and mental), social, and environmental factors (Anderson et al., 2022; Patton-Lopez et al., 2014; Payne-Sturges et al., 2018), however, no research has been conducted showing how food access affects QoL for CALS students. The research will contribute to the body of literature to help better understand and support students struggling with food access barriers.

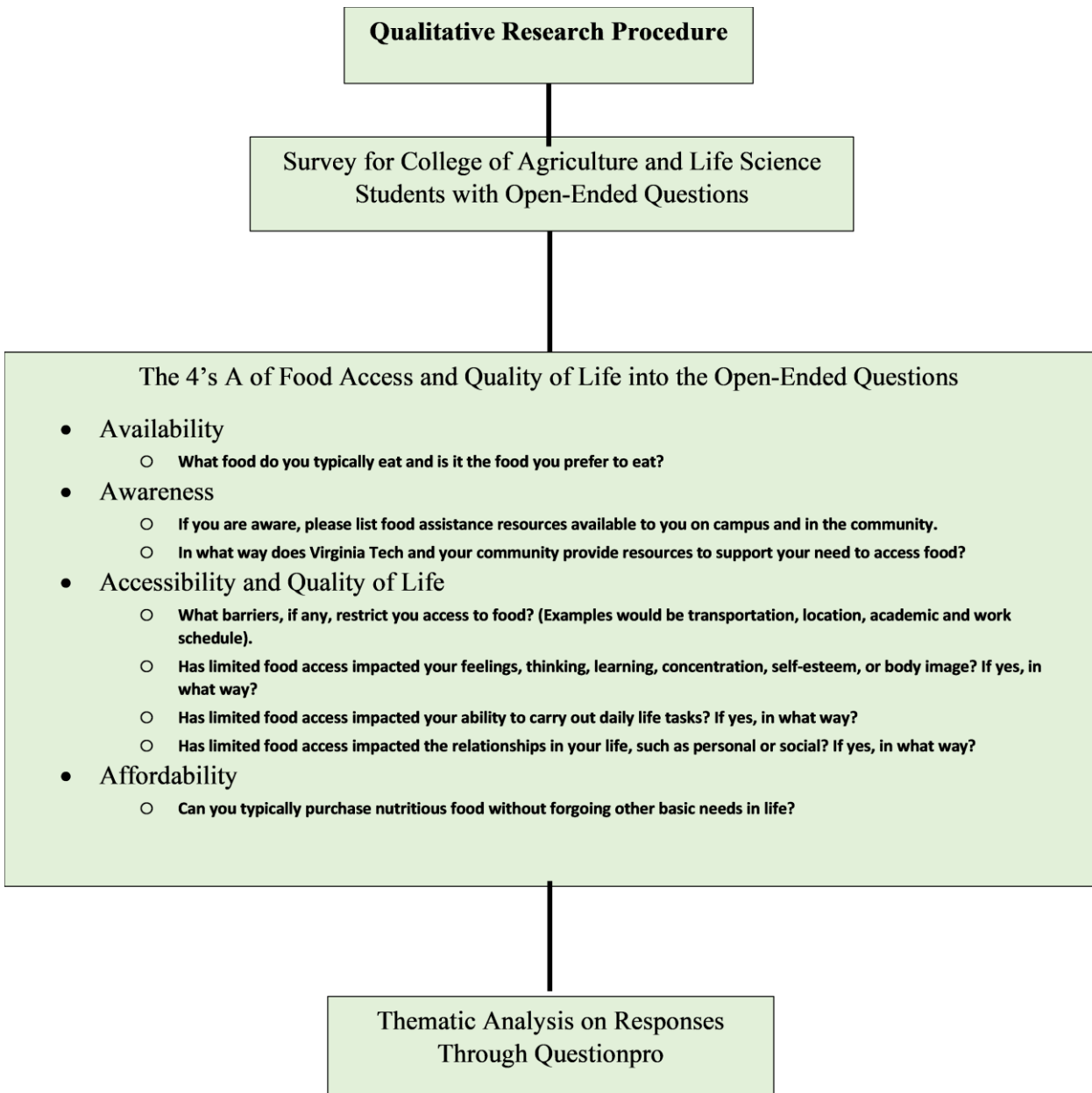
Research Question

How does food access impact the quality of life for first-generation, international, rural, and urban students in the College of Agriculture and Life Sciences at Virginia Tech?

Objectives

- ❖ Determine how food accessibility, affordability, availability, and awareness impact QoL for College of Agriculture and Life Sciences students at Virginia Tech.
- ❖ Determine how environment, physical health, psychological health, and social relationships affect College of Agriculture and Life Sciences students at Virginia Tech.
- ❖ Determine how food access and QoL interact with one another?

Figure 1.2 Qualitative Procedure Diagram



Manuscript #3

Student voices: A mixed-method approach to understanding the quality of life of students living with food access concerns at Virginia Tech

Purpose Statement

This mixed-method research study aims to understand how food access impacts the QoL of College of Agriculture and Life Science students by examining multiple choice and open-ended questions from a survey that is then compared to responses from student interviews. College students have food access barriers (Anderson et al., 2022; Schwartz et al., 2019), but examining how food access and QoL affect first-generation, international, rural, and urban student populations in the CALS has yet to be explored. The research will open the conversation about how agricultural students combat hunger while majoring in and pursuing a career in agriculture.

Research Question

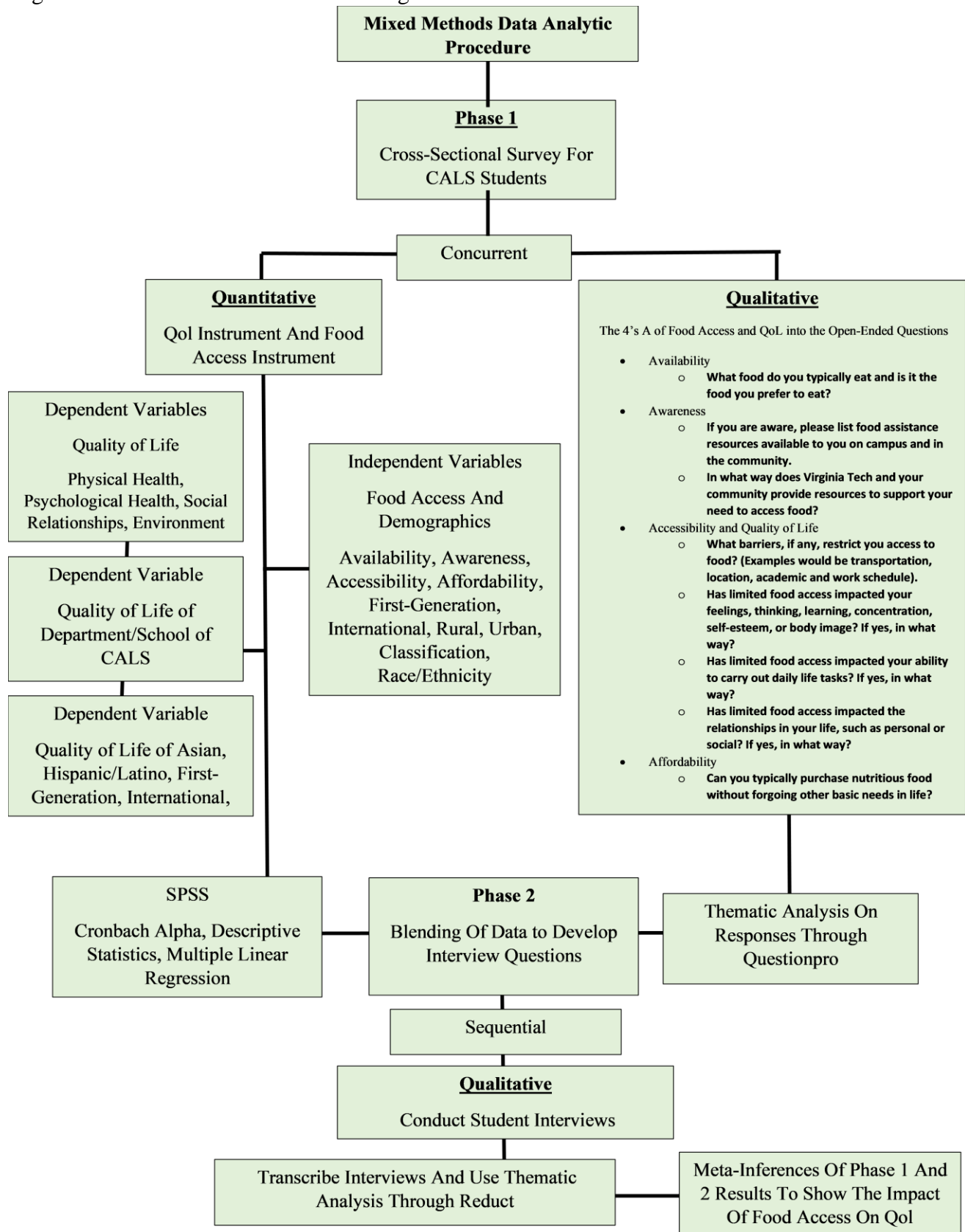
How does food access impact the quality of life for first-generation, international, rural, and urban students in the College of Agriculture and Life Sciences at Virginia Tech?

Objectives

- ❖ Understand how food access affects the QoL of first-generation, international, rural, and urban in the College of Agriculture and Life Sciences at Virginia Tech.
- ❖ Determine food accessibility, awareness, availability, and affordability of first-generation, international, rural, and urban in the College of Agriculture and Life Sciences at Virginia Tech.

- ❖ To determine how physical health, psychological health, social relationships, and environment affect QoL of first-generation, international, rural, and urban students in the College of Agriculture and Life Sciences at Virginia Tech.
- ❖ Explain how the effects of food access contribute to QoL for students.
- ❖ To determine the variations between first-generation, international, rural, and urban student groups.
- ❖ To understand the QoL of students living with food access concerns at Virginia Tech.

Figure 1.3 Mixed-Method Procedure Diagram



Summary

Higher education has faced many challenges during the Covid-19 pandemic (Marinoni et al., 2020; Rashid & Yadav, 2020). However, colleges have proven that adapting and evolving is possible. Food access concerns among students will likely continue as cost-of-living increases. Exploring avenues to support students will be necessary in order to retain students. As tuition costs continue to rise, students have to take on more and more debt to attend. The negative pressures of balancing work, school, and life will continue to impact students attending college. A student's QoL may be affected in a negative way if they do not have access to the basic necessities, such as food, while in school, thus impacting their future (Frongillo et al., 2017; Hanmer et al., 2021; Sok et al., 2018). Students who are supported will be more likely to stay in school and complete their degrees (Jorgenson et al., 2018). Faculty, staff, and administration on college campuses can play an integral role in creating a supportive environment for students by helping them overcome their food access difficulties.

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Chapter 2

Literature Review

What is Maslow's Hierarchy of Needs?

Maslow (1943) suggested that everyone has needs that must be met based on a hierarchy. Maslow (1943) stated, “A person who is lacking food, safety, love, and esteem would most probably hunger for food more strongly than for anything else.” In Maslow's hierarchy of needs (MHoN), individuals will put physiological necessities before other needs.

MHoN is as follows, starting with the greatest need: physiological, safety, love and belonging, esteem, and self-actualization. The five needs are grouped into the following categories: basic needs, psychological needs, and self-fulfillment. The hierarchy of needs can be further broken down into deficiency needs (lower order) to growth needs (higher order) (Ansorger, 2021; McLeod, 2018). If an individual struggles to meet physiological needs, feeling safe and secure will not be fulfilled until food, water, and shelter are satisfied. Once an individual has reached self-actualization, their full potential is achieved.

Physiological Needs

The basic needs for anyone to survive and meet the biological requirements of life are food, water, rest, clothing, shelter, and reproduction (Maslow, 1943, Mcleod, 2018). Maslow (1943) states,

“Undoubtedly, these physiological needs are the most pre-potent of all needs.

What this means specifically is that in the human being who is missing everything in life in an extreme fashion, it is most likely that the major motivation would be the physiological needs rather than any others.” (p. 5)

A person living in the physiological needs state is living in a survival mode. A person will do everything in their power to satisfy hunger and will be in a state of constantly thinking about meeting the need (Maslow, 1943).

Safety Needs

The next level of obtainment in the hierarchy of needs is security and safety. After an individual has met the necessities of life, they want to feel secure and safe (Maslow, 1943; Mcleod, 2018). These needs can include protection from violence and theft, emotional stability and wellbeing, health security, and financial security. Maslow (1943) states an individual will have a common preference for a job, the desire for a saving account, and for quality insurance such as medical, dental, and disability.

Belonging and Love Needs

Once an individual meets the basic of physiological and safety needs, Maslow (1943) states the individual will,

“Hunger for affectionate relations with people in general, namely, for a place in his group, and he will strive with great intensity to achieve this goal. He will want to attain such a place more than anything else in the world and may even forget that once when he was hungry, he sneered at love.” (p. 9)

Interpersonal relationships motivate individuals' behavior and provoke a need for belonging and love. The connections can come in the form of friendships and family bonds, both with biological family and chosen family, physical and emotional intimacy, or social groups.

Esteem Needs

Maslow (1943) states,

“All people in our society (with a few pathological exceptions) have a need or desire for a stable, firmly based, (usually) high evaluation of themselves, for self-respect, or self-esteem, and for the esteem of others. By firmly based self-esteem, we mean that which is soundly based upon real capacity, achievement, and respect from others.” (para. 5)

Esteem is broken down into two categories (Maslow, 1943). The first is the individual’s self-esteem which can be classified as dignity, achievement, mastery, confidence, and independence. The second category is self-respect and prestige, reputation, importance, and status.

Self-actualization

Maslow (1943) defines self-actualization as, “the person’s desire for self-fulfillment, namely, to the tendency for him to become actualized in what he is" and that "what a man can be, he must be.” McLeod (2018) says, “Every person is capable and has the desire to move up the hierarchy toward a level of self-actualization. Unfortunately, progress is often disrupted by a failure to meet lower-level needs. Life experiences, including divorce and loss of a job, may cause an individual to fluctuate between levels of the hierarchy.” The need will vary from person to person based on their desires and aspirations.

What is Quality of Life?

How one perceives quality of life (QoL) can vary and has to be cogitated in a multidimensional way. The term QoL was introduced in medicine by Elkinton (1966), stating,

“What every physician wants for every one of his patients old or young, is not just the absence of death but life with a vibrant quality that we associate with a vigorous youth. This is nothing less than a humanistic biology that is concerned, not with material mechanisms alone, but with the wholeness of human life, with the spiritual quality of life that is unique to man.” (p. 714)

His take on the term was focused on a medical perspective of the ethical treatment of patients (Post, 2014). The WHO (1947) first defines QoL as a "state of complete physical, mental and social wellbeing, and not merely the absence of disease and infirmity." Then in 2012, the WHO redefined QoL as, "individuals' perceptions of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns." The new definition of QoL was proposed to show a broad view of what is meant by the term.

Another description of QoL in medicine is by Ware (1987), who states, “The goal of the health care system is to maximize the health component of quality of life, namely health status. Measures of health outcomes should be defined accordingly.” Haraldstad et al. (2019) and McGee (2001) express the importance of using QoL measurements because getting patient feedback can improve symptom relief, care, and rehabilitation in medicine. McGee (2001) goes as far as to say, "Assessment to facilitate decision making for the individual patient is not widely used at present" and that, "Professional judgment consistently underestimates patient QOL.”

Haraldstad et al. (2019) asserts, “QOL is a complex concept that is interpreted and defined in a number of ways within and between various disciplines.” No matter how it is defined, it is certain that assessing QoL in schools can provide leadership, educators, and the

community with vital information to help in the development and implementation to benefit educational programs and policies on students (Erez et al., 2020).

QoL is broken down into six domains (physical health, psychological health, level of independence, social relationships, environment, and beliefs) by WHO (2012). The following will show how each domain is defined in its subcategories and how an individual interacts with each one.

Physical Health

Physical health can be defined as the ability to carry out a daily task and the wellbeing of an individual's body (Nishat, n.d.). How one's body functions and handles everyday life can be an indicator of their physical health. A person's physical health is essential to maintain because the implications can impact a myriad of outcomes from birth to adulthood (CDC, 2020; Hancock, 2021). The Australian Government Department of Health (n.d.) states,

“A balanced diet, proper sleep, and cutting down unhealthy habits such as smoking, alcohol, and drugs are some of the key physical health factors that can promote mental wellbeing. Some of the things that can affect mental wellbeing are stress, working too much, and being too inactive.” (para. 2)

The WHO (2012) lists the following as subcategories for physical health: pain and discomfort, energy and fatigue, sleep and rest. These categories must be considered when evaluating the state of one's physical health.

Pain and Discomfort

Ashkenazy & DeKeyser Ganz (2019) define the difference between pain and discomfort as follows,

"Discomfort can be physical or psychological and is characterized by an unpleasant feeling resulting in a natural response of avoidance or reduction of the source of the discomfort. Pain is one of the causes of discomfort, but not every discomfort can be attributed to pain." (para. 5)

Reducing or eliminating pain or discomfort can improve an individual's QoL. The WHO acknowledges that even though an individual might not be in pain, the thought or threat of oncoming pain can impact the QoL of someone.

Energy and Fatigue

Ankerman (2021) stresses the importance of understanding the difference between tiredness and fatigue by saying, "Tiredness is something that is natural. You might be tired after a busy day at work or exercising. That's normal, and most people experience that," but with fatigue, "No matter how much you rest, or how little you do, you still have this feeling of not having a ton of energy or ability to do much." When an individual is experiencing fatigue the amount of energy that will be expended in daily activities or tasks will be low. Fatigue can be the result of several different causes such as illness, depression, or overexertion (WHO, 2012).

Sleep and Rest

Sleep and rest are needed to function in everyday life. The amount of each that an individual obtains will impact QoL. An individual's sleep and rest can be impacted by trouble going to sleep, waking up during sleep, waking up too early and not being able to go back to sleep, or not feeling refreshed after sleep (WHO, 2012). Berger et al. (2020) states,

"Sleep gives your body and brain time to recover from the stresses of the day. After a good night's sleep, you perform better and are better at making decisions. Sleep can help

you feel more alert and optimistic and get along with people better. Sleep also helps your body ward off disease." (para. 2)

Not being able to rest properly will impact your brain's ability to function and perform a task. In certain situations, if an individual can not concentrate on a task due to lack of sleep, it may even put them or someone else in danger.

Psychological Health

In Donatelle & Ketcham's (2019) book, psychological health is defined as how one thinks, feels, relates, and exists in day-to-day life and how one's skills and experiences shape it. The psychologically unhealthy state showcases poor QoL attributes for individuals. Levine et al. (2021) further explains the negative consequences on psychological health,

"Negative psychological health encompasses depression, chronic stress, anxiety, anger, pessimism, and dissatisfaction with one's current life. Positive psychological health is also multifaceted and may be characterized by a sense of optimism, a sense of purpose, gratitude, resilience, positive affect (i.e., positive emotion), and happiness." (para. 2)

The WHO (2012) lists the following subcategories for psychological health: positive feelings, thinking, learning and concentration, self-esteem, body image and appearance, and negative feelings.

Positive Feelings

According to the WHO (2012), positive feelings can be synonymous with contentment, balance, peace, happiness, hopefulness, joy, and enjoyment of the good things in life. How a person views the future is focal in one's positive feelings.

Thinking, Learning, Memory, and Concentration

Thinking, learning, memory, and concentration demonstrates the speed of thought and clarity of thinking for an individual (WHO, 2012). How one processes information and the ability to make decisions will impact current and future QoL, as it pertains to college life, careers, families, and everyday life.

Self-esteem

An individual's self-esteem is interpreted as how one feels about themselves, whether positive or negative (WHO, 2012). Research has been conducted that indicates links between low self-esteem and poor QoL (Hemati & Kiani, 2016; Gold, 2016). An individual interprets their self-esteem by what is meaningful and relevant to their quality of life (WHO, 2012).

Body Image and Appearance

According to the National Eating Disorder Association (n.d.), "body image is how you see yourself when you look in the mirror or when you picture yourself in your mind," and that body image "is an important part of mental wellbeing and eating disorders prevention." How one views their image can be positive or negative and can be affected by how others view them (WHO, 2012).

Negative Feelings

Negative feelings can be experienced in the form of despondency, guilt, sadness, tearfulness, despair, nervousness, anxiety, and a lack of pleasure in life (WHO, 2012). The Better Health Channel (n.d.) explains why negative feelings are harmful by explaining,

“Negative emotions stop us from thinking and behaving rationally and seeing situations in their true perspective. When this occurs, we tend to see what we want and only remember what we want to remember. This only prolongs the anger or grief and prevents us from enjoying life.” (para. 3)

Lawson (n.d.) argues that chronic stress can contribute to negative attitudes as well as feelings of helplessness and hopelessness. This is because stress upsets the body’s hormone balance, depletes brain chemicals required for happiness, and attacks the immune system. Negative feelings disrupt one’s general sense of wellbeing and have an adverse impact on one’s overall QoL.

Level of Independence

The ability to safely and autonomously carry out activities of daily living is one’s level of independence (Australian Institute of Health and Welfare, n.d.). Working, leisure activities, and medications are being taken to help complete day-to-day tasks can all impact QoL. According to the WHO (2012), the level of independence can be broken down into the subcategories of mobility, activities of daily living, dependence on medications or treatments, and work capacity.

Mobility

Mobility can be defined as the potential for movement and the ability to get from one place to another using one or more modes of transport to meet daily needs (Eltis, n.d.). Mobility can be determined by an individual’s abilities to move from one place to another, move around the home, move around the workplace, or get to and from transportation services (WHO, 2012).

Activities of Daily Living

Activities of daily living include the ability to perform personal care tasks such as bathing or showering, dressing, getting in and out of bed or a chair, walking, using the toilet, and eating (Kernisan, n.d.; Lawton, 1963; WHO, 2012). Performing these daily activities without the assistance of other individuals is key. Edemekong et al. (2022) states, "The inability to accomplish essential activities of daily living may lead to unsafe conditions and poor quality of life."

Dependence on Medication or Treatments

The WHO (2012) defines as a dependence on medication or treatments dependency on medication or alternative medication that supports one's physical or psychological wellbeing. The dependency can be seen as positive or negative depending on the effect on one's QoL. For example, one using painkillers as a cancer patient is considered a positive dependency because the pain is being treated and is enhancing their QoL.

Work capacity

Anbazhagan et al. (2016) and Ilmarinen & Tuomi (2004) define work capacity as the ability to perform physical work while applying aerobic capacity, endurance, energetic efficiency, voluntary activity, and work productivity. Work can also be defined as any significant activity in which the person is engaged in the following major activities: paid work, unpaid work, voluntary community work, full-time study, childcare, and household duties (WHO, 2012).

Social Relationships

The sum of positive or negative social interactions between people over time can be termed social relationships (Sam, 2013). Individuals with active social relationships are more likely to be satisfied with their lives (Amati et al., 2018). Umberson & Montez (2010) found that,

“(1) social relationships have significant effects on health

(2) social relationships affect health through behavioral, psychosocial, and physiological pathways

(3) relationships have costs and benefits for health

(4) relationships shape health outcomes throughout the life course and have a cumulative impact on health over time

(5) the costs and benefits of social relationships are not distributed equally in the population.” (p. 1)

Social relationships impact daily living for individuals. If one does not have a strong social network, then their QoL will be impacted. The WHO (2012) lists the following subcategories for social relationships as personal relationships, social support, and sexual activity.

Personal Relationships

The ability and opportunity to love, to be valued, and to be intimate with others, a sense of loving and being love, and the extent to which people feel they can share moments of both happiness and distress with loved ones is defined as personal relationships (WHO, 2012). People

can form close connections through emotional bonds and human interactions as they share life with family, friends, and partners.

Social support

Social support is how a person perceives the commitment, approval, and availability of practical assistance from family and friends (WHO, 2012). An individual may seek support from their family, friends, neighbors, religious affiliations, colleagues, caregivers, or support groups. Individuals' QoL can be affected by adverse social support, such as verbal and physical abuse.

Sexual Activity

WHO (2012) defines sexual activity as the "urge and desire for sex, and the extent to which the person is able to express and enjoy his/her sexual desire appropriately." According to the WHO (2006), sexual health is defined as "a state of physical, emotional, mental and social wellbeing in relation to sexuality; it is not merely the absence of disease, dysfunction or infirmity." One's QoL may be affected by little or no desire for sex.

Environment

According to Braveman et al. (2011), an individual's environment can impact health in a multitude of ways. A person's environment includes their access to such fundamental resources as air, water, and land. For some, the quality of these basic needs is questionable and not always the safest. Research has shown that the environment one lives in can directly affect health and the overall quality of life. Individuals that have access to public space and a healthy beneficial environment are more likely to perceive that they possess a good quality of life (Chang et al., 2020).

The Office of Disease Prevention and Health Promotion (n.d.) states,

“Implementing and enforcing environmental standards and regulations, monitoring pollution levels and human exposures, building environments that support healthy lifestyles, and considering the risks of pollution in decision-making can improve health and quality of life for all Americans.” (para. 1)

The WHO (2012) lists the following subcategories for the environment: physical safety and security, home environment, financial resources, health and social care, opportunities for acquiring new information and skills, participation in recreation/leisure activities, physical environment, and transportation.

Physical Safety and Security

An individual’s safety and security in the environment in which they live is important to how they perceive QoL. A threat to safety and security can destroy a person’s sense of freedom. The WHO (2012) addresses that certain groups may be more likely to be affected. Such groups could be victims of disasters, the homeless, people in dangerous professions, people living in high-crime rate areas, and victims of abuse.

Home Environment

The place in which one sleeps and keeps their possessions is their home environment. A healthy and safe home environment is crucial to having good QoL and for promoting and protecting health and development (Bronfenbrenner, 2001; Schmeer & Yoon, 2016). The basic needs of a home environment are water, shelter, clothes, and food. The psychological environment of a home includes the mutual interactions of family members, respect, a voice in family matters (Khan et al., 2019).

Financial Resources

How much a person can buy or spend is depicted as their financial resources. An individual's QoL is impacted by the degree their resources provide for and promote a healthy and comfortable life (WHO, 2012). Catapano et al. (2022) summarized,

“Being able to enjoy these external sources of happiness, people with greater financial resources do not have to rely on more internal sources to feel happy. Conversely, people with fewer financial resources must rely on the sources of happiness available to them—including their sense of meaning in life, which is cognitively constructed.” (p. 2)

Health and Social Care: Accessibility and Quality

Access to and the availability of quality health and social care will influence QoL. The health of an individual is directly impacted by the health services in the community. When trying to access health care, a common theme is how individuals from marginalized groups are unequally treated compared to others (Smedley & Nelson, Eds.; Fein & Geiger, 2019). Not only do marginalized groups have fewer options to be insured, but the quality of care and treatment received is often lower in quality.

Opportunities for Acquiring New Information and Skills

Individuals need to have a sense of being included in what is happening in the world around them. The WHO (2012) states, “a person's chances to fulfill a need for information and knowledge whether this refers to knowledge in an education sense, or to local, national or international news that has some relevance to the person's quality of life.” Information or skills obtained can be from a variety of different sources.

Participation In and Opportunities for Recreation/ Leisure Activities

The WHO (2012) describes participation in recreation and leisure activities as a person's capacity for, opportunities for, and enjoyment of recreation and relaxation. The activities can range from seeing friends to reading or simply doing nothing.

Physical Environment (Pollution/Noise/Traffic/Climate)

Pollution, water quality, mold, access to food, and other physical environmental factors influence an individual's health. These factors are largely determined by where an individual lives. Lower-income communities are more likely to experience health issues due to a poor physical environment.

Transport

Transportation, access to one's own public means of transport, will affect the QoL of an individual. A person may have a more difficult time performing a daily task without the proper means of and access to transportation (WHO, 2012). The freedom to choose leisure activities can be also impacted by the manner of transportation for an individual.

Beliefs

Religious, Spiritual, and Personal Beliefs

A belief system can shape one's overall QoL and can be based on certainties, probabilities, or matters of faith. The WHO states, "For many people, religion, personal beliefs, and spirituality are a source of comfort, wellbeing, security, meaning, sense of belonging, purpose, and strength. However, some people feel that religion has a negative influence on their life." An individual may derive an overall sense of wellbeing from their personal beliefs.

What is Food Access?

Recent studies have shown a correlation between food access and academic achievement, mental health, and physical health in college students (Gutiérrez et al., 2013; Payne-Sturges et al., 2018; Peterson & Freidus, 2020). In order to explore and understand food access, the differences between it and food security should be clarified and addressed. Individuals with consistent and dependable access to food are considered to be food secure (Coleman-Jensen et al., 2021). Gundersen et al., (2022) found that 100% of counties and congressional districts have individuals or families experiencing hunger. The Food and Agriculture Organization of the United Nations defines food security as “a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.” This further helps to substantiate the role access plays in food security. The United States Department of Agriculture (USDA) Economic Research Service (ERS) (n.d.) differentiates between food security and food insecurity. Food security is defined as having high or marginal, references food insecurity as low or very low. Whether an individual experiences food security or insecurity will depend on having consistent and dependable food access (Coleman-Jensen et al., 2021). Thus, food security is dependent on an individual’s food access.

Another term associated with food security and food access which should be explored is nutrition security. Poor nutrition has been shown to be a leading cause of illness in the United States and responsible for more than 600,000 deaths per year (USDA 2022; Xu et al., 2021). According to Mozaffarian et al., (2021) nutrition security is described as, “having consistent access, availability, and affordability of foods and beverages that promote well-being and

prevent (and if needed, treat) disease”. The USDA (2022) adds to the nutrition security definition by stating,

“Recognizing that Americans, in general, fall short of an active, healthy lifestyle, aligned with our Nation’s dietary and physical activity guidelines and emphasizing that we apply an equity lens to ensure our efforts to promote access, availability, and affordability to foods and beverages serve all populations and address the connection between food insecurity and diet-related chronic diseases.” (p. 1)

Additionally, while food security focuses mainly on access and availability of food for an individual, nutrition security broadens the definition to add diet quality and nutrition (Mozaffarian et al., 2021). Nutrition security also encompasses the aspects of health services, healthy environment, and caring practices (Pangaribowo et al., 2013). To achieve food nutritional security examining food access, the foods that are available, accessible, and affordable need to be nutritional as well for an individual.

Food security and nutrition security are important driving factors when examining food access, but what exactly is food access? The United States Agency of International Development (USAID) (1992) describes food access as "individuals having adequate incomes or other resources to purchase or barter to obtain levels of appropriate foods needed to maintain consumption of an adequate diet/nutrition level.” The Agriculture and Economic Development Analysis Division (2006) defines food access as “access by individuals to adequate resources (entitlements) for acquiring appropriate foods for a nutritious diet.” The USDA Economic Research Service (ERS) (n.d.) defines factors affecting food access as the following,

- ❖ *“Accessibility to sources of healthy food, as measured by distance to a store or by the number of stores in an area.*
- ❖ *Individual-level resources that may affect accessibility, such as family income or vehicle availability.*
- ❖ *Neighborhood-level indicators of resources, such as the average income of the neighborhood and the availability of public transportation.” (para. 1)*

Further literature proposes that food access is associated with availability, accessibility, accommodation, and affordability (Cason & Boege, 2020; Costigan, 2020; Dhillon, 2019; Usher, 2015). While in an international context, Rozaki (2021) argues that looking at food access, food availability, food accessibility, and food utilization is critical to achieving food security. Food access has been expanded and a better understanding can only be achieved when it is examined in the light of all of its dimensions.

When looking at food access, understanding that it has many contributing factors is important because not one individual or population is the same. No one yardstick or measurement can be applied across the board. Focusing on the characteristics of a certain individual or population and the barriers specific to them can help find resources and programs to support their needs. Attending college is a specialized time of life in which students are potentially faced with barriers that others experiencing food access concerns don't encounter.

Figure 2.1 Multidimensional Outlook on Food Access



Since some of the diction is relatively new in food access studies, multiple viewpoints are incorporated into the descriptions of the terms being used in figure 2.1 (Cason & Boege, 2020; Dhillon et al., 2019; Usher, 2015). The following discussion focuses on four areas of food access that play a role in one's food security and how we can use these terms to better understand the barriers someone may face. The following four categories explored are accessibility, availability, affordability, and awareness.

Accessibility

Food accessibility pertains to how easily someone can obtain healthy and nutritious foods (Usher, 2015). Systematic barriers that play into whether or not accessibility is affected are poverty, high food prices, low skills/knowledge, unhealthy food environments, climate change, and urbanization (Gerritsen et al., 2019). The goal is to have an equitable food system for everyone to access without barriers. College students, for example, may have limited access to

food due to a lack of private and public transportation in the community where the college resides. Baugus (2020) stated, “Low-income individuals from rural areas often rely on their support network of friends and family to provide transportation. Often low-income individuals do not have their own transportation or are utilizing a vehicle that may not be reliable.” Students, additionally, have to work around an ever-changing schedule of academics, work life, and social life while trying to access food.

Factors to consider:

❖ College student schedules vary according to classes, homework, extra activities, and work. When hours vary, it can be hard for the students to go shopping for food (Sogari et al., 2018). The stores that are open when a student has the opportunity to shop may not have what is nutritious or affordable.

❖ Infrastructure (Internal and External)

Internal: The attitude and demeanor of how people that work at food banks, food pantries, or other food-supported programs matter. If an individual has a negative encounter while using a supportive program, they may not use it again. Also, having multiple support program options available can help increase accessibility for students.

External: Transportation is a leading factor in whether or not someone can access food.

Thrive: NRV Food Access Network. (2019) states, “*low food access is also impacted by access to a vehicle and the distance to a grocery store.*” If one does not have a car, live next to a bus or train station, have a bike, have sidewalks to use, or even live in a safe neighborhood, it will influence accessibility. Most students rely on transportation in order to commute to work.

❖ Drexel University (2018) states, “for more than twenty years of national food insecurity measurement, there have been persistent and severe gender, racial and ethnic disparities.” Systematic barriers can be affecting students on campus from accessing needed resources. Ilieva et al. (2019) found students to have a “distrust of the college institution” and that “both researchers and college institutions must examine the inadvertent signals that institutions send to food-insecure students through their food policies.” Higher education leadership can better help foster an environment that breaks down barriers to food-insecure students.

❖ Students face a long list of eligibility requirements when trying to receive SNAP benefits. USDA (2021) states,

“Generally, students attending an institution of higher education (i.e., college, university, trade/technical school) more than half-time are not eligible for SNAP unless they meet an exemption. The institution of higher education determines what is considered ‘half-time’ enrollment. Students who meet an exemption must also meet all other SNAP eligibility requirements.” (para. 5)

The eligibility for SNAP was changed recently due to the Covid-19 pandemic helping to elevate difficulty in obtaining food.

Availability

The definition of food availability varies but mainly consists of whether or not there is enough food in terms of quantity, variety and quality (Mockshell & Villarino, 2019; Ogot, 2021). The availability of foods in an individual’s proximity can vary depending on the location. Individuals

experiencing food availability concerns are often affected by the environment in which they live (Paquet, 2019).

Factors to Consider

Older Terminology

- ❖ Food deserts are defined as regions where residents don't have access to affordable, healthy food options due to the proximity of grocery stores (USDA & ERS, 2009). However, as The Food Empowerment Project (2010) acknowledges, this definition does not take into account systematic issues such as racism, cost of living, people being time-poor and cash-poor, cultural appropriateness of available foods, and the ability of people to grow their own foods.
- ❖ Food swamps are food environments that characteristically have large numbers of fast-food retailers and convenience stores (Chew et al., 2020; Cooksey-Stowers et al., 2017). CDC (n.d.) states, "Low-income and minority communities often lack convenient places that offer affordable, healthier foods."
- ❖ Food banks and food pantries are becoming more prevalent on college campuses as food resources for students. Feeding America (n.d.) currently operates 316 food pantries and 124 mobile food pantries on college campuses. They provide food access opportunities to college students, with 129 food banks around college campuses in operation. Food banks are non-profit organizations that can store large amounts of food donations and supply people in need directly at the food bank or from food pantries located in the area (Feeding America, (n.d.)). In contrast, a food pantry collects and distributes food provided by the food bank, thereby offering support to the local

community. In a food bank or pantry, providing precisely what someone needs can be challenging depending on the season, amount of donations, and the cost of items that must be purchased.

Newer Terminology

- ❖ Low-Income Area (LI) is classified by USDA’s ERA Food Access Research Atlas (n.d.) as “poverty rate of 20% or greater, or median family income at or below 80% of the statewide, or metropolitan area median family income.” Johnson et al. (n.d.) raises the concerns however for the criteria of LI areas by pointing out that, *“Income and distance to nearby supermarkets as the leading indicators of food access using available census tract data may omit other factors that some cities and communities may regard as important under alternative definitions, such as race or local geographic conditions.” (p. 1)*
- ❖ Low-Access Area (LA) is defined by USDA ERA Food Access Research Atlas (n.d.) as “a low-income tract with at least 500 people or 33% of the tract’s population living more than 1 mile (urban areas) or more than 10 miles (rural areas) from the nearest supermarket or grocery store.” Johnson et al. (n.d.) points out that the definition provided by USDA ERA Food Access Research Atlas does not encompass all factors that go into food access when using the tool. Only considering distances to food resources and not accounting for additional places to purchase food hinders the overall ability to accurately represent access to food.

Affordability

Food prices and people's perception of worth relative to cost relates to affordability (Cafer et al., 2018). Students often work off a small budget when going to school. As the global food system has been impacted by Covid-19 and ongoing conflict, access to affordable food has become more complicated. While it is possible for students to take loans out, work multiple jobs, and scrape by with the essentials, this scenario is not preferable. Why should this be the norm for so many college students? Higher education can provide reduced meal plans, food scholarships, or emergency funds for students to access when in need.

Factors to Consider:

- ❖ As food prices continue to increase and the food chain supply is disrupted, having available resources for students is crucial (IPES-Food, 2022).
- ❖ Having a meal plan has been shown to help reduce food insecurity; however, meal plans at colleges and universities are costly. Students are often forced to take out more loans to purchase a meal plan (Mathewsona, 2017).
- ❖ Food scholarships would be a means to support students in need on campus. Houston Community College in Texas currently provides food scholarships to new and existing students with limited financial resources (Bronton et al., 2020). Providing students with these scholarships would enable more students to finish college.
- ❖ Another factor contributing to students experiencing food affordability concerns is the rise in cost of living expenses. Cost increase in living expenses such as tuition, medical expenses, childcare, rent, and utilities, deplete the funds available to purchase

food (Fernandez et al., 2019). A student may decide not to purchase the food needed in order to pay for these and other unforeseen expenses.

To say food access is limited solely by insufficient funds to purchase food is simplistic. Food access may be impacted by a variety of factors. A multidimensional area of study must be considered when determining an individual's ability to access food. Greenberg et al. (2010) states, "Inadequate nutrition all too often is associated with inadequate shelter, lack of health care, and bad education, and poverty is at the core of all." Defining food access is only achievable if we look at all the factors contributing to the problem.

Awareness

Awareness of available resources on campus and how to access them can help combat food insecurity for college students (Hagedorn-Hatfield et al., 2022). Food resources such as emergency grants, food banks/pantries, SNAP education, or nutritional education will only be effective if students are aware of them. These services cannot be successful if students are not aware of their existence.

Factors to consider:

- ❖ College students may not be aware of what is available to them on campus. Making information about resources more prominent is key to food access. Having programs students can use prominent during orientations, in-school handbooks, flyers on campus, and even on course syllabi can help increase awareness of resources. Brnton et al. (2020) showcased what could be included on a syllabus for students by giving this statement,

“Any student who has difficulty affording groceries or accessing sufficient food to eat every day or who lacks a safe and stable place to live, and believes this may affect their performance in the course, is urged to contact the Dean of Students for support. Furthermore, please notify me if you are comfortable in doing so. This will enable me to provide any other resources that I may possess.” (p. viii)

- ❖ It should be required that anyone on campus responsible for sharing resource information with students should be properly trained on what resources are available and how they work. SNAP, for example, can be very confusing to use even if a college student has eligibility.
- ❖ Training in cultural competency for leadership, staff, and educators would be beneficial by raising awareness on how to better support students in certain sectors. Feeding America (2021) argued importance of, “promoting respect and understanding, valuing and appreciating human difference, and upholding the experience of equity and social justice in all the food bank network’s policies and interactions.”
- ❖ Including inclusive marketing of resources can help spread awareness of food access programs on campus.

How do MHoN and QoL Relate to Food Access on Campus?

In their most recent study, The Hope Center (2021) found that 39% of students at a 2-year institution and 29% of students at a 4-year institution were food insecure. The same study shows that 3 out of 5 students experience basic needs insecurity while at college. Of the students experiencing basic needs insecurity, 52% said they didn't apply for support because they didn't know how to. Students struggling to pay for basic needs such as food have a higher incidence of

low performance in school and more mental health challenges (Regan, 2020). Having limited food quantities or going without food causes a student to have less energy to attend, participate in, and study for classes, thus leading to poor academic performance (Thoelke, 2021).

Ansorger (2021) said students need food, water, rest, oxygen, health, and safety at home the basic requirements of Maslow's hierarchy in order to learn, grow, and develop. Ansorger reinvented MHoN to show how students are impacted by creating a pyramid that incorporates emotional wellness in the physiological wellness level are basic need. It is crucial to acknowledge that mental health and wellness are basic life needs because without first meeting them other facets of the pyramid will not be met. McLeod (2018) says,

“Before a student's cognitive needs can be met, they must first fulfill their basic physiological needs. For example, a tired and hungry student will find it difficult to focus on learning. Students need to feel emotionally and physically safe and accepted within the classroom to progress and reach their full potential.” (p. 12)

Studies have also shown the correlation between food insecurity and adverse effects on QoL for individuals (Frongillo et al., 2017; Hanmer et al., 2021; Sok et al., 2018). Having basic needs meet results in improved QoL of students, thus increasing successfully completing their course of study. Once acquired, Braveman et al. (2011) states, having access to education can improve health overall by providing better economic outcomes for individuals, thus even further enhancing the quality of life of the individual.

For a student to succeed in college it is critical to have their basic needs met. College Atlas (2018) shows that 30% of first-year college students drop out after their first year. The research further explained various contributing factors to why students drop out, stop, or transfer

out while in college. Each factor resulting in a student leaving school can be associated with a basic need not being met, impacting their overall QoL.

Providing students with access to nutritious and healthy food will need to be at the forefront of higher education goals, especially as the diversity in the student population continues to grow. More and more first-generation, low-income, or minority students are attending college. The lack of resources and support systems on campus can be detrimental to these students' successful completion of their education goals. The most basic need that needs to be met is food. As the student population continues to grow and diversify, working to provide resources and programs for college students dealing with food access concerns can help support the overall success of students and benefit higher education by aiding in student retention.

Student Demographics Explored

Agriculture Students

In 2020 the agriculture and food sector related to 19.7 million full and part-time jobs in the U.S., totaling 10.3 percent of the overall employment (United States Department of Agriculture Economic Research Service (USDA ERS), n.d.). The agriculture, food, and associated industries totaled 1.055 trillion U.S. gross domestic product (GPD), and farmers contributed 134.7 billion of that total. Agriculture is everywhere we go and everywhere we look. Agriculture supplies the world with one of the most basic needs of food. In order to arrive at the consumer end product, someone has to produce, grow, harvest, package, and deliver the food. The individuals involved in all facets of agriculture help provide the food for consumption to the consumer.

At Virginia Tech, the College of Agriculture and Life Sciences (CALs) has approximately 2,700 undergraduate and 400 graduate students pursuing degrees (Virginia Tech, n.d.). These students come from all parts of the world but have a common denominator: agriculture. The problem is that some students who are driven to be a part of the system that provides food for everyone may be going without food themselves.

Not only is the evidence of adverse effects of food insecurity on a college campus saddening, but research has been shown that if you are in a minority group, you are more likely to experience food access concerns (Dhillon et al., 2019; Forman et al., 2018; Hall et al., 2019; Ilieva et al., 2019; Wolfson et al., 2022). Hall et al. (2019) showed that at Virginia Tech, Hispanic/Latino, Black/African American, Pell grant recipients, students financing their education, low GPA students, and students with a disability were more likely to have low or very low food security. The following will describe first-generation, international, rural, and urban students in the context of who they represent and why they matter when thinking about food access.

First Generation Students

As the belief that a degree provides the means to move up in the world continues to grow, more students are beginning a journey that their parents did not undertake (Leung et al., 2021). Being a first-generation student means that your parents did not complete a 4-year college or university degree (Center for First-Generation Student Success, n.d.). The Center for First-Generation Student Success showed that 1 in 3 undergraduate students are first-generation, and this number will continue to rise as degree attainment goes up. However, there are barriers that hinder these students from completing a degree, such as lack of family support, resources, and lack of financial aid. RTI International (2019) suggested that the low number of first-generation

students taking advantage of indicating they do not know the resources exist, cannot refer to a parent or guardian for guidance, or have barriers in their environment that prevent access. Additionally, Olfert et al. (2021) stated, “Faculty and administrators should provide first-generation students with comprehensive information and resources to understand how to receive guidance and assistance for food insecurity.” Lack of awareness of food programs and other combined barriers have been shown to leave first-generation students vulnerable to food insecurity (Forman et al., 2018; Riddle et al., 2020; Wolfson et al., 2022). Cataldi et al. (2018) stated, “proportionally more first-generation than continuing generation students had left postsecondary education without earning a postsecondary credential and had not returned.” Virginia Tech (n.d.). stated that for the year of 2022, there was a “19 percent increase in applicants identified as first-generation college students.” The increase of first-generation students will continue to rise as campuses diversify.

International Students

Open Doors (2021) found that for the fiscal year of 2020-2021, 914,095 international students were enrolled in U.S. higher education. The National Center for Education Statistics (NCES) (2020) showed that international students represented 10% of Virginia Tech’s population. International students bring their varied cultural beliefs, values, and influences to college campuses and diversify the student population. International students additionally bring economic advantages to universities. Chen (2021) found that “on average, international students’ tuition revenue accounts for 12 percent of the total tuition revenue (net of institutional aid) across public universities in 2016, exceeding 30 percent for some institutions.”

Couple with the higher cost of education and moving to unfamiliar places, international students are at risk of being affected by food insecurity. Shi et al. (2021) found that changes in

international students' diets impacted weight and adversely affected physical health, leading some to revert to their traditional diets. Introduction to a new food environment, changing original dietary habits, and having limited information on available resources are some of the reasons this sector of students may become food insecure. Additionally, international students that hold a visa are not allowed to work off-campus (Virginia Tech, n.d.).

Geographic Locations: Rural vs Urban Students

The Postsecondary National Policy Institute (PNPI) (2021) says, “rural, urban, and suburban students enroll in and complete higher education at very different rates, with rural students most often attending and graduating at much lower rates.” Marré (2017) found that urban students have more completed degrees, bachelors and higher, than rural students from 2000 to 2019. However, in the report, urban students have fewer completed high school diplomas compared to their rural counterparts. Another growing concern detailed in the report is that the urban-rural education gap among individuals with bachelor’s degrees increased from 11% in 2000 to 14% in 2015. Wells (2019) found a positive correlation between degree attainment and predictors such as parental educational attainment, family income, parental expectations, and academic preparation.

When it comes to accessing food, Feeding America (n.d.) explains that people in rural areas face higher hunger rates than individuals from urban communities. Gundersen et al. (2022) found that,

“Rural counties (those outside of major metropolitan areas) make up 63% of all U.S counties but represent 87% of counties with food-insecurity rates in the top 10%. In other

words, counties with the highest rates of food insecurity are disproportionately rural.”
(p. 8)

The report further describes how hunger in children is more prevalent in rural communities by citing, “86% of the counties with the highest percentage of children at risk for food insecurity are rural.” Goldrick-Rab et al. (2017) conducted research that showed that 53% of students attending a community college in a rural community faced food insecurity. Helping reduce nonacademic barriers such as food security, transportation, childcare, and health services could improve degree attainment for rural students (Waters-Bailey et al., 2019).

Summary

Attending college is a specialized time of life in which students are faced with barriers that others experiencing food access concerns don't encounter. Bendfeldt (2020) stated,

“Car keys and the checkbook are commonly misplaced around the house and discovered later hidden in plain sight. The food security needs of individuals and households in our communities may similarly go unnoticed and be hidden in plain sight.” (p. 1)

Students facing food access concerns have been hidden in plain sight. The need to address food access issues is continuing to grow in literature, and slowly, but surely, resources and programs are being provided and created. However, much more must be accomplished to prevent students from going hungry on campus.

Higher education wants students to stay in college. The community wants students to stay in college. The workforce wants students to stay in college. The parents of students want them to stay in college. Most importantly, students want to be successful and stay in college. Why are we not coming together as a whole and helping ensure the success of these struggling students? As

we continue to learn more about the needs of students that can and should be addressed by higher education, it is important to be able to “stop, look, and listen” to develop and create systems that support students.

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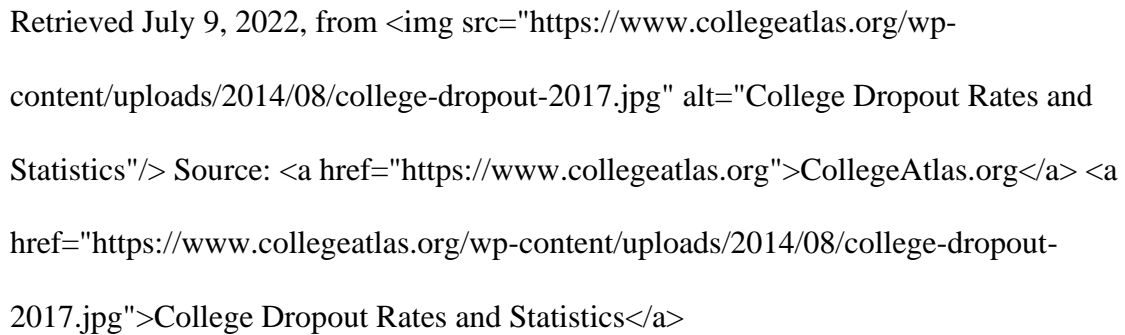
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Chapter 3

Manuscript 1

Supporting all students: Exploring how food access contributes to the quality of life for students in the College of Agriculture and Life Sciences.

Abstract

Students' ability to access the quality and quantity of food they need to be successful in college is imperative. The diversity on campuses continues to grow and provides a crucial opportunity for student's economic mobility. However, minority student populations are experiencing alarming numbers of food and nutrition insecurity. This quantitative research study explores how food access impacts the quality of life (QoL) of first-generation, international, rural, and urban students. The overall stepwise multiple regression model was found to be statistically significant with a $p=.017$ which is less than $.05$. The adjusted R square explained $.277$ or 27% of the variance in the dependent variable QoL to be affected by the predicted independent variables. The stepwise multiple regression model predicted food access, Asian race/ethnicity, first-generation student, and senior classification have an influence on QoL. When the QoL of students by department/school was explored, Agricultural and Applied Economics, Animal and Poultry Science, Biochemistry, Human Nutrition, Foods, Exercise, School of Plant and Environmental Sciences, and Combined department/schools were indicated to each be significant in a stepwise multiple linear regression and each have a highly significant relationship with QoL and food access. Exploring how food access impacts students' QoL will be important in understanding how to better support food insecure students. Addressing food insecurity on campus and providing food resources for minority student populations will be a key factor on student success while in school.

Introduction

Food security is defined as having consistent and dependable access to food (Coleman-Jensen et al., 2021). Mozaffarian et al. (2021) clarifies that food security has a greater emphasis on quantity rather than quality of food. Additionally, The Food and Agriculture Organization of the United Nations (2003) describes food security as having physical, social, and economic access to safe and nutritious food that meets the needs of dietary and food preferences.

Nutrition security builds on food security by incorporating the concepts of diet quality and health equity in addition to quantity of food (Mozaffarian et al., 2021). Nutrition security, additionally, examines the environment that one resides in and how that impacts access to quality food (Pangaribowo et al., 2013). Food access plays a role in food and nutrition security are important to establish because both play a role in food access. A person's food and nutrition security will depend on food access. Food access is defined by the ability of an individual to acquire resources to obtain appropriate foods for a nutritious diet (Gibson, 2012; The United States Agency of International Development (USAID), 1992). There are four constructs of food access: accessibility, affordability, availability, and awareness (Cason & Boege, 2020; Costigan, 2020; Dhillon, 2019; Usher, 2015).

A college student experiencing barriers to accessing food can be susceptible to food and nutrition insecurity, thus causing poor academic achievement, poor physical health, and poor mental health (Gutiérrez et al., 2013; Hall et al., 2019; Payne-Sturges et al., 2018; Peterson & Freidus, 2020, Regan, 2020).

Food Access Dimensions

The following will dive deeper into food access, particularly the factors that can affect one's access. Figure 3.1 shows four areas of food access that play a role in one's food and

nutrition security and shed light on the barriers someone may face. The four categories explored are availability, awareness, accessibility, and affordability and are adapted from literature from (Cason & Boege, 2020; Costigan, 2020; Dhillon, 2019; Usher, 2015).

Figure 3.1 Multidimensional Outlook on Food Access



Accessibility

Food accessibility is shown to be coupled with how easily someone can acquire healthy and nutritious foods (Usher, 2015). Rose & Richards (2004) stated, “Easy supermarket access was associated with a significantly greater fruit consumption.” Factors (which can be internal or external) that can potentially impact whether or not someone has food accessibility include poverty, high food prices, low skills/knowledge, unhealthy food environments, climate change, and urbanization (Gerritsen et al., 2019). If a person does not have access to healthy and nutritious foods, food accessibility could be impacted. One example of an internal barrier a student can face on campus is having an encounter with a person while using a supportive

program. A person that has a negative encounter may not use it again. Furthermore, who you have working in these places matters in determining if supportive programs accomplish their intended purposes. A negative encounter can occur at supportive services on campus but can also occur when someone may be using SNAP or WIC at grocery stores.

External barriers can impact college students in a variety of ways. An example of this is limited access to food because they do not have access to private or public transportation where the college resides. According to Baugus (2020), “Low-income individuals from rural areas often rely on their support network of friends and family to provide transportation. Often low-income individuals do not have their own transportation or are utilizing a vehicle that may not be reliable.” In addition, hectic work schedules can be a challenge for college students because of balancing academics, work, and social life, which can impact when or if they have time to access food.

Availability

Food availability is referred to as if a person has enough food in terms of quantity and whether there is enough variety in terms of food quality (Mockshell & Villarino, 2019; Ogot, 2021). The individual’s location to food sources can drastically impact food availability, based on proximity to grocery stores. Paquet (2019) discusses individuals experiencing food availability concerns can often be influenced by the environment in which they reside in. Most often the highest availability concerns are seen in low-income areas or low-access areas (USDA ERA Food Access Research Atlas, n.d.). On college campuses, food availability to students is growing with the addition of food banks and food pantries becoming more popular as places where students can access food. In the US currently 316 food pantries and 124 mobile food pantries are run by Feeding America and provide opportunities for college students to access

food (Feeding America, n.d.). In addition to the food pantries and mobile pantries, Feeding America has 129 food banks around college campuses in operation.

Affordability

The perception of worth relative to the cost and the price of food pertains to a person's affordability (Cafer et al., 2018). While in college, students are often running on a small budget to get through school, and often in time needing financial help from others or a job outside of school hours. A student having to pay for rising tuition, medical expenses, childcare cost, rent, utilities, and unforeseen costs can have an impact on whether or not they will be able to afford their next meal (Fernandez et al., 2019). A meal plan can have a positive impact of food access problems, but the cost to purchase the meal plan may lead a student to taking out an additional loan (Mathewson, 2017). Dubick et. al. (2016) discovered that "46 percent of food insecure students reported having run out of meal points before the end of the term at some time in the past, compared to 33 percent of all students on a meal plan." If a student has run out of their allotted meal plan, what or how are the students getting food? A student should not be expected to take loans out, work multiple jobs, and scrap by with the essentials, while trying to obtain a degree. The success of a student academically should be the concern they have. Not where their next meal will come from.

Awareness

Cornett (2022) found,

"Of the 49,946 participants who attended a school with an on campus food distribution center, only 38 percent knew of the resource, while 53 percent were unaware" and that, "Forty-two percent of those who were not aware that their institution offered a food pantry were food insecure." (p. 1)

A college student's awareness of where to access food resources on campus can help alleviate food insecurity (Hagedorn-Hatfield et al., 2022). Peterson et al. (2022) discussed how a majority of respondents reported they did not access resources because they lacked the knowledge of the resources available to them on and off campus. Food resources on campus such as emergency grants, food banks/pantries, SNAP education, or nutritional education will only be effective if students are aware of them.

Quality of Life

How an individual perceives quality of life (QoL) can vary and has to be considered in a multidimensional way. QoL was first introduced in medicine by Elkinton (1966), and was described as,

“What every physician wants for every one of his patients old or young, is not just the absence of death but life with a vibrant quality that we associate with a vigorous youth. This is nothing less than a humanistic biology that is concerned, not with material mechanisms alone, but with the wholeness of human life, with the spiritual quality of life that is unique to man.” (p. 714)

His perspective on QoL was focused on a medical outlook on the ethical treatment of patients (Post, 2014). The WHO (1947) is the first to define QoL as a "state of complete physical, mental and social wellbeing, and not merely the absence of disease and infirmity." Then, in 2012, QoL was redefined by the WHO stating, "individuals' perceptions of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns." This new definition of QoL was brought to light to introduce a broader view of what is meant by the term. In addition to expanding on the definition of QoL, the WHO created two instruments to measure QoL. The instruments are WHOQOL-

BREIF and WHOQOL-100. For this research study the researcher focused on the WHOQOL-BREIF instrument which consists of four domains being measured (physical health, psychological health, social relationships, and environment) (WHO, 2012).

Both Haraldstad et al. (2019) and McGee (2001) express the significance of using QoL measurements as a tool. Utilizing patient feedback in regards to their perceived QoL can improve symptom relief, care, and rehabilitation in medicine. Additionally, McGee (2001) goes on to say, “Assessment to facilitate decision making for the individual patient is not widely used at present” and “Professional judgment consistently underestimates patient QOL.” The use of assessing QoL in schools can provide leadership, educators, and the community with important information pertaining to positive and negative impacts on the development and implementation of educational programs and policies on students in school (Erez et al., 2020).

Literature has shown the adverse effects that food and nutrition insecurity have on individuals’ QoL (Frongillo et al., 2017; Hanmer et al., 2021; Sok et al., 2018). In contrast, Braveman et al. (2011) found that having access to education can improve health overall by producing better economic outcomes, and, in return, enhance one’s QoL. However, the success of a student (and, in turn, the ultimate benefit of that enhanced QoL) depends greatly on having their basic needs met, including access to nutritious, affordable food.

Theoretical Framework

Hagedorn-Hatfield et al. (2022) states, “A secure source of food is needed to thrive, yet in the United States, consistent availability of nutritious foods fails to be the reality for millions of Americans.” Maslow (1943) posited that everyone has needs that must be met based on a certain hierarchy, with physiological necessities coming before safety, then love and belonging, esteem,

and lastly self-actualization. Maslow's Hierarchy of Needs (MHoN) can be used to understand the impact of food access on QoL for college students.

MHoN holds that one's greatest need is physiological, all of the five needs are combined into categories: basic needs, psychological needs, and self-fulfillment. Maslow's theoretical concept details each level of hierarchy and what the need is supporting for an individual. Delving deeper, MHoN can be further dissected into deficiency needs (lower order) to growth needs (higher order) (Ansorger, 2021; McLeod, 2018). A person can only reach full potential once they have achieved self-actualization.

In regard to a student's basic needs, Ansorger (2021) notes that students need food, water, rest, oxygen, health, and safety at home in order to learn, grow, and develop. Furthermore, Ansorger developed a MHoN to show how students are impacted. The pyramid created by Ansorger adds emotional wellness to the physiological wellness level as a basic need requirement for an individual to be met. McLeod (2018) stated,

“Before a student's cognitive needs can be met, they must first fulfill their basic physiological needs. For example, a tired and hungry student will find it difficult to focus on learning. Students need to feel emotionally and physically safe and accepted within the classroom to progress and reach their full potential.” (p. 12)

If a student isn't able to meet their basic needs, the theory is the student has low food access and low QoL. Hanmer et al. (2021) found a strong correlation between food insecurity and the QoL of adults, while Sok et al. (2018) study showed that the presence of a basic need not being met predicted lower physical health and mental health. MHoN is the foundation when exploring why food access has an impact on QoL of college students.

Methodology

Purpose Statement

This quantitative research study explored how food access impacts the QoL of students in the College of Agriculture and Life Sciences (CALs) at Virginia Tech. The research contributes to the literature by exploring how the four constructs of food access (accessibility, awareness, availability, and affordability) impact students' QoL.

Research Question

How does food access impact the quality of life for first-generation, international, rural, and urban students in the College of Agriculture and Life Sciences at Virginia Tech?

Objectives

- ❖ To determine the QoL of first-generation, international, rural, and urban students in the College of Agriculture and Life Sciences.
- ❖ To determine food access for first-generation, international, rural, and urban students in the College of Agriculture and Life Sciences.
- ❖ To describe how food access contributes to QoL for students in the College of Agriculture and Life Sciences.

Methods

The research design of this study was a quantitative approach. The survey was cross-sectional and took students around 15–20 minutes to complete (Creswell & Creswell, 2018). QuestionPro software was used to conduct the survey as well as analyze. A purposive single sampling approach was used to survey the population. The researcher performed one overall stepwise multiple linear regression examining how QoL impacts food access. Then an additional 12 stepwise multiple linear regressions were conducted. First, 6 regressions were used to explore

department/school QoL scores, and then the researcher took the significant predictors of department/school QoL scores to examine their own significant predictors.

Participants

The target population was 3,356 full- and part-time undergraduate and graduate students in CALS at Virginia Tech. Students indicating younger than 18 years in age were excluded from the survey.

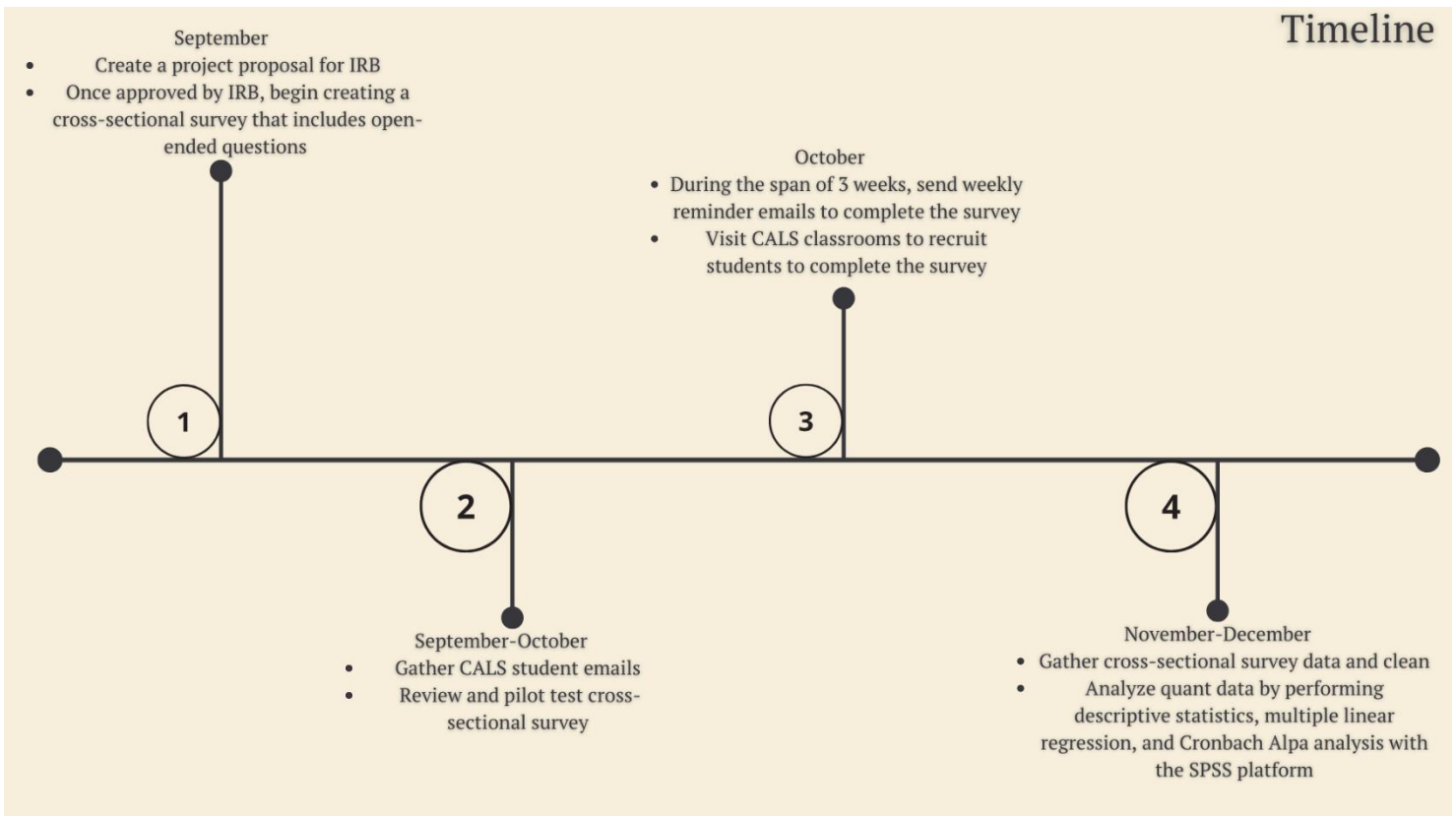
Data Collection

Data collection occurred during the fall of 2022. Students were sent information via email on completing the survey via QuestionPro. The students had three weeks to complete the survey. A reminder email was sent each week to students instructing them on how to complete the survey. Additionally, the survey was introduced in a short pre-class presentation in classes and through flyers. A QR code was provided to facilitate access to the survey. QuestionPro stored data until the end of the data collection period. Student names, email addresses, and other identifying information were removed from the raw data before analysis to protect confidentiality. Cleaned data was then transferred into Google Drive.

Instrumentation

The survey had 11 questions regarding student demographics, 25 questions encompassing the QoLBREIF instrument with constructs of physical health, psychological health, social relationships, and environment, and 6 questions pertaining to food access. The researcher first checked the survey for face validity and then conducted pre-testing before sent to students. The researcher analyzed Likert scale scores for the WHO QoLBRIEF instrument and the food access instrument from support with the SAIG group and Virginia Tech Library Data Services on the Virginia Tech campus.

Figure 3.2 Quantitative Timeline



Data Analysis

Descriptive statistics were used for demographic variables. SPSS was used for data analysis. First, the researcher used SPSS to run a Cronbach Alpha reliability test on both the QoLBRIEF and food access instrument. After the reliability had been established, the researcher performed stepwise multiple linear regression analyses. Multiple linear regression was performed to explore the significant predictors in the regression model (Berge, 2018). The regressions were used to determine the relationship between QoL and first-generation, international, rural, urban, degree selection, undergraduate classification, graduate classification, food access, and race/ethnicity. Figure 3.3 shows the overall statistical equation for the multiple linear regression. The researcher then examined different dependent QoL score variables. Figures 3.4-3.9 shows the statistical equations of the dependent variable of the QoL score of

students for each department/school in the CALS and the independent variables of first-generation, international, rural, urban, degree selection, undergraduate classification, graduate classification, food access, and race/ethnicity. Figures 3.10-3.15 indicates the statistical equations for the dependent QoL variables of Asian, Hispanic/Latino, first-generation, international, rural, and undergraduate senior and then the independent variables of first-generation, international, rural, urban, undergraduate senior status, and food access intermittently depending on the dependent variable being used.

Figure 3.3 Statistical Equation Multiple Linear Regression

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_p X_p + \varepsilon$$

QoL (physical health, psychological health, social relationships, environment) = β_0 (first-generation) + β_1 (international) + β_2 (rural) + β_3 (urban) + β_4 (Degree Selection) + β_5 (Undergraduate Classification) + β_6 (Graduate Classification) + β_7 (Race/Ethnicity) + β_8 (Food Access)

Figure 3.4 Statistical Equation Multiple Linear Regression

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_p X_p + \varepsilon$$

Agricultural and Applied Economics student QoL scores = β_0 (first-generation) + β_1 (international) + β_2 (rural) + β_3 (urban) + β_4 (Degree Selection) + β_5 (Undergraduate Classification) + β_6 (Graduate Classification) + β_7 (Race/Ethnicity) + β_8 (Food Access)

Figure 3.5 Statistical Equation Multiple Linear Regression

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_p X_p + \varepsilon$$

Animal and Poultry Sciences student QoL scores = β_0 (first-generation) + β_1 (international) + β_2 (rural) + β_3 (urban) + β_4 (Degree Selection) + β_5 (Undergraduate Classification) + β_6 (Graduate Classification) + β_7 (Race/Ethnicity) + β_8 (Food Access)

Figure 3.6 Statistical Equation Multiple Linear Regression

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \dots + \beta_pX_p + \varepsilon$$

Biochemistry student QoL scores = β_0 (first-generation) + β_1 (international) + β_2 (rural) + β_3 (urban) + β_4 (Degree Selection) + β_5 (Undergraduate Classification) + β_6 (Graduate Classification) + β_7 (Race/Ethnicity) + β_8 (Food Access)

Figure 3.7 Statistical Equation Multiple Linear Regression

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \dots + \beta_pX_p + \varepsilon$$

Human Nutrition, Foods, and Exercise student QoL scores = β_0 (first-generation) + β_1 (international) + β_2 (rural) + β_3 (urban) + β_4 (Degree Selection) + β_5 (Undergraduate Classification) + β_6 (Graduate Classification) + β_7 (Race/Ethnicity) + β_8 (Food Access)

Figure 3.8 Statistical Equation Multiple Linear Regression

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \dots + \beta_pX_p + \varepsilon$$

School of Plant and Environmental Sciences student QoL scores = β_0 (first-generation) + β_1 (international) + β_2 (rural) + β_3 (urban) + β_4 (Degree Selection) + β_5 (Undergraduate Classification) + β_6 (Graduate Classification) + β_7 (Race/Ethnicity) + β_8 (Food Access)

Figure 3.9 Statistical Equation Multiple Linear Regression

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \dots + \beta_pX_p + \varepsilon$$

Combined (Agriculture, Leadership, and Community Education, Agricultural Technology Program, Biological Systems Engineering, Entomology, Food Science and Technology, Dairy Science, Other) student QoL scores = β_0 (first-generation) + β_1 (international) + β_2 (rural) + β_3 (urban) + β_4 (Degree Selection) + β_5 (Undergraduate Classification) + β_6 (Graduate Classification) + β_7 (Race/Ethnicity) + β_8 (Food Access)

Figure 3.10 Statistical Equation Multiple Linear Regression

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \dots + \beta_pX_p + \varepsilon$$

Race/Ethnicity Asian student QoL scores = β_0 (first-generation) + β_1 (international) + β_2 (rural) + β_3 (urban) + β_4 (Food Access) + β_5 (Undergraduate Senior)

Figure 3.11 Statistical Equation Multiple Linear Regression

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \dots + \beta_pX_p + \varepsilon$$

Race/Ethnicity Hispanic/Latino student QoL scores = β_0 (first-generation) + β_1 (international) + β_2 (rural) + β_3 (urban) + β_4 (Food Access) + β_5 (Undergraduate Senior)

Figure 3.12 Statistical Equation Multiple Linear Regression

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \dots + \beta_pX_p + \varepsilon$$

First-Generation student QoL scores = β_0 (first-generation) + β_0 (international) + β_1 (rural) + β_2 (urban) + β_3 (Food Access) + β_4 (Undergraduate Senior)

Figure 3.13 Statistical Equation Multiple Linear Regression

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \dots + \beta_pX_p + \varepsilon$$

International student QoL scores = β_0 (first-generation) + β_1 (rural) + β_2 (urban) + β_3 (Food Access) + β_4 (Undergraduate Senior)

Figure 3.14 Statistical Equation Multiple Linear Regression

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \dots + \beta_pX_p + \varepsilon$$

Rural student QoL scores = β_0 (first-generation) + β_1 (international) + β_2 (Food Access) + β_3 (Undergraduate Senior)

Figure 3.15 Statistical Equation Multiple Linear Regression

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \dots + \beta_pX_p + \varepsilon$$

Undergraduate Senior student QoL scores = β_0 (first-generation) + β_1 (international) + β_2 (rural) + β_3 (urban) + β_4 (Food Access)

Results

A total of 809 (81.1%) CALS students completed the online survey. In table 3.1, the Cronbach Alpha for the QoL instrument was measured through SPSS and showed a .917 reliability statistic meeting the excellent rating (Creswell & Creswell 2018). In addition, SPSS was used to measure the Cronbach Alpha for the food access instrument in table 3.2, showed a .694 reliability statistic meeting an acceptable rating. In addition, table 3.3 and 3.4 illustrates student demographics results based on the cross-sectional survey data.

Table 3.1 QoL Reliability Statistic

Reliability Statistics		
Quality of Life Scale		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.917	.919	25

Table 3.2 Food Access Reliability Statistic

Reliability Statistics		
Food Access Scale		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.694	.711	6

Table 3.3 Department/School within CALS

<i>Department/School within the College of Agriculture and Life Sciences</i>		
<i>Department/School</i>	<i>(%)</i>	<i>(n)</i>
<i>Agricultural and Applied Economics</i>	9%	n=76
<i>Animal and Poultry Sciences</i>	27%	n=224
<i>Biochemistry</i>	10%	n=82
<i>Human Nutrition, Foods, and Exercise</i>	21%	n=173
<i>School of Plant and Environmental Sciences</i>	14%	n=112
<i>Combined (Agricultural, Leadership, and Community Education, Agricultural Technology Program, Biological Systems Engineering, Entomology, Food Science and Technology, Dairy Science, Other)</i>	19%	n=159
Total	100%	n= 826

Table 3.4 Demographics

Demographics	(%)	(n)
<i>Degree Selection</i>		
<i>Undergraduate</i>	74%	n=681
<i>Graduate (M.S., Ph.D., OMALS)</i>	25%	n=229
<i>Associate</i>	1%	n=10
<i>Other</i>	0.33%	n=3
Total	100%	n=923
<i>Undergraduate Classification</i>		
<i>Freshman</i>	24%	n=169
<i>Sophomore</i>	21%	n=143
<i>Junior</i>	29%	n=202
<i>Senior</i>	23%	n=161

<i>5th year senior</i>	2%	n=15
<i>Other</i>	0.72%	n=5
Total	100%	n=695
Graduate Classification		
<i>M.S.</i>	33%	n=72
<i>Ph.D.</i>	47%	n=103
<i>OMALS</i>	16%	n=36
<i>Other</i>	4%	n=8
Total	100%	n=219
Race/Ethnicity		
<i>American Indian or Alaskan Native</i>	1%	n=10
<i>Asian</i>	13%	n=121
<i>Black or African American</i>	7%	n=71
<i>Caribbean</i>	0.31%	n=3
<i>Hispanic or Latino</i>	5%	n=52
<i>Middle Eastern or North African</i>	2%	n=19
<i>Native Hawaiian or Pacific Islander</i>	0.72%	n=7
<i>White or Caucasian</i>	70%	n=680
<i>Self-identify as another race/ethnicity</i>	0.52%	n=5
Total	100%	n=968
First-Generation Student		
<i>Yes</i>	22%	n=194
International Student		
<i>Yes</i>	8%	n=67
Geographic Region		
<i>Rural Area</i>	42%	n=365
<i>Urban Area</i>	54%	n=471

In table 3.5, the overall multiple linear regression model shows a .277 (27%) adjusted R square of predictability of independent variables with the dependent variable QoL with a significant P-value of ($p=.017$). Additionally, in table 3.6, the independent variables that showed significance in the multiple linear regression model, after using stepwise regression, were food access ($p<.001$), identify as Asian ($p<.001$), first-generation ($p<.001$), and seniors ($p=.017$).

Table 3.5. Overall Multiple Linear Regression Table Model Summary

Model Summary								
Overall								
R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
				R Square Change	F Change	df1	df2	Sig. F Change
.530 ^d	.281	.277	.13143	.005	5.769	1	821	.017

Table 3.6 Coefficients Table

Coefficients						
	Unstandardized Coefficients		Standardized Coefficients		t	Sig.
	B	Std. Error	Beta			
(Constant)	.930	.024			38.955	<.001
Food Access	.109	.007	.480		16.079	<.001
Asian	-.049	.013	-.109		-3.674	<.001
First-Generation	-.041	.011	-.109		-3.651	<.001
Undergraduate: Senior	.030	.013	.071		2.402	.017

a. Dependent Variable: Quality of Life

For the QoL scores for students correlating to their department/school table 3.7 shows the stepwise multiple linear regression for the Agricultural and Applied Economics student in CALS. The model had a statistically significant p-value=.003. The adjusted R value showed a .29 (29%) of predictability for the relationship between the dependent variables and independent variables. Table 3.8 indicates international students (p-value=<.001), and food access (p-value=.003) were significant to have a correlation with QoL of Agricultural and Applied Economics students.

Table 3.7 Agriculture and Applied Economics Multiple Linear Regression Model Summary

Model Summary								
Agricultural and Applied Economics								
R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
				R Square Change	F Change	df1	df2	Sig. F Change
.561 ^b	.315	.296	.15282	.088	9.370	1	73	.003

Table 3.8 Agriculture and Applied Economics Coefficients

Coefficients					
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.036	.106		9.756	<.001
International	-.158	.044	-.371	-3.608	<.001
Food Access	.092	.030	.315	3.061	.003

a. Dependent Variable: Quality of Life

Table 3.9 displays the stepwise multiple linear regression summary for the department of Animal and Poultry Science. The adjusted R squared predicted .275 (27%) of the relationship between the dependent and independent variables. The model was shown to be overall significant with a p-value=.004, which is less than .05. In the table 3.10 the independent variables that showed a significance when interacting with the dependent variable were food access (p-value=<.001) and located in a rural demographic (p-value=.004).

Table 3.9 Animal and Poultry Science Multiple Linear Regression Model Summary

Model Summary								
Animal and Poultry Science								
R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
				R Square Change	F Change	df1	df2	Sig. F Change
.530 ^b	.281	.275	.12802	.028	8.558	1	221	.004

Table 3.10 Animal and Poultry Science Coefficients

Coefficients					
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.834	.048		17.482	<.001
Food Access	.119	.014	.500	8.757	<.001
Rural	.051	.017	.167	2.925	.004

a. Dependent Variable: Quality of Life

Table 3.11 represents the stepwise multiple linear regression model of the Biochemistry department and showed an adjusted R square of .244 (24%) predictability. The model also indicated a significant overall p-value=.007. Table 3.12 illustrates the significant independent variables of food access (p-value=.004), undergraduate status senior (p-value=.006), and first-generation (p-value=.007).

Table 3.11 Biochemistry Multiple Linear Regression Model Summary

Model Summary								
Biochemistry								
R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
				R Square Change	F Change	df1	df2	Sig. F Change
.521 ^c	.272	.244	.12183	.073	7.776	1	78	.007

Table 3.12 Biochemistry Coefficients

Coefficients					
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.074	.072		14.947	<.001
Food Access	.063	.021	.297	3.007	.004
Undergraduate Senior	.125	.044	.280	2.836	.006
First-Generation	-.094	.034	-.274	-2.789	.007

a. Dependent Variable: Quality of Life

In table 3.13, the Human Nutrition, Foods, and Exercise department indicated a significant p-value=.031 for the stepwise multiple linear regression table and an adjusted R squared of .366 (36%). Table 3.14 displays the coefficients of significance in the stepwise multiple linear regression model. The independent variables that showed a relationship with the dependent variable were food access (p-value=<.001), international (p-value=.016), and first-generation (p-value=.031).

Table 3.13 Human Nutrition, Foods, and Exercise Multiple Linear Regression Model Summary

Model Summary								
Human Nutrition, Foods, and Exercise								
R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
				R Square Change	F Change	df1	df2	Sig. F Change
.614 ^c	.377	.366	.12280	.017	4.710	1	169	.031

Table 3.14 Human Nutrition, Foods, and Exercise Coefficients

	Coefficients				
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.960	.045		21.499	<.001
Food Access	.111	.012	.549	8.952	<.001
International	-.117	.048	-.149	-2.435	.016
First-Generation	-.057	.026	-.133	-2.170	.031

a. Dependent Variable: Quality of Life

The stepwise multiple linear regression for the School of Plant and Environmental Sciences, shown in table 3.15, indicated an overall significant p-value=.027. The adjusted R squared revealed a .266 (26%) of predictability for the dependent and independent variables in the model. The significant coefficients, presented in table 3.16, were shown to be food access (p-value=<.001) and Asian (p-value=.027).

Table 3.15 School of Plant and Environmental Sciences Multiple Linear Regression Model Summary

Model Summary								
School of Plant and Environmental Sciences								
R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
				R Square Change	F Change	df1	df2	Sig. F Change
.529 ^b	.279	.266	.12868	.033	5.039	1	109	.027

Table 3.16 School of Plant and Environmental Sciences Coefficients

Coefficients					
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.930	.064		14.631	<.001
Food Access	.103	.018	.466	5.650	<.001
Asian	-.072	.032	-.185	-2.245	.027

a. Dependent Variable: Quality of Life

The last stepwise multiple regression for department/school as a dependent variable is represented in table 3.17. The remaining department/schools in CALS were (Agriculture, Leadership, and Community Education, Agricultural Technology Program, Biological Systems Engineering, Entomology, Food Science and Technology, Dairy Science, other) combined. The model showed a significant p-value=.014 and an adjusted R squared value of .346 (34%) predictability of QoL and the independent variables. The coefficients displayed in table 3.18, indicated three independent variables to be significant in the regression model. Food access and undergraduate senior status were shown to be highly significant with both having a p-value=<.001, while Hispanic or Latino had a significant p-value=.014.

Table 3.17 Combined Department/School Multiple Linear Regression Model Summary

Model Summary								
Combined (Agriculture, Leadership, and Community Education, Agricultural Technology Program, Biological Systems Engineering, Entomology, Food Science and Technology, Dairy Science, Other)								
R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
				R Square Change	F Change	df1	df2	Sig. F Change
.599 ^c	.358	.346	.11923	.026	6.205	1	155	.014

Table 3.18 Combined Department/Schools Coefficients

Coefficients					
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.902	.046		19.430	<.001
Food Access	.114	.013	.544	8.441	<.001
Undergraduate Senior	.092	.027	.221	3.429	<.001
Hispanic or Latino	-.115	.046	-.160	-2.491	.014

a. Dependent Variable: Quality of Life

Table 3.19 details the stepwise linear regression model summary for race/ethnicity of Asian students QoL scores. The model was overall significant with a p-value=.016 and an adjusted R squared of .14 (14%) predictability. The coefficients in table 3.20 that showed to be significant predictor variables were food access (p-value=<.001) and undergraduate senior status (p-value=.016).

Table 3.19 Race/Ethnicity Asian Stepwise Linear Regression Model Summary

Model Summary								
Race/Ethnicity Asian Demographic								
R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				Sig. F Change
				R Square Change	F Change	df1	df2	
.394 ^b	.155	.140	.13769	.046	5.951	1	110	.016

Table 3.20 Race/Ethnicity Asian Coefficients

	Coefficients				
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.982	.067		14.570	<.001
Food Access	.072	.020	.311	3.538	<.001
Undergraduate Senior	.094	.038	.215	2.439	.016

a. Dependent Variable: Quality of Life

The stepwise linear regression model summary for Hispanic/Latino students is shown in table 3.21. In the table, the model indicated a significant p-value=.049 and a .424 (42%) of predictability for the adjusted R squared. In table 3.22, the predictor variables that revealed significance were food access (p-value=<.001), first-generation (p-value=.007), and undergraduate senior status (p-value=.049).

Table 3.21 Race/Ethnicity Hispanic/Latino Stepwise Linear Regression Model Summary

Model Summary								
Race/Ethnicity Hispanic/Latino								
R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				Sig. F Change
				R Square Change	F Change	df1	df2	
.678 ^c	.460	.424	.11169	.049	4.088	1	45	.049

Table 3.22 Race/Ethnicity Hispanic/Latino Coefficients

Coefficients						
	Unstandardized Coefficients		Standardized Coefficients		t	Sig.
	B	Std. Error	Beta			
(Constant)	.913	.096			9.549	<.001
Food Access	.124	.028	.492		4.428	<.001
First-Generation	-.094	.033	-.312		-2.831	.007
Undergraduate Senior	.119	.059	.224		2.022	.049

a. Dependent Variable: Quality of Life

Table 3.23 shows the results of the first-generation stepwise linear regression model. The model was found to be statistically significant with a p-value=.024. The adjusted R square was a .318 (31%) of predictability of the dependent and independent variables. Table 3.24 shows the significant predictor variables for first-generation QoL scores. Food access (p-value=<.001) and undergraduate senior status (p-value=.024) were significant in the regression model.

Table 3.23 First-Generation Student Stepwise Linear Regression Model Summary

Model Summary								
First-Generation								
R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
				R Square Change	F Change	df1	df2	Sig. F Change
.570 ^b	.325	.318	.14494	.020	5.167	1	178	.024

Table 3.24 First-Generation Student Coefficients

Coefficients						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
2	(Constant)	.788	.052		15.296	<.001
	Food Access	.136	.015	.545	8.829	<.001
	Undergraduate Senior	.065	.029	.140	2.273	.024

a. Dependent Variable: Quality of Life

The stepwise multiple linear regression for international students QoL scores, shown in table 3.25, indicated an overall significant p-value= $<.001$. The adjusted R squared revealed a .221 (22%) predictability for the dependent and independent variables in the model. The significant coefficients, presented in table 3.26, was shown to be only food access (p-value= $<.001$) in the regression model.

Table 3.25 International Student Stepwise Linear Regression Model Summary

Model Summary								
International								
R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
				R Square Change	F Change	df1	df2	Sig. F Change
.482 ^a	.232	.221	.15344	.232	19.671	1	65	<.001

Table 3.26 International Student Coefficients

Coefficients					
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.835	.084		9.994	<.001
Food Access	.124	.028	.482	4.435	<.001

a. Dependent Variable: Quality of Life

Table 3.27 represents the stepwise multiple linear regression model of rural students QoL scores and showed an adjusted R square of .306 (30%) predictability. The model also indicated a significant overall p-value= $<.001$. Table 3.28 illustrates the significant independent variable of food access (p-value= $<.001$).

Table 3.27 Rural Student Stepwise Linear Regression Model Summary

Model Summary								
Rural								
R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
				R Square Change	F Change	df1	df2	Sig. F Change
.555 ^a	.308	.306	.12679	.308	159.118	1	357	<.001

Table 3.28 Rural Student Coefficients

Coefficients					
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.877	.033		26.292	<.001
Food Access	.123	.010	.555	12.614	<.001

a. Dependent Variable: Quality of Life

The last table, Table 3.29, displays the stepwise multiple linear regression model summary for senior students QoL scores. The adjusted R squared predicted .119 (11%) of the relationship between the dependent and independent variables. The model was shown to be overall significant with a p-value= $<.001$, which is less than .05. In the table 3.30 the independent variables that showed a significance when interacting with the dependent variable was food access (p-value= $<.001$).

Table 3.29 Senior Student Stepwise Linear Regression Model Summary

Model Summary								
Senior Students								
R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
				R Square Change	F Change	df1	df2	Sig. F Change
.355 ^a	.126	.119	.13975	.126	18.723	1	130	<.001

Table 3.30 Senior Student Coefficients

Coefficients					
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.991	.078		12.770	<.001
Food Access	.096	.022	.355	4.327	<.001

a. Dependent Variable: Quality of Life

Discussion

Food Access and QoL

The data in the overall model showed a significant association between food access and QoL, which has been shown in the literature (Frongillo et al., 2017; Hanmer et al., 2021; Sok et al., 2018). In addition, this study expands on the association between food access and QoL by showing a significant association when examining QoL scores by departments/schools, Asian race/ethnicity, Hispanic/Latinx race/ethnicity, first-generation students, international students, and senior status students. No other study has examined how food access impacts the QoL of

agriculture students. The following discusses the importance of providing resources for these groups when concerning food access and their QoL.

Student Demographics

Asian

QoL scores for international students were not shown to be significant in the overall stepwise linear regression model. However, for the demographic of race/ethnicity, participants that identified as Asian were shown to have their QoL impacted by food access. In addition, if an Asian student was in the School of Plant and Environmental Sciences, they were likely to have a lower QoL score. When exploring the QoL scores of Asian students, the predictor values of food access and being a senior had an influence. Asian students were the second highest race/ethnicity selection behind White or Caucasian students.

The findings in this study build upon previous literature about the barriers Asian students face while attending college. Suyemoto et al. (2009) found social relationships, racial segregation, negative experiences with advising, difficulties with faculty, and lack of faculty representation to affect the success of Asian students while in college. Additionally, Henning et al. (2011) found that an Asian medical student cohort was more likely to have difficulty developing social relationships, experience test anxiety, have self-efficacy problems, and have intrinsic value struggles. Furthermore, the study found that international Asian students were more at risk of experiencing lower QoL scores than Asian domestic students.

An association has been found involving international students who often face more challenges in food security than their domestic peers because of dietary changes (Shi & Allman-Farinelli, 2021). In addition to dietary changes impacting food security, the research also found

factors associated with food security: personal preferences, health concerns, family influences, time availability, and food environment. Each suggested factor can be tied back to food access and QoL for students.

Hispanic and Latinx

Camelo & Elliott (2019) and Owens et al. (2020) found that Hispanic or Latinx students were more likely to experience food insecurity in studies conducted with college students. Hall et al. (2019) previously noted that Hispanic or Latinx students at Virginia Tech had an increased likelihood of experiencing food insecurity compared to non-Hispanic and Latinx students. Trevino & DeFreitas (2014) said, “The academic achievement of Latino college students is becoming a more pressing issue in the United States due to their growing population and unique needs as a result of many being first-generation college students.” At Virginia Tech, Carter (2022) stated, “Hispanic/LatinX students comprise 10.9 percent of the 2022 entering class, an increase of 79 percent compared to 2017.” With the increase in enrollment of Hispanic and LatinX students on campus and the results from this study and the Hall et al. (2019) study, improving food access could have a tremendous impact on the improved QoL of students in this group.

International

In the overall model, international student status was not a significant predictor in the regression model. However, when looking through the lens of department/schools QoL as the dependent variable, Agriculture and Applied Economics (p-value=<.001) and Human Nutrition, Foods, and Exercise (p-value=.016), international students were more susceptible to a reduced QoL. When examining international students' QoL scores, food access was a predictor in

affecting international students' scores with a $p\text{-value} < .001$. Soldavini et al. (2022) found that 1 out of 4 international students were experiencing food insecurity at a Southeastern University. According to Hegarty (2014), "International students have an increasing presence in large universities in the United States, and with them, they bring an important component of diversity of thought." U.S. higher education institutions have international students who bring cultural beliefs, values, and influences on the college campuses they are enrolled at. In addition, international students influence not only campus life but also within the community the college inhabits. Hegarty (2014) found that international students were more likely to feel overwhelmed due to cultural differences in food, customs, financial constraints, homesickness, loss of social status, fear, and a sense of insignificance. Due to cultural differences in food, financial straits, lack of resources, and being in a new environment, international students were more likely to face hunger while attending school (Benefield, J et al., 2018; Shi & Allman-Farinelli, 2021). Lastly, international students with a visa are not allowed to work off-campus while attending Virginia Tech (Virginia Tech, n.d.). This is a cause for concern because, according to Carnevale et al. (2015), "about 40 percent of undergraduates and 76 percent of graduate students work at least 30 hours a week". If a student cannot be employed to establish an income to support themselves, then how are students experiencing low food access supporting their needs?

Rural

Animal and Poultry Science students that were classified as rural ($p\text{-value} = .004$) had a lower QoL score than other departments. When exploring rural students' QoL scores and predictor variables, food access was found to be significant with a $p\text{-value} < .001$. An increasing number of students from all different walks of life are starting to attend college to acquire degree mobility (Leung et al., 2021). Research has shown that if in a minority group, you are more

likely to experience food access concerns (Dhillon et al., 2019; Forman et al., 2018; Hall et al., 2019; Ilieva et al., 2019; Wolfson et al., 2022). Gundersen et al. (2022) discovered,

"Rural counties (those outside of major metropolitan areas) make up 63% of all U.S. counties but represent 87% of counties with food-insecurity rates in the top 10%. In other words, counties with the highest rates of food insecurity are disproportionately rural." (p. 8)

In addition, Gundersen goes on to explain that hunger in children is more prevalent in rural communities by citing, "86% of the counties with the highest percentage of children at risk for food insecurity are rural." A student coming from a rural background face hardships that their peers might not encounter. Guiffrida (2018) found,

"Rural students may have a more difficult time than urban and suburban students adjusting to the increased size of the campus and surrounding community; becoming comfortable with racial/ethnic diversity; becoming accustomed to expanded social, academic, and career options; adapting to broad cultural differences between urban and rural cultures; and accessing student support services. These challenges are likely to have contributed to the high mental health problems experienced by rural college students, low college persistence rates at large institutions, and high transfer rates." (p. 19)

The barriers that rural students face can impact the success of the student in obtaining a degree and staying in school. The added pressure of experiencing food access concerns decreases a student's QoL and a chance for success.

First-Generation

One in three undergraduate students is first-generation (The Center for First-Generation Student Success, n.d.). Virginia Tech in 2022 saw a 19 percent increase in first-generation applications (Virginia Tech, n.d.). As degree mobility is crucial in economic mobility, a continued rise of first-generation college students will be seen on campus (Leung et al., 2021). Barriers such as lack of family support, resources, and financial aid can influence a student's success in obtaining a degree. RTI International (2019) found that first-generation students do not use resources because they do not know they exist, cannot refer to a parent or guardian, or have environmental barriers that prevent usage.

The lack of awareness experienced by this population of students has been shown to be impacted by food insecurity (Forman et al., 2018; Riddle et al., 2020; Wolfson et al., 2022). In a longitudinal study, Wolfson et al. (2022) found, "Students experiencing food insecurity, particularly those who are first-generation students, are less likely to graduate from college, and if they do graduate, they are more likely to receive an associate degree rather than a bachelor's or graduate/professional degree." In addition, Olfert et al. (2021) highlight the need for faculty and administrators to provide first-generation students with resources to access food if in hunger. Cataldi et al. (2018) noted, "proportionally more first-generation than continuing generation students had left postsecondary education without earning a postsecondary credential and had not returned."

Grade Classification Senior

After living on campus for a few years, students typically seek to find off-campus housing to move into. However, as appealing as this time of life can be, students face barriers

they may not experience on campus with food access. Riddle et al. (2020) found that off-campus students were more likely to experience food insecurity. Living off campus for students can be a disadvantage if the student does not have transportation or a safe environment to go grocery shopping, the ability to attend class or study sessions, or get to work (Baugus, 2020; Gerritsen et al., 2019).

Additionally, being off campus increases the likelihood that one does not have a meal plan or dining plan to use on campus. A meal plan has been shown to reduce food insecurity for students (Mathewsona, 2017); however, Dubick et al. (2016) found that 46% of food-insecure students ran out of their meal plans. Unfortunately, the rising cost of basic needs and housing has been shown to increase housing and food insecurity for students (The Hope Center for College, Community, and Justice, 2021). Seniors are at the cusp of obtaining a degree that can propel them forward in life.

Implications and Recommendations

All agriculture students, regardless of background, have hopes and aspirations to obtain a degree to work in a part of the agricultural sector. A student experiencing low food access and low QoL will have obstacles that their peers may not face (Ahmad et al., 2021). Virginia Tech can support students on campus by providing more culturally appropriate food, food scholarships/vouchers, and increased awareness of resources and programs to reduce barriers to accessing food (Hegarty, 2014; Mathewsona, 2017; Olfert et al., 2021). If we want an equitable system, we must focus on supporting all students.

The CALS at Virginia Tech can build an environment where students feel supported when facing food access concerns to improve their QoL. In return, if food access and QoL are

improved for students, this could help improve academic success and college retention rates. Virginia Tech can help ensure that the students experiencing food access problems do not fall through the cracks and succeed in obtaining their degrees.

Conclusion

Wolfson et al. 2022 stated, "The experience of food insecurity during college can have long-term adverse effects throughout the life course." In addition to the affirmative findings from multiple research articles regarding food insecurity on college campuses, this research has shown that food access can impact QoL for college students, particularly the sample population of agriculture students. Being a first-generation student, Asian, or a senior also appeared to be significant in affecting the QoL of students. Higher education institutions have research that shows food insecurity is plaguing campuses; now, we must focus on what roadblocks stop students from accessing food when in need.

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Chapter 4

Manuscript 2

“I eat less because I do not have consistent access to food, and this decreases my quality of life”:
How do food access and quality of life interact for College of Agriculture and Life Science students.

Abstract

Food access can be described by exploring factors pertaining to accessibility, awareness, availability, and affordability. Additionally, experiencing low food access can impact Quality of Life (QoL). College students experience unique food access concerns. This qualitative study explored what food access factors College of Agriculture and Life Science (CALs) students at Virginia Tech and how it impacted their QoL. Several students had no awareness of available resources and programs, while responses of physical health, psychological health, social relationships, and environmental factors influenced food access and what perceived QoL a student had. The results from this study can help further initiatives to support students experiencing food access problems and create a more equitable system of food access through higher education.

Introduction

For someone to be food secure is to have consistent and dependable access to food (Coleman-Jensen et al., 2021). A person's food security is dependent on whether they can obtain food to meet basic needs in life. Mozaffarian et al. (2021) continues by adding, "food security continues to place a greater emphasis on access to quantity, rather than quality, of food." Additionally, The Food and Agriculture Organization of the United Nations (2003) describes food security as having physical, social, economic access to safe and nutritious food that meets the needs of dietary and food preferences for an individual. For someone to have nutrition security is to have food that maintains healthy quality in terms of food and is nutritious to eat (Mozaffarian et al., 2021). Food security tends to focus on obtaining or accessing food while nutrition security expands the term by making sure the food is sufficient to fuel the body for daily life tasks. Nutrition security is seen to examine the environment that one resides in and how that impacts access to quality food as well (Pangaribowo et al., 2013). Food and nutrition security are essential to establish because each are intertwined with food access. Essentially, a person's food and nutrition security will depend on one's access to food. A better understanding of food access can be achieved by considering food accessibility, availability, affordability and awareness. These terms give a more comprehensive understanding of how one obtains food and what barriers could be affecting access to food.

Food Access Dimesons

The following will expand on food accessibility, availability, affordability, and awareness. Understanding how these four dimesons play a role in one's food and nutrition security can be used to better understand the barriers someone may face. Additionally, Figure 4.1 shows how the four dimensions being explored can apply to higher education (Cason & Boege, 2020; Costigan, 2020; Dhillon, 2019; Usher, 2015).

Figure 4.1 Multidimensional Outlook on Food Access



Accessibility

Food accessibility is associated with how easily someone can acquire healthy and nutritious foods (Usher, 2015). Rose & Richards (2004) found that environmental factors are importantly related to dietary choice and that “Easy supermarket access was associated with a significantly greater fruit consumption.” Factors (which can be internal or external) affecting whether someone has food accessibility are poverty, high food prices, low skills/knowledge, unhealthy food environments, climate change, and urbanization (Gerritsen et al., 2019). If one does not have access to healthy and nutritious foods, one’s food accessibility could be impacted. An example of an internal barrier that a student can face on campus is if an individual has a negative encounter with a person while using a supportive program. If one is trying to access a food bank, pantry, or emergency service, and has a negative experience, they may not use it again. The people that work in these settings matter and, thus, providing appropriate training for

them to be successful is crucial. Not only can these negative encounters happen at supportive services, but also when someone may be using SNAP or WIC at grocery stores. College students can also face a variety of external barriers. One common example is limited access to food due to a lack of private and public transportation in the town where the college resides. According to Baugus (2020), “Low-income individuals from rural areas often rely on their support network of friends and family to provide transportation. Often low-income individuals do not have their own transportation or are utilizing a vehicle that may not be reliable.” Students are also attempting to balance academics, work, and social life which can impact whether they have access to food simply based on the busyness of their schedule.

Availability

The term food availability pertains to whether there is enough food (in terms of quantity) and whether there is enough variety (in terms of food quality) (Mockshell & Villarino, 2019; Ogot, 2021). One’s food availability can often be correlated with their proximity to quality food sources. Paquet (2019) elaborates that individuals experiencing food availability concerns are often affected by the environment in which they live. For example, residing in a low-income area or low-access area negatively impacts food availability (USDA ERA Food Access Research Atlas, n.d.). Food availability on college campuses is growing with the addition of food banks and food pantries becoming more popular as food resources for students. Feeding America (n.d.) currently operates 316 food pantries and 124 mobile food pantries and provides food access opportunities to college students with 129 food banks around college campuses in operation.

Affordability

The prices of food and the perception of worth relative to the cost of food relates to affordability (Cafer et al., 2018). College students often rely on a small budget to get them

through the semester with income limited to financial assistance from others or a part time job outside of school hours. The increased cost of basic needs and having to pay for rising tuition, medical expenses, childcare costs, rent, utilities, and unforeseen costs (Fernandez et al., 2019), can impact whether or not a student will be able to afford their next meal. Meal plans have been shown to help offset food access concerns, however, the cost to purchase the meal plan may lead to a student taking out an additional loan (Mathewsona, 2017). However, Dubick et. al. (2016) found that “46 percent of food insecure students reported having run out of meal points before the end of the term at some time in the past, compared to 33 percent of all students on a meal plan.” If students don’t have any more meal plan left, it is extremely disconcerting to consider the grim outlook that many are then faced with. Students are often expected to take loans out, work multiple jobs, and scrap by with the essentials, but how is this setting someone up for success in school?

Awareness

Davis et al. (2021) stated, “Food insecurity is sadly not a modern world issue; however, increasing the awareness of food insecurity in college student populations is critical.” In addition, Peterson et al. (2022) found that,

“31.8 percent of 481 respondents reported that they did not access resources that they needed to address hunger. We found that lack of knowledge (56.9 percent) was one of the most frequent reasons given for this.” and “34.8 percent of respondents did not know about the campus pantry but would like to use it” (p. 144)

Simply put, a heightened awareness of how to access food resources on campus can reduce food insecurity (Hagedorn-Hatfield et al., 2022). The availability of emergency grants,

food banks/pantries, SNAP education, or nutritional education is only useful if the students in need are aware they exist.

Quality of Life

Haraldstad et al. (2019) states the importance in understanding Quality of Life (QoL) when he says, "QOL is important for understanding the consequences of illness and treatment, and for medical decision-making across age groups and culture." QoL was initially introduced in medicine by Elkinton (1966), and described as,

"What every physician wants for every one of his patients old or young, is not just the absence of death but life with a vibrant quality that we associate with a vigorous youth. This is nothing less than a humanistic biology that is concerned, not with material mechanisms alone, but with the wholeness of human life, with the spiritual quality of life that is unique to man." (p. 714)

This view on QoL was centered around a medical outlook on the ethical treatment of patients (Post, 2014). The first to define QoL was the WHO (1947) and defined it as a "state of complete physical, mental and social wellbeing, and not merely the absence of disease and infirmity." However, the WHO redefined the term in 2012 by stating QoL as being, "individuals' perceptions of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns." The new QoL definition was broadened to encompass other areas of an individual's life that could factor into QoL. In addition, the WHO designed two instruments to measure QoL. The instruments created were the WHOQOL-BREIF and WHOQOL-100. The researcher focused on the WHOQOL-BREIF instrument which is comprised of four domains being measured: physical health, psychological health, social relationships, and environment (WHO, 2012).

Using the QoL measurement as a tool of gathering patient feedback was seen to help improve symptom relief, care, and rehabilitation in medicine (Haraldstad et al., 2019 and McGee, 2001). In addition, McGee (2001) explains, “Assessment to facilitate decision making for the individual patient is not widely used at present” and “Professional judgment consistently underestimates patient QOL.” Improving physical health, social relationships, designing health education programs meant to modify unhealthy lifestyle choices, and training educators to identify the immediate psychological needs of the student body would be impactful measures to improve the QoL of students (Enrique et al., 2022). Determining QoL measurements for students can provide leadership, educators, and the community with important information concerning positive and negative impacts on the development and implementation of their educational programs and policies (Erez et al., 2020).

A person’s food access and QoL have been shown to have parallels and adverse outcomes (Frongillo et al., 2017; Hanmer et al., 2021; Sok et al., 2018). Engelman & Kushalnagar (2021), found that low perceived QoL is significantly associated with food security status when controlling for sociodemographic, depression, and chronic conditions. If a student is not able to be successful because of low QoL and food access, then retention of that student can be impacted. Braveman et al. (2011) explains the importance of that retention in finding that access to education can improve health overall by producing better economic outcomes for people, and, in return, enhance their QoL. Having an education is important not just to economic growth but overall well-being. In addition, Davis et al. (2021) stated, “The next generation and future professionals of our country should not have to face the negative effects food insecurity presents during a critical time in their intellectual and personal development.” It is in society’s

best interest for students to be successful, and a student needs to access nutritious food and have a positive QoL score in order to be successful while in school.

Theoretical Framework

Hagedorn-Hatfield et al. (2022) says that “a secure source of food is needed to thrive.” Food access stability and the quality and quantity influences a person’s ability to participate in daily life. Maslow (1943) realized that people have requirements that must be met centered on a certain hierarchy of needs. Maslow (1943) stated, “A person who is lacking food, safety, love, and esteem would most probably hunger for food more strongly than for anything else.” A person will put physiological demands before other needs in life according to Maslow. Maslow’s Hierarchy of Needs (MHoN) is a foundation to build upon when understanding the impacts of food access on QoL for college students.

The greatest tier in MHoN is physiological which are basic needs a person must meet to advance up the hierarchy. The next need is safety, followed by love and belonging, then esteem, and finally self-actualization. The five tiers of MHoN’s are placed into categories of: basic needs, psychological needs, and self-fulfillment. The theoretical concept for MHoN’s contains a level of hierarchy and briefly describes each level by stating what is needed to support the individual in that tier. Additionally, MHoN can be placed into categories of deficiency needs (lower order) to growth needs (higher order) (Ansorger, 2021; McLeod, 2018). Once self-actualization is achieved, a person has reached their full potential.

A student attending school has basic needs such as food, water, rest, and oxygen that must be met in order to learn, grow, and develop (Ansorger, 2021). Ansorger developed a MHoN to show how students are impacted and added emotional wellness to the physiological wellness level as a basic need requirement. McLeod (2018) stated,

“Before a student's cognitive needs can be met, they must first fulfill their basic physiological needs. For example, a tired and hungry student will find it difficult to focus on learning. Students need to feel emotionally and physically safe and accepted within the classroom to progress and reach their full potential.” (p. 12)

A student who doesn't have access to food will not have their basic need met according to Maslow which can also negatively impact their QoL. Hanmer et al. (2021) research showed a strong correlation between food insecurity and QoL of adults and Sok et al. (2018) study revealed that the occurrence of a basic need not being met corresponded with decreased physical health and mental health. The need for improvement and awareness of food access and QoL resources and programs is crucial because it allows all of our students equitable footing in the push for academic excellence (Ansonger, 2021). MHoN is the foundation in understanding why food access has such an impact on the QoL of college students.

Methodology

Purpose Statement

This qualitative research study aimed to explore how food access and QoL have an impact on students in the College of Agriculture and Life Sciences. Literature has shown how food access impacts cognitive and non-cognitive factors; however, no research has been conducted showing how food access affects QoL for college of agriculture students. The research will contribute to the body of literature to better understand and support students struggling with food access problems.

Research Question

How does QoL and food access impact students in the College of Agriculture and Life Science?

Objectives

- ❖ Understand how food accessibility, awareness, availability, and affordability affect College of Agriculture and Life Sciences students.
- ❖ Understand how environment, physical health, psychological health, and social relationships affect College of Agriculture and Life Sciences students.
- ❖ How do food access and QoL interact with one another.

Design

The purpose of this research study was to examine how food access impacts students on campus from the perspective of CALS students at Virginia Tech. The research design of this study was a qualitative approach. The research design had a survey developed on QuestionPro and consisted of 8 open-ended questions. The questions included inquiries about student knowledge and perceptions of how accessibility, awareness, availability, and affordability of food affect QoL of students. The target population of students were in the CALS program at Virginia Tech.

Participants

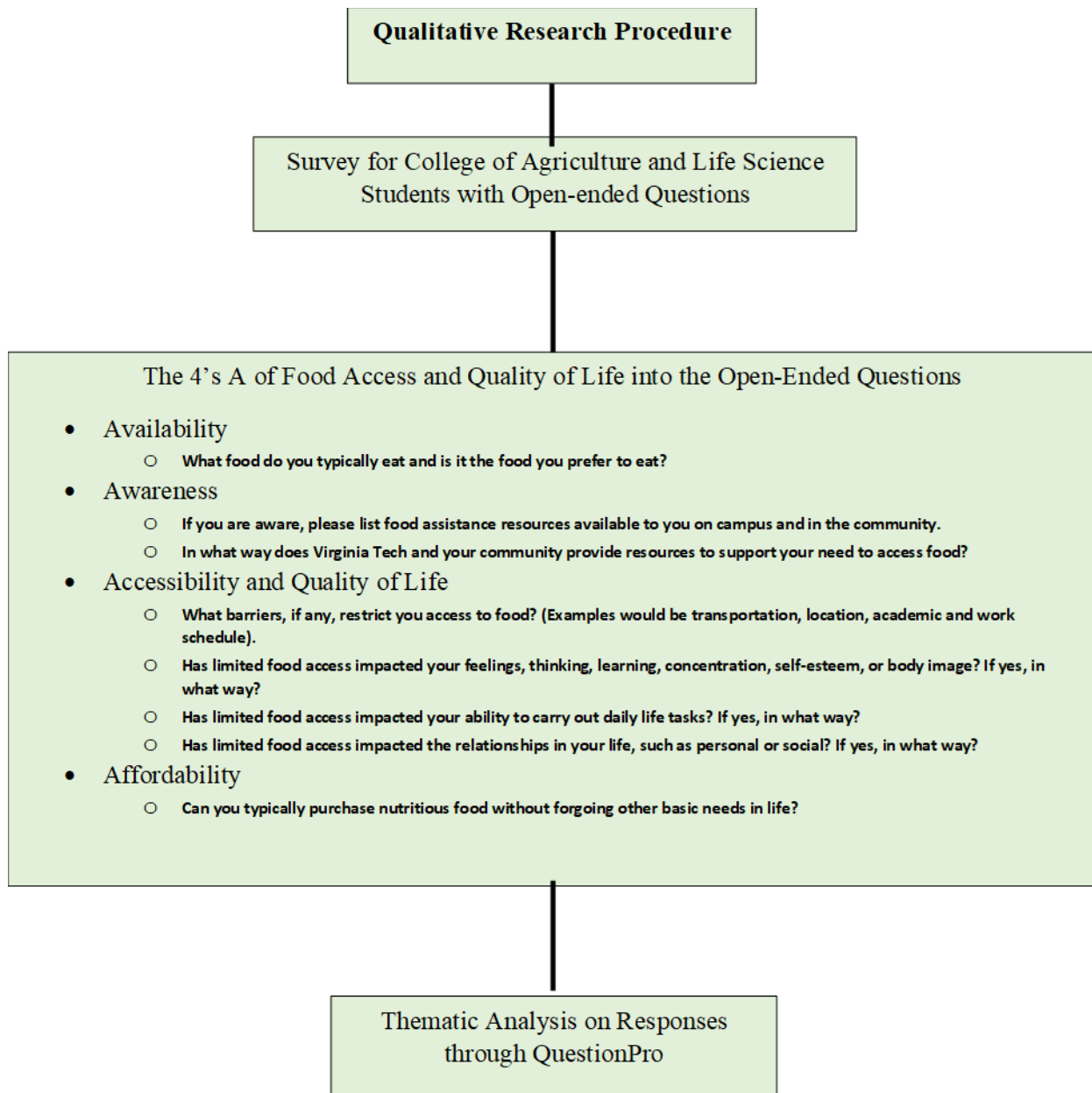
The research participants survey population was full-time and part-time undergraduate and graduate students in CALS at Virginia Tech. The sampling population size the research used was 3356. The researcher chose the sampling population based on interest in studying food access and the impact on QoL of CALS students. The target age of the population was students that were above the age of 18 years. Students that specify younger than 18 were omitted from the survey. The participants range from different levels of degree attainment in CALS that are listed

as associate, bachelor's, master's, doctorates, certificates, and licenses (Virginia Tech, n.d.). Currently, CALS has 70 different program options for students to select from.

Data Collection

Figure 4.4 shows the qualitative procedure diagram for this research study. Data collection began during the fall of 2022. The CALS student participants were sent information on completing the survey via QuestionPro to their Virginia Tech student emails. The students were given three weeks to complete the survey. Each week, students were sent a reminder email instructing them on how to complete the survey through QuestionPro. In addition, in order to recruit participants in the survey, the researcher visited classes in CALS to gather student participation in the survey. The researcher created a QR code to give access to the survey and handed out flyers in class. QuestionPro stored all completed surveys from students until the end of the data collection period. At the end of the survey's timeline, the researcher collected data from QuestionPro and used the text analysis feature to tag and develop themes from open-ended questions.

Figure 4.2 Qualitative Procedure Diagram



Instrumentation

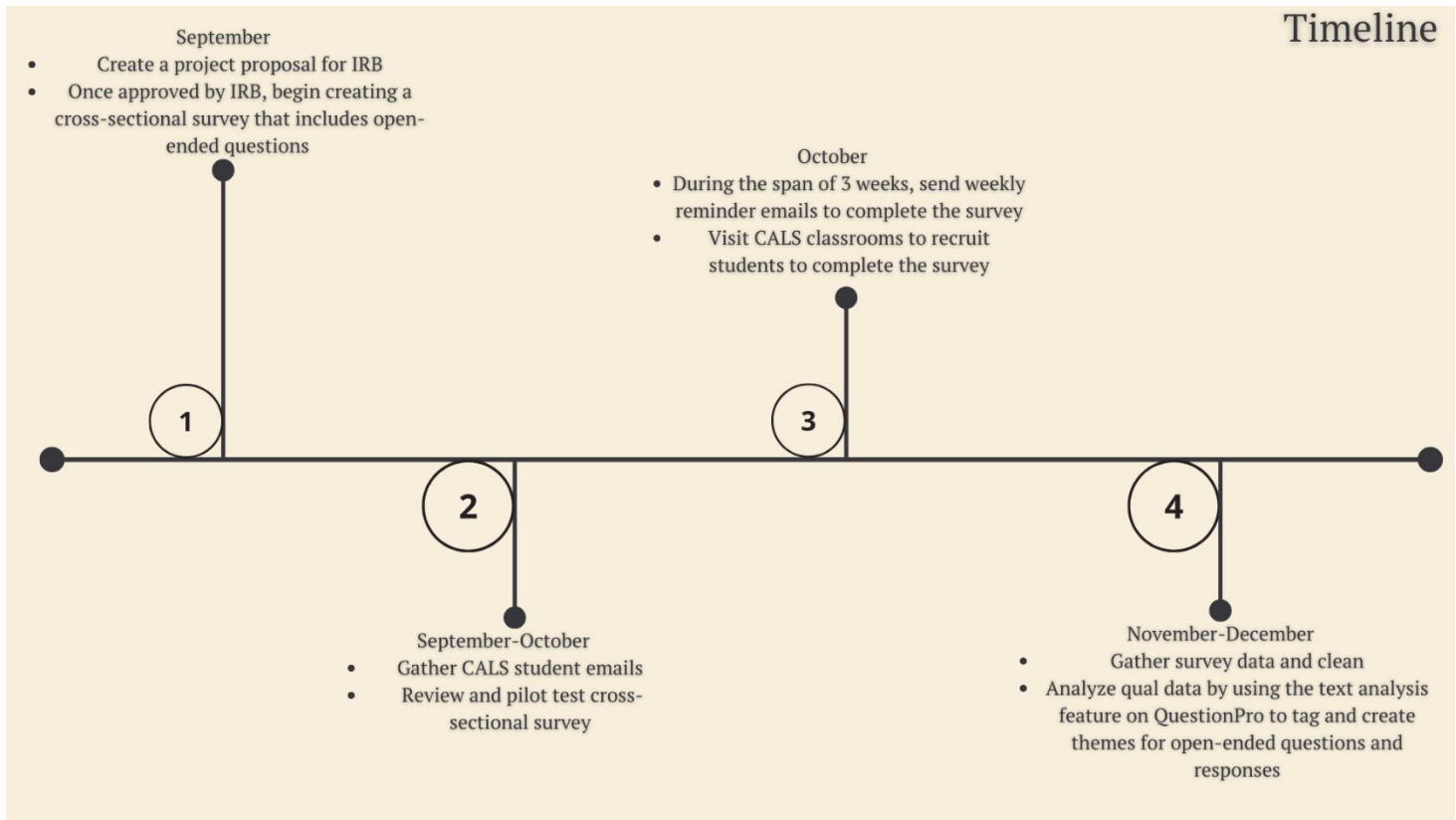
The survey opened with a statement focusing on the layout of the survey, then asked for consent to complete the survey, and whether the participant was 18 years or older. Students under 18 were omitted from the survey. The survey had 8 open-ended questions pertaining to

how food access affects their QoL. After the survey timeline was completed, the researcher analyzed open-ended question responses through the text analysis feature on QuestionPro.

Procedure

. The researcher sent the survey to CALS students via QuestionPro in the fall of 2022. Instructions on how to complete the survey and whom to contact if the participant had any questions or concerns were listed at the beginning along with IRB information. The survey took an estimated 15-20 minutes for the student to complete. At the end of the survey, the researcher had provided a list of relevant campus resources. A reminder email was sent to students that had not completed the survey. The survey lasted for three consecutive weeks. The researcher embedded skip logic in the survey for questions that don't relate to the participant. The survey had text entry options for the open-ended questions relating to food access and effects on QoL.

Figure 4.3 Qualitative Timeline



Data Analysis

The researcher used thematic analysis to better understand the experiences, thoughts, and behaviors of individuals (Kiger & Varpio, 2020). QuestionPro was used to filter responses by putting them into themes. This process was completed by using the text analysis feature to tag open ended questions. The researcher applied Clark & Braun (2017) six-step process consisting of familiarizing yourself with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the report when conducting thematic analysis. Once the open-ended questions were tagged and placed into themes, the researcher used Excel to create graphs and tables from results. Pie charts and bar graphs were used to display results, while a table was used to display the number of responses to the question and each theme developed.

Results

The QuestionPro survey was sent to 3356 undergraduate and graduate students in the CALS program. The total number of participants in the survey was 809 (n=809) CALS students, and, of these participants, there was an 81.14% completion rate. As shown in table 4.1, the total number of responses for what foods students typically eat and if the food is preferred was 782. A total of 12 themes (preferred to eat, not preferred to eat, not ideal choice, easy meals, skipped meals, limited options, cost, not time, ramen, pasta, fast food, and rice) were identified when coded. Students listed easy meals (n=170), rice (n=138), and pasta (n=102) where the top three responses for what students typically eat or have access to. The top factors that contributed to lack of food or access to food were limited options (n=96), cost (n=68), and no time (n=57) reported as factors that inhibited ability to eat foods that were preferred. In addition, n=13 students reported missing meals because of lack of access to food.

Factors in responses as to what students were eating focused on easy, quick, cheap meals. The following student voiced,

“I typically eat one meal a day and it varies between ramen noodles, frozen meals, or quick meals that I can prepare.”

While one student talked about compromising on foods by saying,

“Since I began graduate school, I've been eating more processed, convenient meals because cooking/cleaning/shopping takes up so much time. Even with the grab-and-go meals, getting quality items in my price-range has been difficult and I'm forced to compromise something in some way. I prefer to eat seasonal and locally produced foods.”

Another student expressed only eating one meal per day and experiencing the burn out of consistently eating the same type of food by stating,

“I typically eat 1 meal per day and maybe a snack. It’s usually something consisting of rice or pasta and maybe a frozen meat or eggs or some vegetables. I get tired of eating the same food all of the time to the point where I get disgusted by some things and have no desire to eat them anymore, so no, usually I don’t prefer what I’m eating.”

The common foods students listed as eating were rice, pasta, ramen, and fast food. The following student describes just mainly eating rice by saying,

“Mostly starch (rice). It is what I can afford. Plus it is bulky and fills me up for the day.”

While the next student talks about only having access to one good meal by stating,

“I eat a variety of dining hall foods, but only about once a day. I supplement the rest of my meals with snacks I buy off campus, like protein bars, ramen, granola, canned tuna, and chips.”

Students responding to the question also highlight the lack of options based on their dietary need or preference. One student mentioned they have access to the dining hall, but they are limited in their options,

“Dinning hall food - no I’m vegan so my options are limited.”

Another student that is vegetarian mentioned,

“Freezer vegetarian meals or if I have time to cook I make simple vegetarian meals. On campus I eat at dunkin or abp because everywhere else takes too long or doesn’t have vegetarian options”

One student battling celiac disease talked about the limited options available and the lack of accommodations to store food so they can have to eat by explaining,

“I typically eat animal protein and vegetables at lunch and dinner, and usually oatmeal, cereal, or toast for breakfast. It is not exactly what I would like to eat, but since I have celiac disease, my on-campus food options are very limited. I am also not allowed to have a fridge larger than what is provided by the university, so I am not able to stock the kind of food I would like to eat in my small fridge.”

The availability of food was shown to affect whether a student had access to food. The availability of healthy and nutritious foods was a cause of concern for students. In addition, not having food that pertained to one’s food preferences or dietary restrictions played a role in access to food.

Table 4.1 Question #24 Summary

Question	Total Number of Responses	Themes	Example Response
24. What food do you typically eat and is it the food you prefer to eat?	782	<ol style="list-style-type: none"> 1. Preferred to Eat 2. Not Preferred to Eat 3. Not Ideal Choices 4. Easy Meals 5. Skipped Meals 6. Limited Options 7. Cost 8. No Time 9. Ramen 10. Pasta 11. Fast Food 12. Rice 	<ol style="list-style-type: none"> 1. Japanese, Chinese, southern, etc. those are some of satisfying food I prefer to eat. 2. Rice and spaghetti. These foods are not what I typically prefer to eat. 3. Cheaper food microwaved things I'd like more healthy food. 4. Since being at college, I eat a lot of packaged, easy food. It has been difficult for me to eat a healthy variety of fruits, vegetables, and proteins. I have noticed a huge decrease in energy and major digestive and bloating issues. I believe it to be related to my poor diet. 5. I typically eat 1 meal per day and maybe a snack. It's usually something consisting of rice or pasta and maybe frozen meat or eggs or some vegetables. I get tired of eating the same food

			<p>all of the time to the point where I get disgusted by some things and have no desire to eat them anymore, so no, usually I don't prefer what I'm eating.</p> <ol style="list-style-type: none"> 6. Eating at VT is difficult for me because it's hard to find healthy options that aren't bad or have an incredibly long wait. So, I usually get unhealthy food which has gotten very old. 7. I typically buy groceries but Aldi as it is a cheaper store, so the quality of food isn't always the best because we usually buy the cheapest option, but I make about half of my meals and the other half I eat on campus. 8. Usually, some sort of homemade meal prep. It's fine for now because I don't have time to cook every day. 9. I typically eat one meal a day and it varies between ramen noodles, frozen meals, or quick meals that I can prepare. 10. Pasta because it's cheap and easy. I would prefer to eat chicken, vegetables, and rice (well-balanced meal). 11. Typically eat fast food. Not really. 12. I typically eat rice based food with vegetables & eggs and bread. However, I prefer to eat rice with meat that I can't afford sometimes.
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In table 4.2, summarizes the results of awareness on campus and in the community for question #25. Out of 681 responses, 11 themes were found. The themes were not aware, SNAP, food bank/food pantry, nutrition counseling, emergency grant, food drive, donating dining money, Market at VT, Campus Kitchen, dining halls, and 209 Market. A total of n=437 students reported not being aware of available resources to them. The need to spread awareness of supported programs can play a huge role in supporting students facing food access worries. One student was completely unaware of the resources by saying,

"I'm not exactly sure, I honestly didn't even know tech offered many community resources for access to food."

One student that was unaware of programs or resources was receptive in knowing what was available by stating,

"I am not sure of the specific types of support for access to food in the Blacksburg area, but I'd love to learn."

While another student talked about not being aware and a transfer student answering,

“Not aware of any, I’m a transfer student and I just dove right into classes and really haven’t had time to even figure out any of that.”

As one person said,

“While I’m in a pretty good spot, I do think VT should find ways to better communicate that there are resources available for those who may need them. The only reason I know about the resources I do is from random connections with other people, and I think this should be more streamlined.”

The resources students did know of were food banks and pantries (n=126), The Market at Virginia Tech (n=63), and SNAP (n=41). These programs are available to students, but some have limited access. For example, The Market at Virginia Tech funding for only 115 spots for students experiencing food access concerns at Virginia Tech.

Table 4.2 Question #25 Summary

Question	Total Number of Responses	Themes	Example Response
25. If you are aware, please list food assistance resources available to you on campus and in the community.	681	<ol style="list-style-type: none"> 1. Not Aware 2. SNAP 3. Food Bank and Food Pantry 4. Nutrition Counseling 5. Emergency Grant 6. Food Drive 7. Donating Dining Money 8. The Market at Virginia Tech 9. Campus Kitchen 10. Dining Halls 11. 209 Market 	<ol style="list-style-type: none"> 1. I am not aware of any resources. 2. SNAP 3. I know that there are food banks and on campus food assistance programs but have not had to utilize them. 4. I think there are dietitians in McComas. 5. Talking to the dean. 6. Occasional food donation drives. 7. The only thing I’m aware of is emergency money for dining plan. 8. The Market at VT. 9. The Campus Kitchen. 10. Dining halls. 11. I just learned about 209 marketplace.

Table 4.3 depicts question #26 results once coded. A total of 743 responses were recorded. 7 themes were found when examining barriers that affect access to food. The 7 themes were money, academics, location, schedule, job, transportation, no barriers, limited options, health. The top barriers students reported were schedule (n=290) was the main barrier affecting access to food, followed by academics (n=183), and then their job (n=165). Responses showed how the demanding lifestyle of being a student can impact a student's food access. One student said,

"I usually put studying above my meals."

While another students admitted to missing meals by saying,

"I'm so busy so I often miss meals."

Some students are balancing not only an academic schedule, but also working in order to have money to purchase basic needs. The following student said,

"Some days I go straight from class to work and only have time to eat a few chips."

While the following two other students admitted to skipping meals because of work stating,

"Money, and work. I am working two jobs currently so lunch is a frequently skipped meal."

"My academic schedule has me busy enough to miss meals a lot of the time so I only have time to eat 1-2 times a day."

One student discussed waiting to get groceries with friends because of the difficulties of carrying them on a bus saying,

“I don't have a car and despise carrying my groceries on the bus, so I usually go to the grocery store when one of my friends with a car is going to the grocery store. I also pay for groceries out of my own bank account, so that restricts how much I get/spend at the grocery store.”

Another student commutes from Roanoke on the bus and doesn't have time or the ability to use campus resources, mentioning,

“I have never used the food pantry at school because I take the Smart Way bus from Roanoke. And once I am on campus, I stay within one region of campus in order to minimize time spent walking. My bookbag is very heavy because I pack a lot for 10+ hours on campus every day.”

Additionally, an international student talked about only being able to use the bus on weekends to purchase groceries. Unfortunately, the buses run less frequently on weekends, and, with less buses, more students are trying to access each bus.

“Transportation is a major problem for me. As an international student, I didn't have my own car. So I have to take the bus. During the weekend, buses come less frequently which I do understand. However, the weekend is the only day that I have a big chunk of time to go grocery. Less bus not only means longer waiting time but also there will be more people take in the same bus.”

Having to balance a large workload was shown to affect students' ability to access food. If one has back-to-back classes, they may skip lunch. If a student has to travel to campus, go to class, then go straight to work, when do they have time to eat or buy groceries? If a student is

skipping meals in order to attend class or work, how are they to perform at the best of their ability academically.

Table 4.3 Question #26 Summary

Question	Total Number of Responses	Themes	Example Response
26. What barriers, if any, restrict your access to food? (Examples would be transportation, location, academic and work schedule)	743	<ol style="list-style-type: none"> 1. Money 2. Academics 3. Location 4. Schedule 5. Job 6. Transportation 7. No Barriers 8. Limited Options 9. Health 	<ol style="list-style-type: none"> 1. I have the smallest dining plan so I try to make it stretch as much as I can to save money. 2. I usually put studying above my meals. 3. Location of living is far from dining halls. 4. Schedule. 5. Sometimes I have to work through lunch. 6. Transportation. 7. No physical barriers. 8. I really like to eat, so I don't let too much get in my way of accessing food. 9. I have an anaphylactic milk allergy. All dairy items and items with milk are off limits.

As shown in table 4.4, question #27 had a total of 781 responses. The 3 themes found from student responses were “yes I can”, “no, I can’t”, and “sometimes” when asked about purchasing food without forgoing basic needs in life. Most students (n=610) responded with “yes, I can”, while n=117 listed “sometimes”. A small number of responses (n=79) were listed “no, I can’t” to forgoing other basic needs for nutritious foods. The following student expressed not being able to purchase quality food by stating,

“Can not purchase the quality food because they are very expensive. Have to compromise with the quality.”

Some students find themselves buying frozen or canned foods in order to pay for bills mentioning,

“Sometimes I need to buy unhealthy frozen and canned to pay for my other bills.”

A student having difficulty paying rent or tuition could be forgoing buying food all together. One student commented,

“I usually prioritize my food costs over other important financial obligations. I’m often late on bills but I always make sure I eat in some way. But sometimes other priorities are more urgent so I have to readjust my normal food schedule or quality. Sometimes I’ll skip meals or make a quick non-filling, non-nourishing meal just to.”

While another student mentioned,

“I cannot without stressing about affording rent.”

In addition, the following student talked about skipping buying groceries to pay for other necessities by stating,

“Sometimes, but there are times when I do not buy any groceries at all because I need money for other things.”

From an international student perspective one student said,

“No. Rent and health insurance consume all I earn. It is worse for international students with families who depend entirely on one source of income.”

The prices for rent, utilities, gas, and food have climbed over the years. Students at Virginia Tech voiced having hard decisions being made between other basic needs, such as rent, over purchasing food. Even when students had money for food, they often found themselves thinking about quantity instead of quality. In addition, international students experience additional barriers that domestic students don’t such as not being able to work based on visa guidelines.

Table 4.4 Question #27 Summary

Question	Total Number of Responses	Themes	Example Response
27. Can you typically purchase nutritious food without forgoing other basic needs in life?	781	<ol style="list-style-type: none"> 1. Yes, I Can 2. No, I Can't 3. Sometimes 	<ol style="list-style-type: none"> 1. I normally get nutritious foods at the store but still allow myself to eat the foods I want. 2. NO, I run at zero balances every month and hence I purchase what can get me through the month. 3. I usually prioritize my food costs over other important financial obligations. I'm often late on bills but I always make sure I eat in some way. But sometimes other priorities are more urgent so I have to readjust my normal food schedule or quality. Sometimes I'll skip meals or make a quick non-filling, non-nourishing meal just to.

The next question, #28, explored how limited food impacts one's ability to carry out daily life tasks. 769 responses were analyzed with a total of 5 themes being found. A majority of students (n=624) did not have their daily life impacted by food access. "Sometimes" was listed by n=50 of students and "yes" was selected by n=119. Students listed mental health (n=14) and physical health (n= 70) was affected. One student talked about their work and school performance being affected by saying,

"Yes, low energy causing me to perform poorly at work or school."

The next student explained feeling extremely tired when not eating saying,

"Yes, I feel extremely tired most days, especially when I haven't eaten enough that day and it is hard to get through classes, work, and then homework at the end of the night."

While another student has to resort to either not eating entirely while on campus or buying food from the vending machine stating,

"Yes as I mentioned before, going home to get food I have already paid for rather than staying on campus, I have less focus on homework hence I would need to

stay on campus where food is expensive. This means I either have to starve or eat via the vending machine and even if I did stay on campus while hungry, I am not as well able to do my work.”

Food that is from one’s culture is not always available on campus or in the community.

One student is physically being impacted from having to change diets explaining,

“Yes because usually I eat Asian food from home and coming to college has been a huge transition change that has been hard on me and my stomach.”

Sadly, the next student talks about running on fumes while on campus explaining,

“Yes, I often feel like when I'm running on fumes when I haven't eaten something nourishing. Depending on my commute to campus, I park and still have to walk/bike to get to my final destination. I often worry about falling faint when I'm operating on limited sleep and food. I even feel impacted by my ability to focus on class or work. On another side, I often focus so much on my daily tasks that I forget to eat entirely.”

While another student notes being so hungry, they are getting to the point of nausea and can’t eat stating,

“Yes. Sometimes I don't have enough energy if I don't eat. A lot of times, if I'm hungry enough, I can't even eat to fix it because it makes me nauseous.”

For a student to be at the point of almost fainting or so nauseous they can’t eat is very alarming. A student not having access to food was shown to affect students physically

and mentally. A student that doesn't have access to food will not be able to carry out daily life activities as they would with access to food.

Table 4.5 Question #28 Summary

Question	Total Number of Responses	Themes	Example Response
28. Has limited food access impacted your ability to carry out daily life tasks? If yes, in what way?	769	<ol style="list-style-type: none"> 1. No 2. Yes 3. Sometimes 4. Mental Health 5. Physical Health 	<ol style="list-style-type: none"> 1. No, I feel as though I am able to carry out daily life tasks. 2. Yes, because usually I eat Asian food from home and coming to college has been a huge transition change that has been hard on me and my stomach. 3. Sometimes, I can be very hungry, but not have food available to consume causing lethargy and hunger pain. 4. Yes I get depressed when I don't eat. 5. Yes, it lowers my energy level.

In table 4.6, students were asked how limited access to food has impacted their feelings, thinking, learning, concentration, self-esteem, or body image. A total of 8 themes were found out of the 763 responses from students. The themes were no, yes, feelings, thinking, learning, concentration, self-esteem, and body image. A total of n=496 responded with "No." "Yes" was listed for n=270 of students. Feelings (n=113), body image (n=105), and concentration (n=94) were listed as ways food access has impacted them in the categories listed. Students in the CALS expressed how psychological health was impacted by food access with one student saying,

"Yes, it has increased the effect of my depression, concentration is harder, and I have a lower self-esteem."

The next student said,

"Food access has impacted my feelings because I feel anxious thinking about if I will be able to afford to buy the groceries I need and still afford rent. It impacts my thinking/learning/concentration because I frequently feel hungry which distracts me from being able to focus in class."

The following student emphasized body image and having to buy cheaper options of food saying,

“Yes, feelings and concentration when the stress of feeling like I don't have money to buy food and I need to ration what I have. Also self-esteem in feeling guilty of my financial status. A little in body image when sometimes the cheaper options might be non-nutritious.”

Another student described being to the point of hunger pains expressing,

“Yes, body image and concentration in the sense of focusing on hunger pains instead of work/class.”

Lastly, the next student voiced,

“I'm constantly stressed about money and being able to afford being alive.”

The stress of worrying about food affected student at Virginia Techs psychological health. The effects of lack of food access were shown to play a role in a student's academic performance by impacting learning, concentration, and thinking. In addition, students expressed that having lack of nutritious food impacted body image, feelings, and self-esteem.

Table 4.6 Question #29 Summary

Question	Total Number of Responses	Themes	Example Response
29. Has limited food access impacted your feelings, thinking, learning, concentration, self-esteem, or body image? If yes, in what way?	763	<ol style="list-style-type: none"> 1. No 2. Yes 3. Feelings 4. Thinking 5. Learning 6. Concentration 7. Self-Esteem 8. Body Image 	<ol style="list-style-type: none"> 1. No 2. Yes, it can hurt my stomach and make me become upset. 3. Yes. My feeling is impacted. 4. Yes slows my thinking down. 5. Yes learning. 6. Yes, it will influence concentration. 7. Yes. There's not a lot of healthy food options here that taste good. So, I either eat junk food or nothing. This has

			<p>been causing me to have bad acne, which makes me scared to show my face.</p> <p>8. At times, I feel the only food that is available is unhealthy. This has led to me having a very unhealthy relationship with how I view my body.</p>
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As shown in table 4.7, 4 themes were found when coded question #30. The themes found were yes, no, personal, and social. Of the 758 responses, n=655 selected “No”. A total of n=98 of students listed food access impacted their relationships in life. Of the n=98 that listed yes, n=80 had a social relationship problem, while n=24 mentioned personal relationships affected. One CALS student said they were impacted by saying,

“Sometimes yes because money is required for some social events and I have a difficulty justifying to myself to spend money on a social gathering that I might need for everyday food. Like one outing to axe-throwing or bowling could affect the food budget. Not going to these events, however, makes my social life feel nonexistent.”

Another student added,

“Yes, I constantly make excuses not to hang out with some of my colleagues because I don't have the funds to eat out. When I do hang out with them at restaurants, or food places, I'm constantly calculating to the cent of how much the food will impact my overall ability to stay out of debt.”

While the next student expresses how their physical health and social relationships are impacted saying,

“Yes, I have less energy to socialize and am sometimes irritable and “hangry.” I also often feel embarrassed having people over because I know I don’t really have much to offer if they want something to eat.”

Another student describes how their personal relationship has been impacted stating,

“It has put a HUGE strain on my marriage because we argue over what we can afford to buy for dinner.”

In addition, another student felt awkward discussing their situation with peers responding,

“Yes. It’s awkward and hard to talk about even with peers. It’s hard to say that you’ve lost weight because of lack of eating instead of going to the gym more. I don’t want to hang out with friends because I don’t want to make someone else feel awkward if I can’t afford food, or offer food when hosting.”

While the next student is having to hide their situation expressing,

“Yes, I often lie about my financial and food status. I pretend everything is ok most of the time when its not. I go without real food for a week until I can afford something.”

Social relationships are important to students at Virginia Tech. However, if one doesn’t have money for food to purchase at friend outings, or the ability to purchase groceries for hosting/events, they are likely to not attend. In addition, students voiced having feelings of embarrassment not being able to go out with friends because they can’t afford to purchase food.

Table 4.7 Question #30 Summary

Question	Total Number of Responses	Themes	Example Response
30. Has limited food access impacted the relationships in your life, such as personal or social? If yes, in what way?	758	<ol style="list-style-type: none"> 1. Yes 2. No 3. Personal 4. Social 	<ol style="list-style-type: none"> 1. Yes, like not able to take friends or family to outside dinner. 2. I don't think so. 3. it has put a HUGE strain on my marriage because we argue over what we can afford to buy for dinner. 4. Absolutely yes. When others are going to a restaurant or a bar, money is tight, and I don't go. But I am not going to tell them that I can't afford it.

The last question students were asked was what ways they see Virginia Tech and their community support their access to food. Table 4.8 depicts a total of n=691 responses with students listed being unaware (n=344) of resources as the top response. Resources students listed as being aware of most were dining halls (n=114) on campus because of easy access, and then food options/variety (n=97) provided from on campus dining and easy access to grocery stores in their community. Like in question #24, unawareness was a commonly voiced theme in question #31. One student expressed not being aware of resources mentioning,

“Not aware of any ways currently. I really just show up, study, go home. I need to look more into these options.”

The following student was unaware of resources and voiced not having equal ability to access food by stating,

“I am not sure. I think the cost of the food on campus does not allow for individuals with financial needs to have an equal ability to access food.”

Another students talked about not knowing about resources available and the cost of living as a college students saying,

“I don't know. Honestly, if my off-campus living was cheaper things would be substantially easier. College students do not have a lot of money and it is

upsetting to have to choose to live in a nice apartment or choose a cheap apartment that hasn't been maintained. It is another way of having more systemic problems on campus. People who come from low-income areas or are first-generation students are going to have a harder time and need to find external funding (part-time jobs) to support their daily needs. It doesn't make sense that some housing can be so expensive on a college campus, even dorms.”

One student tried to use programs, but barriers impacted their ability to access food. The student stated,

“I know there are some resources out there, but they are often offered at inconvenient times or it is difficult to get to the place where we are supposed to go. Once, I asked about a program, vouchers for food, and they had already handed out all of them, so that particular resource seemed like it would not be a good option and provide any stability. At the same time, I don't ask because it's embarrassing, and I don't want to answer a bunch of invasive questions.”

Unawareness of campus and community resources was voiced several times in the responses. While most students mentioned not having to seek these resources out because of not being in need, others stated they were in need and wanted to know the resources available. In addition, even if a student doesn't need to access food resources, they can still play a role in spreading awareness of resources for people that are in need.

Table 4.8 Question #31

Question	Total Number of Responses	Themes	Example Response
31. In what way does Virginia Tech and your community provide resources to support your need to access food?	691	<ol style="list-style-type: none"> 1. Unaware 2. Food Bank or Food Pantry 3. Resource Suggestions 4. Farmers Market 5. The Market at Virginia Tech 6. Graduate School 7. Food Donations 8. SNAP 9. Athletics 10. Word of Mouth 11. Dining Halls 12. Nutrition Counseling 13. Transportation 14. Virginia Tech Salary 15. Food Options/Variety 16. 209 Market 17. Campus Kitchen 	<ol style="list-style-type: none"> 1. I am not aware of any resources. 2. We have many food pantries in our area. 3. Have more healthy food and not calorie dense foods. 4. The farmers market. 5. I think The Market at VT is a phenomenal resource. 6. The graduate school also provides emails regularly with directions to relevant resources, if very hard times ever did happen. 7. I don't personally need food assistance, but I have participated in multiple food drives through club sports and other clubs I'm in. 8. My professors and bosses are helpful in making sure that I eat full meals. Clubs often provide food and allow people to take extras home. 9. Virginia tech athletics feeds me 5 days a week. It could not be better. 10. I have heard about different resources from lectures in a few of my classes. 11. Providing dining halls to be able to get food. 12. Dietitian program thing was helpful. 13. Bt access. 14. It pays me for working? 15. They have lots of food options. 16. I would like to go to 209 marketplace, but it's at an inconvenient time for my schedule. 17. Campus kitchen and other resources from student life.

Discussion

Availability: What Do I Have to Eat?

College students may have access to food, but is the food they have access to what they would prefer to eat? According to this study, most students in the CALS program at Virginia Tech are eating the foods they want. However, those who are experiencing food access problems are not eating what they may prefer or their ideal choice of food. The ongoing rhetoric for college students is surviving off of a ramen noodle diet. However, this should not be the standard nor the expectation. Just because someone has access to a large quantity of ramen noodles

doesn't equate to the quality of food the student needs or prefers. This is especially important because a student facing food insecurity will likely be less academically successful and have poorer psychological health (Raskind et al., 2019). Additionally, Florence et al., found (2008),

“Dietary adequacy and variety were identified as specific aspects of diet quality important to academic performance, thereby highlighting the value of consuming a diverse selection of foods in order to meet the recommended number of servings from each food group.” (p, 213)

Where a student lives, transportation, dining halls, health, cultural beliefs, religious beliefs, academic schedule, or work schedule can impact whether or not a student can obtain the food they prefer.

Awareness: What do students know?

Questions #24 and #31 showed high numbers of unawareness of resources and programs to access if in need of food. This can be alarming because Hall et al. (2019) found that 29% ($\pm 3.8\%$) of undergraduate and 35% ($\pm 7\%$) of graduate students were classified as having low or very low food insecurity at Virginia Tech. The need to spread awareness of supported programs can greatly support students facing food access worries. Students will often only be aware of what is available to them if they are told. In addition, just because you do not need the resource doesn't mean you shouldn't know about it.

Spreading information can help build awareness on campus. Virginia Tech does have programs and resources like emergency grants through the Dean of Students, The Market at Virginia Tech, Campus Kitchen, and 209 Marketplace at Virginia Tech, whereas the surrounding community has the Interfaith Food Pantry and The NRV Food Assistance Directory.

Affordability: Food or Rent?

Today's students face high tuition prices and struggle to purchase basic needs while in school (Lillis & Tian, 2008; The Hope Center for College, Community, and Justice, 2021). Students often must balance which basic needs to meet, and these decisions often extend to choices surrounding access to food. Some students even experience having to decide between the quantity versus the quality of food. Tuition and expenses have shown to continue to increase over the years. As more and more students access higher education for degree obtainment, some are forced to pay rent or buy food. No one should have to make that decision in life.

QoL (Physical Health, Psychological Health, Social Relationships, and Environment)

The relationship between food access and QoL has been studied and proven to correlate with each other (Hanmer et al., 2021; Sok et al., 2018). As Maslow (1943) emphasizes, a person lacking food would make it their priority to satisfy compared to safety, love, or self-esteem. If a person cannot access food, their physical health, psychological health, social relationships, and environment can be affected. Meza et al. (2019) said, "food insecurity can affect academic performance, including a lack of energy due to not consuming enough or the right foods, the distraction of one's stomach growling in a small classroom, and sleeping to cope with hunger." A student cannot succeed in a classroom if their basic needs are unmet.

A person's physical health can be negatively impacted if they are not consuming enough food to complete daily life tasks (Hagedorn-Hatfield et al., 2022; Payne-Sturges et al., 2018; WHO, 2012). A college student needs access to nutritious food to perform well academically; otherwise, how can they have the energy in class to concentrate or study? Psychological health is as important as physical health for college students, food access plays into each area just as much. Becerra & Becerra (2020) conducted a study that found food insecurity was significantly

associated with the presence of psychological distress. Martinez et al. (2020) emphasize, "mental health and academic performance may be improved if food insecurity is addressed." The responses from students show that attention needs to be paid to how food access impacts their psychological health.

One area of QoL and food access that hasn't been often explored is how social relationships are affected. As Cutrona & Russell (1987) stated, "friends can be good medicine." However, if a student is not able to socialize with their friends due to lack of food to bring or lack of money to buy food, how does this impact their social relationships? Higher education promotes social relationships with students, creating a sense of belonging and improving retention rates (Meehan & Howells, 2019; O'Keeffe, 2013). However, as detailed by students, if they are financially unable to purchase or provide food, they will not hang out with friends. Students were shown to have to make excuses or lie to not feel ashamed for not hanging out with friends and making their social life non-existent. In addition, one student is experiencing a strain on their marriage because they are unable to socialize.

Internal and external barriers can influence food access for students (Gerritsen et al., 2019). College students have lives that involve many competing obligations and interests for their time. A student often will have to prioritize being a student while in school and put other areas of their life as secondary or tertiary priorities. Responses showed how the demanding lifestyle of being a student could impact a student's food access.

In addition to academic and work schedules, students discussed the environment and transportation barriers to accessing food. Not having access to a car has been shown to tremendously impact food access for people (Baugus, 2020).

A student missing meals because of a rigorous schedule is cause for concern. When students schedule classes, they are often at the mercy of what must be checked to complete their degree. The time a student has left after attending classes is supposed to be for studying; however, if money is needed to pay for basic needs or tuition, then a student will have to have a job.

Implications and Recommendations

A student should have equal opportunities to succeed in college as their peers, but if faced with problematic scenarios like low QoL, how can they? Not only are the side effects of poor QoL cause for concern, but it is clear that many students cannot perform at their best academically. As shown in this study, many students were physically affected by exhaustion or lethargy from not having food. Psychologically students experienced stress, depression, low concentration, poor body image, or low self-esteem because of their lack of food access. The findings in this study can be used to understand better what students are experiencing when having low food access and how to support these students.

Expanding on current resources and programs can better support students facing food access concerns on campus. Another solution that has been seen to help is having food scholarships available. Bunker Hill Community College in Boston, Massachusetts, provides "meal vouchers" to students experiencing food insecurity (Goldrick-Rab et al., 2020). The meal vouchers from Bunker Hill Community College are handed out as debit cards students can use at dining halls on campus. One way Virginia Tech could raise funds for meal vouchers is to include them on Giving Day. The funds could go directly to supporting students experiencing hardships when acquiring food. Virginia Tech (2023) raised 8.4 million dollars in donations and had 15,787 donors for the year 2022. Having access to a scholarship would help more students be

able to finish college and thus increase degree mobility. In addition, having and adding programs for students is wonderful. However, if students don't know the existing programs or how to access them, the effectiveness of these resources in combating food insecurity is limited. The reality is that students need a positive view of QoL and access to food to fuel their bodies to be successful in daily life tasks like classes and studying.

Conclusion

This qualitative study showed that food access could have significant consequences on the QoL of college students. Students were shown to experience physical fatigue, low energy levels, episodes of fainting, and nausea from having low access to food. Psychological health was also seen to be impacted in terms of self-esteem, concentration, stress, anxiety, depression, and body image. In addition to overall health, their social relationships took a backseat when involving low food access. Students indicated they were less likely to attend social events with friends due to not having money or food to contribute.

Findings also showed that a student's environment was impacted by their work and school schedule. A busy schedule caused students to miss meals or caused them not to have time to purchase food. In addition, several students expressed concerns about not having a car and having to use the bus system. This can create a challenge for students due to the bus's unreliable schedule on the weekends and the inconvenience of carrying groceries onboard.

Students' food accessibility, availability, awareness, and affordability were shown to impact their QoL. The most concerning finding was a person's lack of awareness of the programs and resources available to them. At the same time, food access to healthy and nutritious foods was not always an option for them due to financial or availability reasons.

As MHoN emblemizes, food is a basic need in life. A student will only reach self-actualization if their food needs are met. Higher education is aware of students experiencing hunger. Research has documented that. However, thinking of food access through an equitable lens will need to be applied.

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Chapter 5

Manuscript 3

Student voices: A mixed-method approach to understanding the quality of life of students living with food access barriers at Virginia Tech.

Abstract

For a student to be successful in school they need to have their most basic needs met. One of the basic needs in life according to the Maslow Hierarchy of Needs is food. A student that lacks food is less likely to succeed in academics, along with other areas of life such as socially, physically, and psychologically. This mixed-method study explored the barriers of food access and the factors that affect their Quality of Life (QoL). The study involved a concurrent phase (1) of quantitative and qualitative approaches in a cross-sectional survey and a sequential phase (2) of student interviews to explore the findings in phase 1 to phase 2. The cross-sectional survey showed that the overall multiple regression model to be statistically significant with a p -value=.017 and the adjusted R square explained .277 or 27% of the variance. In addition, the model predicted that food access, Asian race/ethnicity, first-generation, and senior classification had an influence on QoL. The open-ended question themes that contribute to low food access for students were demanding work and academic schedules, low food availability/options, cost of living, location, transportation, and lack of overall awareness of support programs. The effects seen on QoL were low energy, lack of concentration, lack of learning, negative mental health, negative physical health, and limited social relationships. In phase 2, 9 themes were found in the student interviews. The themes were barriers of food access, supporting food access for Virginia Tech students, unawareness of resources, social relationships, psychological health, running out of meal plan money, limited options, physical health, and skipping meals. In conclusion, food

access was shown to have an impact on QoL of students in agriculture. The need to explore ways to support students in hunger if we want students to succeed in school.

Introduction

Food Access

Gundersen et al. (2022) determined that 100% of counties and congressional districts in the United States contain individuals or families experiencing hunger. Hunger is a physiological state one experiences due to being food insecure (United States Department of Agriculture (USDA) Economic Research Service (ERS), n.d.). USDA ERS defines food insecurity as, “a household-level economic and social condition of limited or uncertain access to adequate food.” Food security is dependent on an individual’s ability to access the food they need to sustain their daily needs. The Agriculture and Economic Development Analysis Division (2006) explains food access as “access by individuals to adequate resources (entitlements) for acquiring appropriate foods for a nutritious diet.” The USDA ERS (n.d.) describes influences to food access in stating, “Consumer choices about food spending and diet are likely to be influenced by the accessibility and affordability of food retailers—travel time to shopping, availability of healthy foods, and food prices.” Food access is not one dimensional but encompasses many corresponding factors that influence how one is able to obtain food. Figure 5.1 shows four different dimensions when understanding food access. The following will discuss how these dimensions- food accessibility, availability, affordability, and awareness- influence how someone is able to access food.

Figure 5.1 The Four A's of Food Access



Food accessibility refers to the physical proximity of an individual to food and their ability to access the food (Usher, 2015). When analyzing someone's accessibility to nutritious food, it is important to determine if the individual has reliable transportation to access a grocery store or a food bank. If not, then their access to food is certainly impacted. Food availability refers to whether an individual has the quantity and quality of food that is needed to sustain daily life activities (Cason & Boege, 2020). As such, it is also important to consider if one can find an ample quantity and sufficient quality of food in their vicinity. An individual's income, and how that income is allocated for household needs, will impact food affordability (Caspi et al., 2020). If someone does not have the money to purchase food to meet their basic needs, then this will influence food affordability. In research accessibility, availability, and affordability are established terms when discussing food access (Dong et al., 2022; Cason & Boege, 2020; Caspi et al., 2012, Usher, 2015). However, food awareness has also been shown to be a significant factor in whether or not a person can access food (Peterson et al., 2022; Ortiz et al., 2020). A

lack of awareness of the resources and programs that support an individual could prevent individuals from accessing food they could otherwise obtain. Consequently, community food awareness can play a critical role in improving food access.

Quality of Life

The WHO (1947) first explains QoL as a "state of complete physical, mental and social wellbeing, and not merely the absence of disease and infirmity." Centers for Disease Control and Prevention (2000) defines Health-Related Quality of Life (HRQOL) as "an individual's or group's perceived physical and mental health over time." The WHO then goes on to redefine QoL, to broaden the view of what is meant by QoL, by stating, "individuals' perceptions of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns." The following will go on to further discuss QoL in categories that will be measured in the WHO QoLBRIEF section of the survey. These categories are physical health, psychological health, social relationships, and environment.

The ability to carry out a daily task and the well-being of an individual's body can be defined as physical health (Nishat, n.d.). How one's body functions and handles everyday life can be an indicator of their physical health. The physical health indicators measured are pain and discomfort, energy and fatigue, and sleep and rest. The next category of QoL is psychological health. In Donatelle & Ketcham's (2019) book, psychological health is defined as how one thinks, feels, relates, and exists in day-to-day life, and how one's skills and experiences shape it. A person's psychological health is measured from the person's positive feelings, thinking, learning and concentration, self-esteem, body image and appearance, and negative feelings. The third explored category is social relationships. The sum of the social interactions between people over time (which can be positive or negative) can be termed social relationships (Umberson &

Montez, 2010). Social relationships can be divided into personal relationships, social support, and sexual activity. Lastly, the environment in which one lives can impact an individual's QoL in many ways. Physical safety and security, home environment, financial resources, health and social care, opportunities for acquiring new information and skills, participation in and recreation/leisure activities, physical environment, and transportation are all associated with a person's environment (WHO, 2012). Combining physical health, psychological health, social relationships, and environment can help better understand how an individual's QoL can be affected.

Food Access and Quality of Life

Nelson et al. (2009) found that very few young adults in two-year and four-year institutions are consuming optimal diets. Food access can be directly associated with QoL because if one does not have food that fuels their body, then the ability to participate in daily life will be impacted. An individual's eating habits, food choice, and meal patterns are intertwined with their physical health, psychological health, social relationships, and environment (Hoffmann, 2008). O'Hara & Toussaint (2021) discusses the importance of providing solutions to food access by saying,

“First, a lack of food can trigger deficiencies in critical nutrients and calories necessary to fight the onset of disease; and second, a surplus of nutrient-deficient food of poor quality can ignite health problems such as obesity, diabetes, and hypertension that can compromise immune systems.” (para. 2)

In addition, Amarantos et al. (2001) goes on to say, “Good nutrition improves HRQOL by promoting health, preventing dietary deficiency disease, and ameliorating or averting secondary malnutrition that is caused by or associated with other disease. Food and nutrition are essential components of the good life.” A person’s QoL can depend on food accessibility, availability, affordability, and awareness. To summarize, if one does not have access to adequate transportation, available quality and quantity of foods, income to afford that food, and awareness of programs and resources to assist them, then their QoL can be influenced negatively.

Demographics

First-Generation

According to the Center for First-Generation Student Success (n.d.), one-third of undergraduate college students come from families where they are the first in their family to attend college. The proportion of first-generation college students attending college will continue to rise in response to demands of degree attainment and professional upward mobility. The troubling circumstances first-generation students face compared to their peers include inadequate family support, limited resources, and insufficient financial aid (RTI International, 2019). A first-generation student is not able to rely on family to provide support in navigating school because their families have not experienced the journey themselves. With the obstacles that first-generation students face, this group of students is often exposed to being food insecure while in school (Forman et al., 2018; Riddle et al., 2020; Wolfson et al., 2022). As of 2022, Virginia Tech (n.d.) had a 19% increase of first-generation students attending school.

International

Hegarty (2014) stated, “International students have an increasing presence in large universities in the United States and with them they bring an important component that of diversity of thought.” International students attending US higher education institutions bring in cultural beliefs, values, and influences to their college campuses. Plus, this student population not only influences campus life, but also the community in which the college resides.

Unfortunately, international students are more likely to feel overwhelmed due to cultural differences of food, customs, financial constraints, homesickness, loss of social status, fear, and a sense of insignificance (Hegarty, 2014). In addition, studies have shown that, due to having cultural differences in food, financial straits, lack of resources and being in a new environment, international students often face food insecurity and food access concerns (Benefield et al., 2018; Shi & Allman-Farinelli, 2021). As international students continue to grow in number and diversity, providing culturally appropriate resources and programs will be crucial in the success of this population of students.

Geographic Locations

Feeding America (n.d.) found that people living in rural communities experience higher rates of hunger than people living in urban communities. In addition, Gundersen et al. (2022) found that,

“Rural counties (those outside of major metropolitan areas) make up 63% of all U.S counties but represent 87% of counties with food-insecurity rates in the top 10%. In other words, counties with the highest rates of food insecurity are disproportionately rural.” (p. 8)

The barriers that someone may face when living in rural communities include lack of transportation, lack of grocery store access, lack of food quality, and lack of food quantity (Gerritsen et al., 2019). Thrive: NRV Food Access Network (2019) explains that if someone doesn't have a car and has a greater distance to a grocery store, their food access is impacted. In addition, Baugus (2020) explained, "Low-income individuals from rural areas often rely on their support network of friends and family to provide transportation. Often, low-income individuals do not have their own transportation or are utilizing a vehicle that may not be reliable." Even though rural students are shown to be more likely to experience food access problems, this does not mean urban students do not have factors that affect their access. Environment plays a factor for someone living in an urban environment as well (Paquet, 2019). Someone living in an urban environment may face barriers such as a lack of availability to food options and an inability to afford the price of food (Biehl et al, 2018; Ogot, 2021; Tam et al., 2017). No matter where someone lives, their geographic location can have an impact on their ability to access food.

Theoretical Framework

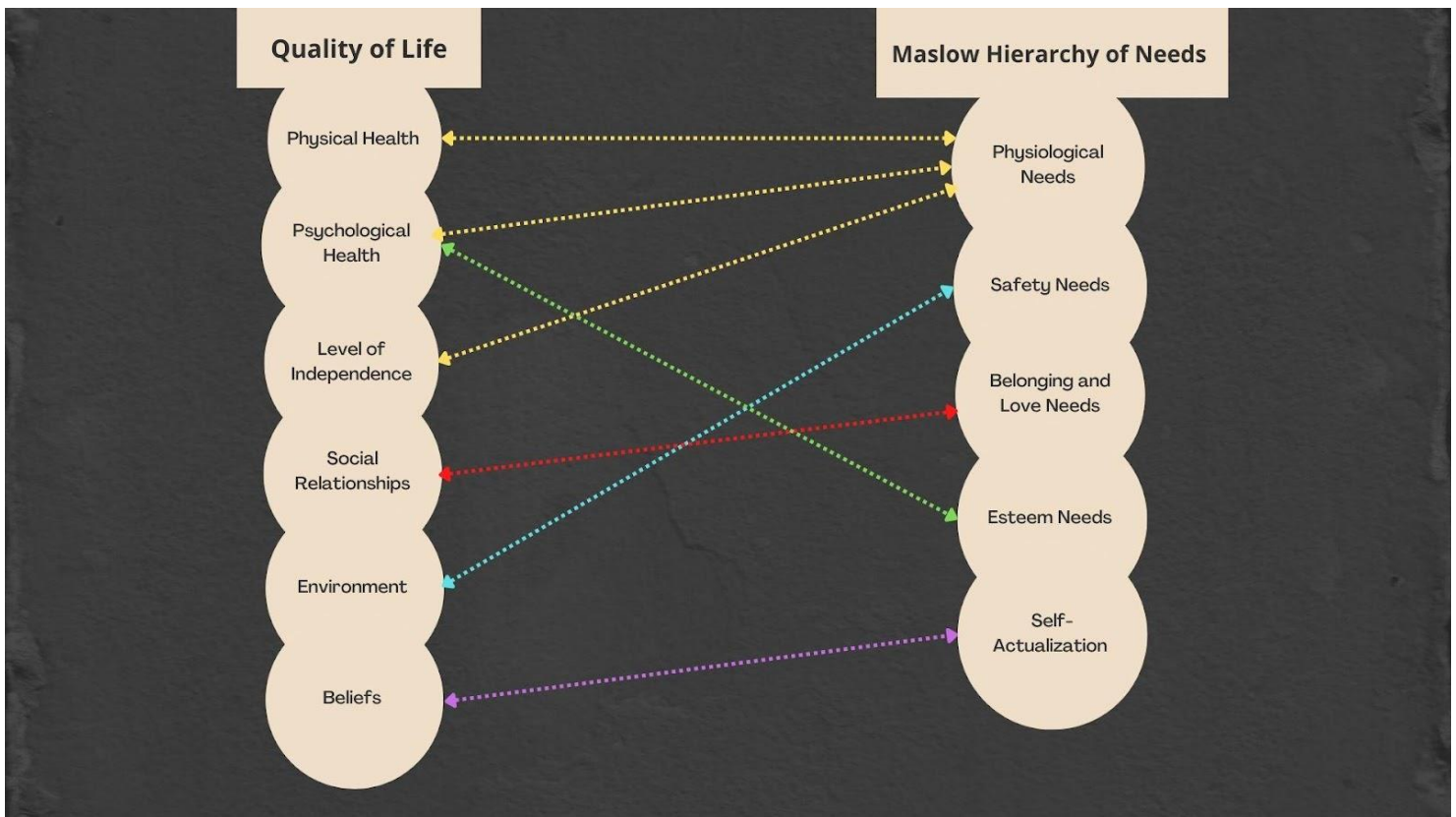
Maslow Hierarchy of Needs

Abraham Maslow (1943) developed a hierarchy of needs in which people must complete the needs of each level before moving onto the next. For example, if one does not have the basic need of food, water, rest, clothing, shelter, or reproduction met, then the next level of safety will not be achieved, because the person is focused on satisfying their most basic need (Maslow, 1943, Mcleod, 2018). Physiological, safety, belongingness and love, esteem, and self-actualization make up the five levels of Maslow's Hierarchy of Needs (MHoN).

QoL Intertwined with MHoN

The two theoretical underpinnings are first associated with how one survives by accessing basic needs. Physiological needs from Maslow are in tandem with physical health, psychological health, and level of independence from the QoL framework. One must be able to eat, rest, have shelter, be mobile, have energy, have work capacity, and be able to perform daily activities to survive. If an individual is lacking in these essential requirements, then their desires are not met, and QoL is adversely affected.

Figure 5.2 Correlations with QoL and MHoN



After one reaches a level where the basic needs of everyday life are met or achieved, their safety and environment can be addressed. The environment and safety where one lives has an impact on QoL and is the second need Maslow proposes. An individual living in a poor-quality

environment may face troubles such as polluted air and water, lack of fundamental resources (such as health and social care), high crime rates, lack of public transportation, and a troubling home environment.

In MHoN, the next level of obtainment is meeting love and belonging needs. This third tier in Maslow's pyramid corresponds with social relationships in the QoL framework. As Maslow (1943) states, "one will hunger for affectionate relations with people." Connections with others can be in the form of family, friends, partners, or in social groups. An individual's sense of love and belonging to others is important when forming a better QoL.

The fourth level of the hierarchy is esteem. Maslow (1943) further breaks down esteem into two separate categories: self-esteem and self-respect. Psychological health, from the QoL framework, relates with Maslow's esteem tier. Positive and negative feelings, image, and prestige are associated with one's esteem and psychological health. An individual that has negative feelings, poor body image, and low confidence in themselves or their abilities will have a worse QoL.

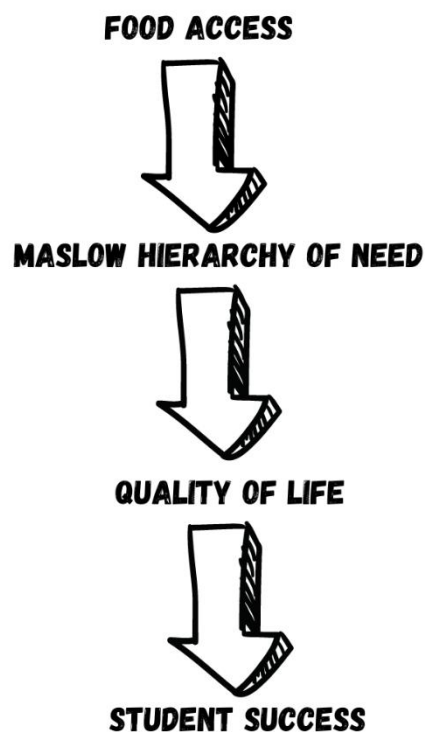
The last correlating categories for MHoN and QoL are self-actualization and beliefs. Maslow states that once one reaches self-actualization, the individual has reached their full potential. All their needs have been met, and the individual can be what they desire. Achieving self-actualization is being able to have the choice of having personal, religious, or spiritual beliefs. Having beliefs gives one purpose and a sense of fulfillment, thus improving QoL.

Food Access, QoL, MHoN, and Student Success

Food access, QoL, and MHoN are dependent on each other for a student to be successful while in school, as shown in figure 5.3. Food is among the basic needs that need to be met at the

physiological level of MHoN. A person that has low access to food will likely not be able to meet their physiological need in life. If a person does not have food to meet this basic need, then their QoL is likely to be impacted. A student that is experiencing low food access, low QoL and is not meeting MHoNs first level, will likely not be able to succeed in school (Ansorger, 2021; McLeod 2018). A student facing food access concerns will focus on acquiring food to meet a basic need and will not be concerned about academics until this need is met. On the other hand, having access to quality and quantity of nutritious food meets this first basic need, thus contributing to improved QoL for students (Ansorger, 2021; Braveman et al. 2011). In doing so, the student can also focus on academics and is more likely to be successful.

Figure 5.3 Food Access, QoL, MHoN, and Student Success



Purpose Statement

This mixed-method research study aimed to understand how food access impacts the QoL of College of Agriculture and Life Science (CALS) students at Virginia Tech by examining multiple choice and open-ended questions from a survey that was then compared to responses in interviews conducted with students. Evidence has demonstrated that college students have barriers to overcome when finding their next meal (Anderson et al., 2022; Schwartz et al., 2019) but examining how food access and QoL affect first-generation, international, rural, and urban student populations in agriculture has yet to be explored. This research hopes to initiate conversation about how students combat hunger while pursuing a degree and career in agriculture.

Research Question

How does food access impact the quality of life for first-generation, international, rural, and urban students in the College of Agriculture and Life Sciences at Virginia Tech?

Objectives

- ❖ To determine the QoL of first-generation, international, rural, and urban students in the College of Agriculture and Life Sciences at Virginia Tech.
- ❖ To determine food access for first-generation, international, rural, and urban students in the College of Agriculture and Life Sciences at Virginia Tech.
- ❖ To describe how food access contributes to QoL for students in the College of Agriculture and Life Sciences at Virginia Tech.
- ❖ To explain how the effects of food access contribute to QoL for students.

- ❖ To understand the QoL of students living with food access concerns at Virginia Tech.

Design

The research design of this study was a mixed-methods approach. The design consists of a multilevel structure with concurrent and sequential data collection points (Creamer, 2018). In phase 1, the researcher used a cross-sectional survey design to observe the relationship between the independent (first-generation, international, urban, rural, physical health, psychological health, social relationships, environment, food access, department/school within the college of agriculture, degree selection, undergraduate classification, graduate classification, race/ethnicity) and dependent (QoL) variables (Creswell & Creswell, 2018). The researcher used an online survey method through the QuestionPro platform to collect data from the students enrolled in the CALS college. A random single sampling approach to collect data was used. The researcher conducted pilot testing on QuestionPro before the survey was sent out to students where four students participated in the pilot. After the pilot test, the researcher began the study. Virginia Tech student emails were used to send the survey to students. The survey incorporated 11 student demographics, 6 food access questions, and 25 WHO QoLBRIEF questions. In addition to the multiple-choice questions, the researcher included 8 open-ended questions on food access and quality of life towards the end of the survey. At the end of the survey, students were asked to provide contact information if they wanted to participate in a follow-up interview. The questions in this follow-up interview were formed from the results of the cross-sectional survey.

In phase 2 of the research, the design consisted of student interviews hosted over the Zoom platform. The researcher-based selection of participants on a first come first serve basis. The first 19 students that agreed to participate in the interviews were selected. The researcher set up 19 interviews that each lasted 45 -60 minutes. The questions used in the student interviews

were developed based on the results in phase 1. The participants were asked at the beginning of the interview for their consent for the interview to be recorded and to participate in the research project. After the completion of each interview, the researcher stored data in a protected Google Drive folder. Once meaningful saturation of interviews had been determined by the researcher, interviews were concluded at 19 participants (Hennink et al., 2017). To analyze the results, the researcher used Reduct to first transcribe the interviews and then tag and code the transcriptions. Once tagging and coding of the transcripts were completed, themes were developed from the data. The researcher then used meta-inferences to compare the findings in phase 1 to the results in phase 2.

Data Collection

Phase 1

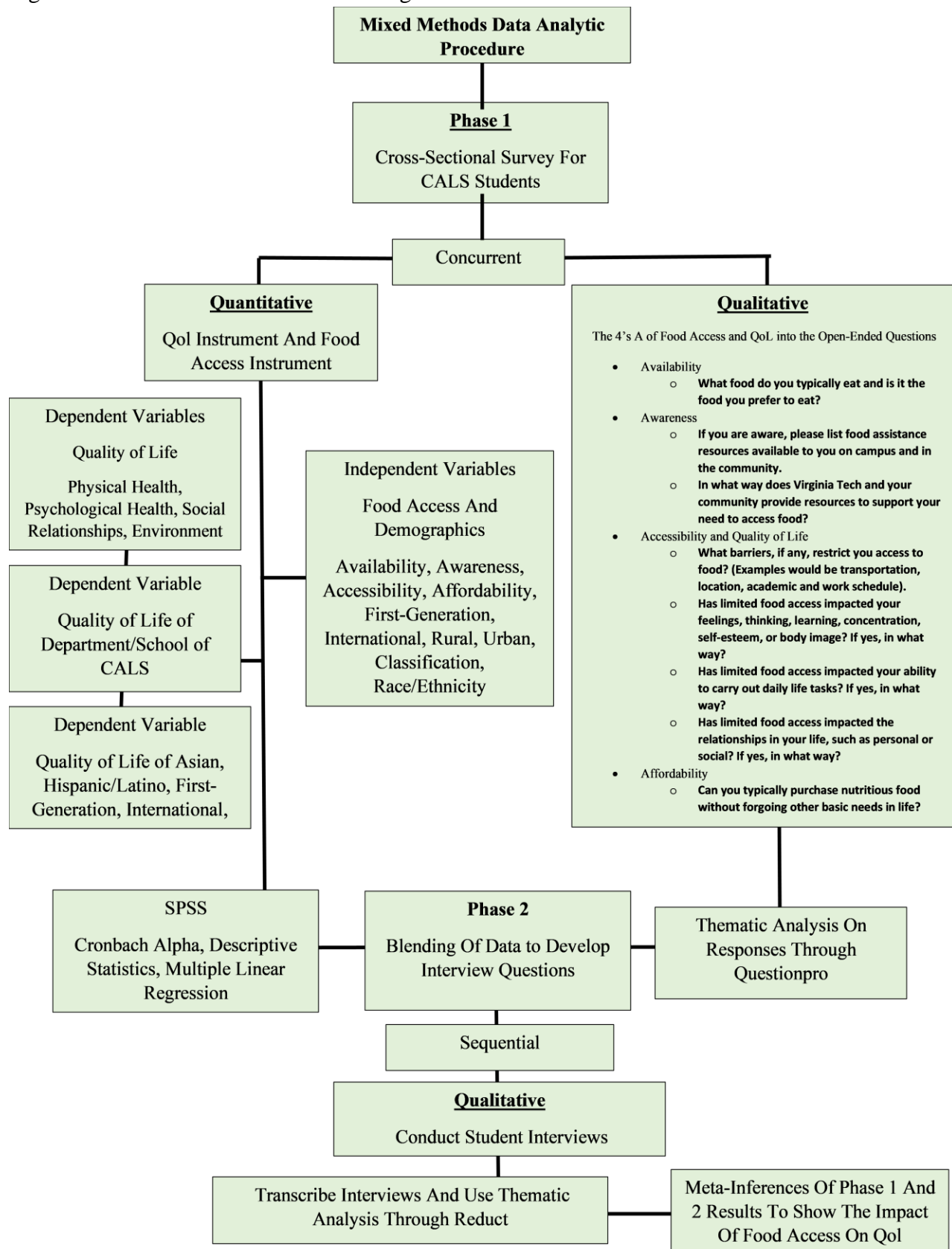
Data collection began during the fall of 2022. Students received guidance on participating in a survey via QuestionPro through their Virginia Tech student emails. The students had three weeks to participate and complete the survey. Students received a reminder email each week during the survey timeline. The researcher visited classes in CALS to garner student participation in the survey. A QR code was created and presented to students when visiting classes that linked to the survey for the students' convenience. QuestionPro stored data from the surveys until the data collection period had ended. Once the data collection period had ended, the researcher gathered the data from QuestionPro to be processed and cleaned. The data collected was then transformed into an Excel spreadsheet and cleaned. The student names, email addresses, and any identifying information were removed to protect confidentiality of the students. After the data was cleaned, the researcher stored the Excel spreadsheet in a protected Google Drive folder.

People with IRB approval were the only ones that had access to the data in the protected Google Drive folder.

Phase 2

The researcher conducted interviews once students had finished the survey and self-selected to participate in the follow-up interview. Students participating in the interviews were instructed that interviews would be hosted over the Zoom platform. The researcher prepared questions based on the quantitative and qualitative themes from the previous cross-sectional survey students participated in. The researcher provided each student participating in the interview with information regarding the timeline of the interview.

Figure 5.4 Mixed-Method Procedure Diagram



Instrumentation

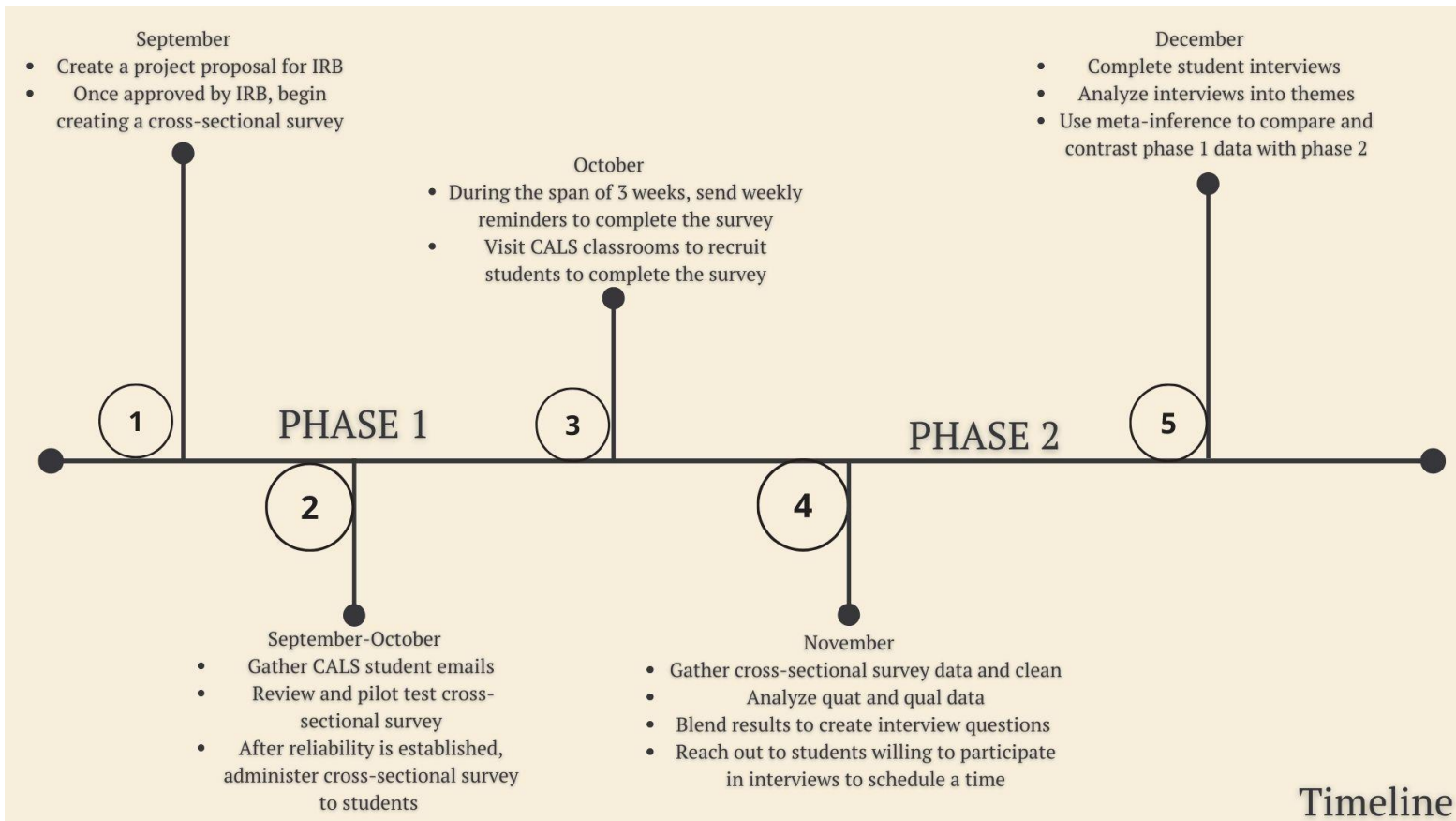
Phase 1

The researcher used and collected data from the QuestionPro platform provided by Virginia Tech. Once the survey timeline had concluded, the researcher first used QuestionPro to download the multiple-choice results to be analyzed in SPSS. The multiple-choice questions were cleaned in Excel and uploaded in SPSS. The researcher then ran a Crohn Bach Alpha on the two survey instruments (food access and QoL), then descriptive statistics and multiple linear regressions on the independent and dependent variables. The open-ended questions on the cross-sectional survey were analyzed through QuestionPro's text analysis function. The researcher tagged and coded the open-ended responses that provided themes to the 8 questions asked in the survey.

Phase 2

The researcher developed a set of questions from the previous cross-sectional survey administered through QuestionPro. The research conducted interviews over Zoom and used the recording feature to save the conversations. The participants were sent information regarding the Zoom interviews via contact information they provided in the survey. The researcher transcribed and analyzed the interviews using Reduct platform. The researcher used the tagging and coding features on Reduct to analyze the transcripts. Once tagging and coding was completed, themes were produced from the transcriptions. The researcher then used results from phase 1 of the cross-sectional survey to compare with overall themes developed in the interviews.

Figure 5.5 Mixed-Method Timeline



Procedure

Phase 1

The survey administered via QuestionPro was sent out to student emails in the fall of 2022 with instructions on how to complete the survey and whom to contact if the participant had questions or concerns. The survey took an estimated 15-20 minutes for the student to complete. At the end of the survey, the researcher provided campus resources available to students in need. The researcher incorporated skip logic embedded in the survey for questions that didn't correspond to a participant. The researcher had multiple choice, matrix tables, and open-ended formatted questions in the QuestionPro survey. A reminder email was sent to students that had not completed the survey at the end of each week until the survey was closed by the researcher.

In addition to sending emails, the researcher recruited students to participate in the survey by speaking in CALS classes and using a QR code which linked to the survey for convenient participation.

Phase 2

Students who were selected to participate in a follow-up interview were contacted by the researcher to schedule a Zoom interview. The researcher scheduled interviews through provided contact information according to student availability. The participants were notified the interview will last approximately 45 minutes to an hour of their time. The researcher sent out calendar invites to the participants ahead of time with the Zoom link as well as the interview questions that would be asked. Before the interview began, consent to be recorded and to participate in the interview was obtained from participants. The researcher described the interview process and informed the participants that they had the option to leave the interview at any time.

Data Analysis

Phase 1

The researcher elicited help from the SAIG group and Virginia Tech Library Data Services on the Virginia Tech campus. First, the researcher cleaned the multiple-choice response data on an Excel spreadsheet downloaded from QuestionPro. After the data was cleaned by checking for data consistency and answers were formatted correctly, the researcher and additional support recoded inverse questions, recoded dummy variables, and obtained mean outputs for food access, QoL, and demographic questions. Once the data was ready to be analyzed, the researcher used SPSS to analyze the QoL and food access instrument by running a Cronbach Alpha reliability test. Next the reliability test was performed, the researcher used SPSS to perform descriptive statistics on the data. The researcher then performed multiple linear

regression through SPSS on three dependent variables (QoL, department/school in CALS QoL score of students, individual QoL scores: Asian, Hispanic/Latino, first-generation, international, rural, and undergraduate senior status) and the independent variables first-generation, international, rural, urban, food access, degree selection, undergraduate classification, graduate classification, race/ethnicity (as seen in figures 5.6-5.18). The researcher used multiple linear regression to search for significant predictors in the regression model (Berge, 2018). Once the quantitative variables were analyzed, the researcher began to clean the responses from the open-ended questions. The open-ended responses were divided into themes (themes which were determined during the tagging and coding of the participants' responses). After the researcher developed themes from the open-ended questions, charts and graphs were then developed in Excel to display the data. Once the quantitative and qualitative data had been recorded and analyzed, the researcher blended the results from phase 1 to form questions for phase 2 of the research design.

Figure 5.6 Statistical Equation 1 Multiple Linear Regression

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_p X_p + \varepsilon$$

QoL (physical health, psychological health, social relationships, environment) = β_0 (first-generation) + β_1 (international) + β_2 (rural) + β_3 (urban) + β_4 (Degree Selection) + β_5 (Undergraduate Classification) + β_6 (Graduate Classification) + β_7 (Race/Ethnicity) + β_8 (Food Access)

Figure 5.7 Statistical Equation Multiple Linear Regression

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_p X_p + \varepsilon$$

Agricultural and Applied Economics student QoL scores = β_0 (first-generation) + β_1 (international) + β_2 (rural) + β_3 (urban) + β_4 (Degree Selection) + β_5 (Undergraduate Classification) + β_6 (Graduate Classification) + β_7 (Race/Ethnicity) + β_8 (Food Access)

Figure 5.8 Statistical Equation Multiple Linear Regression

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \dots + \beta_pX_p + \varepsilon$$

Animal and Poultry Sciences student QoL scores = β_0 (first-generation) + β_1 (international) + β_2 (rural) + β_3 (urban) + β_4 (Degree Selection) + β_5 (Undergraduate Classification) + β_6 (Graduate Classification) + β_7 (Race/Ethnicity) + β_8 (Food Access)

Figure 5.9 Statistical Equation Multiple Linear Regression

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \dots + \beta_pX_p + \varepsilon$$

Biochemistry student QoL scores = β_0 (first-generation) + β_1 (international) + β_2 (rural) + β_3 (urban) + β_4 (Degree Selection) + β_5 (Undergraduate Classification) + β_6 (Graduate Classification) + β_7 (Race/Ethnicity) + β_8 (Food Access)

Figure 5.10 Statistical Equation Multiple Linear Regression

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \dots + \beta_pX_p + \varepsilon$$

Human Nutrition, Foods, and Exercise student QoL scores = β_0 (first-generation) + β_1 (international) + β_2 (rural) + β_3 (urban) + β_4 (Degree Selection) + β_5 (Undergraduate Classification) + β_6 (Graduate Classification) + β_7 (Race/Ethnicity) + β_8 (Food Access)

Figure 5.11 Statistical Equation Multiple Linear Regression

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \dots + \beta_pX_p + \varepsilon$$

School of Plant and Environmental Sciences student QoL scores = β_0 (first-generation) + β_1 (international) + β_2 (rural) + β_3 (urban) + β_4 (Degree Selection) + β_5 (Undergraduate Classification) + β_6 (Graduate Classification) + β_7 (Race/Ethnicity) + β_8 (Food Access)

Figure 5.12 Statistical Equation Multiple Linear Regression

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \dots + \beta_pX_p + \varepsilon$$

Combined (Agriculture, Leadership, and Community Education, Agricultural Technology Program, Biological Systems Engineering, Entomology, Food Science and Technology, Dairy Science, Other) student QoL scores = β_0 (first-generation) + β_1 (international) + β_2 (rural) + β_3 (urban) + β_4 (Degree Selection) + β_5 (Undergraduate Classification) + β_6 (Graduate Classification) + β_7 (Race/Ethnicity) + β_8 (Food Access)

Figure 5.13 Statistical Equation Multiple Linear Regression

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \dots + \beta_pX_p + \varepsilon$$

Race/Ethnicity Asian student QoL scores = β_0 (first-generation) + β_1 (international) + β_2 (rural) + β_3 (urban) + β_4 (Food Access) + β_5 (Undergraduate Senior)

Figure 5.14 Statistical Equation Multiple Linear Regression

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \dots + \beta_pX_p + \varepsilon$$

Race/Ethnicity Hispanic/Latino student QoL scores = β_0 (first-generation) + β_1 (international) + β_2 (rural) + β_3 (urban) + β_4 (Food Access) + β_5 (Undergraduate Senior)

Figure 5.15 Statistical Equation Multiple Linear Regression

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \dots + \beta_pX_p + \varepsilon$$

First-Generation student QoL scores = β_0 (first-generation) + β_1 (international) + β_2 (rural) + β_3 (urban) + β_4 (Undergraduate Senior)

Figure 5.16 Statistical Equation Multiple Linear Regression

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \dots + \beta_pX_p + \varepsilon$$

International student QoL scores = β_0 (first-generation) + β_1 (rural) + β_2 (urban) + β_3 (Food Access) + β_4 (Undergraduate Senior)

Figure 5.17 Statistical Equation Multiple Linear Regression

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \dots + \beta_pX_p + \varepsilon$$

Rural student QoL scores = β_0 (first-generation) + β_1 (international) + β_2 (Food Access) + β_3 (Undergraduate Senior)

Figure 5.18 Statistical Equation Multiple Linear Regression

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \dots + \beta_pX_p + \varepsilon$$

Undergraduate Senior student QoL scores = β_0 (first-generation) + β_1 (international) + β_2 (rural) + β_3 (urban) + β_4 (Food Access)

Phase 2

The researcher used the approach of Clark & Braun's (2017) six-step process while analyzing the data. These six steps are: familiarizing yourself with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the report.

To begin, the researcher reached out to interview participants and provided Zoom information for the follow-up interviews. Once interviews were completed, the researcher used the Reduct platform to transcribe each completed interview and used the tagging feature to highlight frequent words or phrases used by students in the interviews. Once the researcher had completed tagging, the data was then put into themes from the interviews through Reduct. The researcher used thematic analysis to better understand individuals' experiences, thoughts, and behaviors (Kiger & Varpio, 2020). The researcher then used Creamer's (2018) approach to mixing data by comparing and contrasting phase 1's quantitative and qualitative results with phase 2's interview results to potentially show meta-interferences (Teddlie & Tashakkori, 2009). This approach will allow the researcher to go beyond descriptive dialogue and have a conceptualized conclusion.

Results

Phase 1

Multiple Choice Questions

In total, 3,336 CALS Virginia Tech students were sent the cross-sectional survey by QuestionPro. Of that number, 809 (n=809) completed the survey resulting in an 81.14% completion rate. As seen in table 5.1, the Crohn Bach Alpha reliability test for the food access instrument resulted in an acceptable rating of .694 (Creswell & Creswell, 2018). The QoL instrument Crohn Bach Alpha reliability test, shown in table 5.2, had an excellent rating of .917.

Table 5.1 Food Access Cronbach Alpha

Reliability Statistics		
Food Access Scale		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.694	.711	6

Table 5.2 QoL Cronbach Alpha

Reliability Statistics		
Quality of Life Scale		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.917	.919	25

Table 5.3 displays the multiple linear regression table model summary. The model was significant overall with a p-value= .017. The adjusted R square was calculated at .277 (27%) predictability with the dependent and independent variables. In table 5.4, the stepwise multiple linear regression table lists the significant independent variables in the regression model. Food access ($p < .001$), first-generation ($p < .001$), and seniors ($p = .017$) were the significant independent variables in the study. When examining the QoL of students by department/schools, each stepwise linear regression model was statistically significant, and each model had food access as an predictor value of significance. In addition, the other predictor variables that showed to have a relationship with QoL of students by department/schools were international (Agriculture and Applied Economics and Human Nutrition, Foods, Exercise), rural (Animal and Poultry Science), undergraduate senior status (Biochemistry and combined), first-generation (Biochemistry and Human Nutrition, Foods, Exercise), Asian (School of Plant and Environmental Science), and Hispanic or Latino (Combined).

Table 5.3 Overall Stepwise Multiple Linear Regression Table Model Summary

Model Summary								
Overall								
R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
				R Square Change	F Change	df1	df2	Sig. F Change
.530 ^d	.281	.277	.13143	.005	5.769	1	821	.017

Table 5.4 Overall Significant Coefficients

Coefficients					
	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	.930	.024		38.955	<.001
Food Access	.109	.007	.480	16.079	<.001
Asian	-.049	.013	-.109	-3.674	<.001
First-Generation	-.041	.011	-.109	-3.651	<.001
Undergraduate: Senior	.030	.013	.071	2.402	.017

a. Dependent Variable: Quality of Life

Open-ended Questions

Table 5.5 shows survey questions #24-31, and the responses to the 8 open-ended questions. The most prevalent theme found in the open-ended responses was lack of awareness of food resources on and off campus. In question #25, 64.17 % (n=437) of respondents were found to not be aware of resources available to them, while in question #31, 49.78% (n=344) were unaware of the resources available through Virginia Tech and its community. In addition to being unaware of the resources available, responses to question #26 revealed students were

affected by barriers such as schedule (39.04% or n=290), academics (24.63% or n=183), job (22.21% or n=165), and money (18.09% or n=134) when it came to accessing food. Next, in question #29, not having access to food caused 35.39% (n= 270) of students to be most often affected through psychological feelings (14.81% or n=113), body image (13.76% or n=105), and concentration (12.32% or n=94). Lastly, question #30 found that 12.93% (n=98) of students experience their relationships being impacted because of food access. Socially, 10.55% (n=80) of students could not interact with peers, friends, or the community, while 3.17% (n=24) had their personal significant others or family members impacted by food access.

The first question students were asked was, “What food do you typically eat and is it the food you prefer to eat?” This question had a total response of n=782. Table 5.5 shows a majority of students (68% or n=530) responded with eating foods that they prefer, while not preferred (18% or n=137) and not ideal choices (5% or n=41) followed as responses. The other themes developed from this question, shown in figure 4.6, where the foods students typically eat or have access to. Easy meals (22% or n=170), rice (18% or n=138), and pasta (13 % or n=102) were the top three responses for food students typically eat. Limited options (12% or n=96), cost (9% or n=68), and no time (7% or n=57) reported as factors that inhibited ability to eat foods that were preferred. Additionally, 2%, or n=13, students reported skipping meals because of lack of food.

Table 5.5 Typically Food and if Preferred Breakdown

What food do you typically eat and is it the food you prefer to eat?		
Total Responses n=782		
Themes	Count	% Of Responses
Preferred To Eat	n=530	68%
Not Preferred to Eat	n=137	18%
Not Ideal Choices	n=41	5%
Easy Meals	n=170	22%
Skip Meals	n=13	2%
Limited Options	n=96	12%
Cost	n=68	9%
No Time	n=57	7%
Ramen	n=12	2%
Pasta	n=102	13%
Fast Food	n=22	3%
Rice	n=138	18%

Lack of awareness of food resource programs was prominent among students. Table 5.6 shows the breakdown of responses and themes in regard to student knowledge of food assistance resources. Well over half of the 681 responses (64% or n=437) reported not being aware of available resources to them. The leading resources students did list were food banks and pantries (19% or n=126), The Market at Virginia Tech (9% or n=63), and SNAP (6% or n=41).

Table 5.6 Food Assistance Resources Responses Breakdown

If you are aware, please list food assistance resources available to you on campus and in the community.		
Total Responses 681		
Themes	Count	% Of Responses
Not Aware	n=437	64%
SNAP	n=41	6%
Food Banks or Food Pantry	n=126	19%
Nutrition Counseling	n=13	2%
Emergency Grant	n=15	2%
Food Drive	n=14	2%
Donated Dinning Money	n=2	0.3%
The Market at Virginia Tech	n=63	9%
Campus Kitchen	n=11	2%
Dining Halls	n=26	4%

209 Market	n=16	2%
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The next question asked of students was, “What barriers, if any, restrict your access to food?” In table 5.7, responses revealed that their schedule (39% or n=290) was the main barrier affecting access to food, followed by academics (25% or n=183), and then their job (22% or n=165). Some students made a point to say that their schedule is dependent on academics and their job. Only 30% or n=223 students out of 743 reported no barriers to accessing food.

Table 5.7 What Barriers, if any, Restrict your Access to Food Breakdown

What barriers, if any, restrict your access to food? (Examples would be transportation, location, academic and work schedule)		
Total Responses 743		
Themes	Count	% Of Responses
Money	n=134	18%
Academic	n=183	25%
Location	n=73	10%
Schedule	n=290	39%
Job	n=165	22%
Transportation	n=92	13%
No Barriers	n=223	30%
Limited Options	n=20	3%
Health	n=11	1%

Table 5.8 lists the responses of students to the question, “Can you typically purchase nutritious food without forgoing other basic needs in life?”. This table indicates students can typically purchase nutritious food without forgoing other basic needs in life. 78% (n=610) of the 781 participants responded with “Yes, I Can” while 15% or n=117 listed “Sometimes”. A relatively small number of students, 10% or n=79, listed “No, I Can’t” in response to forgoing other basic needs for nutritious foods.

Table 5.8 Purchasing Nutritious Food without Forgoing Other Basic Needs Breakdown

Has limited food access impacted your ability to carry out daily life tasks? If yes, in what way?		
Total Responses 769		
Themes	Count	% Of Responses
No	n=624	81%
Yes	n=119	15%
Sometimes	n=50	7%
Mental Health	n=14	2%
Physical Health	n=70	9%

Table 5.9 illustrates how food access impacted students' ability to carry out daily life tasks. Most of the 769 respondents said food access did not impact them in this way (81% or n=624). "Sometimes" was selected by 7% (or n=50) of students and "yes" was chosen by 15% (or n=119). Additionally, 2% (or n=14) indicated mental health was impacted and 9% (or n= 70) said physical health was impacted.

Table 5.9 Food Access Impacting Ability to Carry out Daily Life Task Breakdown

Can you typically purchase nutritious food without forgoing other basic needs in life?		
Total Responses 781		
Themes	Count	% Of Responses
Yes, I Can	n=610	78%
No, I Can't	n=79	10%
Sometimes	n=117	15%

As seen in table 5.10, students were then asked if food access has impacted their feelings, thinking, learning, concentration, self-esteem, or body image. A majority of students out of n=763 listed "no" (65% or n=496) as their response. Of the 35% (n=270) of students listing yes, feelings (15% or n=113), body image (14% or n=105), and concentration (12% or n=94) were listed as top ways food access has impacted them.

Table 5.10 Food Access Impacting Feelings, Thinking, Learning, Concentration, Self-esteem, and Body Image Breakdown

Has limited food access impacted your feelings, thinking, learning, concentration, self-esteem, or body image? If yes, in what way?		
Total Responses 763		
Themes	Count	% Of Responses
No	n=496	65%
Yes	n=270	35%
Feelings	n=113	15%
Thinking	n=56	7%
Learning	n=53	7%
Concentration	n=94	12%
Self Esteem	n=90	12%
Body Image	n=105	14%

The next question dealt with how food access impacted the relationships in a student's life. Responses are depicted in table 5.11. Of the 758 responses, 86% (or n=655) selected "No". Of the 13% (n=98) of students that answered yes, 11% (n=80) had a social relationship impact and 3% (n=24) cited personal relationships being affected.

Table 5.11 Food Access Impacts on Social Relationships Breakdown

Has limited food access impacted the relationships in your life, such as personal or social? If yes, in what way?		
Total Responses 758		
Themes	Count	% Of Responses
Yes	n=98	13%
No	n=655	86%
Personal	n=24	3%
Social	n=80	11%

Lastly, students were asked in what ways Virginia Tech and their community provide resources or support. Table 5.12 shows a total of 691 responses with the leading answer being "Unaware" (50% or n=344) of what is available to them. The resources that students responded with most often were the dining halls (17% or n=114) on campus because of easy access, and then food options/variety (14% or n=97) provided from on campus dining and their access to

grocery stores where they live. Other frequent responses were “Food Bank or Pantry” (6% or n=44) and “Word of Mouth” (6% or n=41) for support or assistance.

Table 5.12 Resource and Support Programs Breakdown

In what way does Virginia Tech and your community provide resources to support your need to access food?		
Total Responses 691		
Themes	Count	% Of Responses
Unaware	n=344	50%
Food Bank or Pantry	n=44	6%
Resource Suggestions	n=19	3%
Farmers Market	n=7	1%
The Market at Virginia Tech	n=20	3%
Graduate School	n=3	0.4%
Food Donations	n=34	5%
SNAP	n=6	1%
Athletics	n=7	1%
Word of Mouth	n=41	6%
Dining Halls	n=114	17%
Nutrition Counseling	n=18	3%
Transportation	n=20	3%
Virginia Tech Salary	n=12	2%
Food Options/Variety	n=97	14%
209 Market	n=3	0.4%
Campus Kitchen	n=1	0.1%

Phase 2

Interviews

Table 5.13 shows the interview demographics of the interview participants. A total of n=19 interviews were conducted in order to reach meaningful saturation of all 4 variables (first-generation, international, rural, and urban). Each interview ranged between 30 to 60 minutes long. Of the interviewees, 12 considered themselves to be from urban areas, while 4 grew up in rural areas. Of the 19 students interviewed, 6 students were first-generation college students, and 3 students were international.

Table 5.13 Interviewee Demographics

Interviewee Number	Interviewee Demographics
Interviewee 1	Urban
Interviewee 2	First-Generation and Rural
Interviewee 3	Urban
Interviewee 4	Urban
Interviewee 5	First-Generation and Urban
Interviewee 6	Urban
Interviewee 7	Urban
Interviewee 8	Urban
Interviewee 9	Rural
Interviewee 10	Urban
Interviewee 11	Urban
Interviewee 12	Rural
Interviewee 13	Urban
Interviewee 14	First-Generation and Urban
Interviewee 15	First-Generation and Rural
Interviewee 16	International
Interviewee 17	International
Interviewee 18	First-Generation and Urban
Interviewee 19	First-Generation, Urban, and International

Table 5.14 shows the themes found in the conducted interviews. The overarching concern that students talked about were barriers (n=113) to food access. The next theme that students brought to attention (n=40) was how Virginia Tech could better promote available resources, followed by the unawareness (n=35) of programs offered if a student is experiencing food access

problems. The remaining 6 themes were social relationships (n=22), mental health (n=20), running out of meal plan money (n=19), limited options (n=18), physical health (n=12), and skipping meals (n=7).

Table 5.14 Interview Analysis Overview

Theme	Number of Times Mentioned	Example of Responses
Barriers of Food Access	113	Money. Like it's definitely like money, like, oh, like I want to buy something extra at the store or something, but I'm like, I don't need it. I don't need it.
Supporting Food Access for Virginia Tech Students	40	I think just communicating that they have support because like I mentioned earlier I didn't even know they had those type of programs out there so I think just you know. Just getting the information out there to students that need it and I feel like the students that actually show that they actually need it. Yeah that's pretty much it just communicating.
Unawareness of Resources	35	I'm one of those students who before this I had no idea that like we, I mean, I like knew of them, but like, I didn't know the specifics of what programs there were. And I just think that it's kind of like a stigma, but it's not really talked about much. So it doesn't get advertised as much as some other resources.
Social Relationships	22	My friends don't really care about finances. So they'll go out and eat all the time. But I do care about finances. So I don't want to, I don't want to go out and eat with them, or I'd have to eat beforehand. And then that causes like a backwards, well, now I have to plan it all out. And that's, that's more time out of my day.
Psychological Health	20	I would say it's kind of concerning because I'm diagnosed with depression, so there have been several times at least this semester where I've gone weeks without eating three meals a day. It's like between one and two meals a day according to like dining dollars and I'm still running out.
Running Out of Meal Plan Money	19	So last when I was on campus, that was that was like I completely ran through it. And then it was just me living off of my friends swipes because they had they had an access anyway.

		So I may as well live off them. But that was kind of inconvenient because then I'd have to only get food when they get food.
Limited Options	18	For me, in terms of food access, the issue that I encounter is because I have food allergies. It's less about whether or not I can afford food and more whether I can actually find food that I can eat that's safe for me to eat.
Physical Health	12	I feel like yeah when I'm like really hungry and like you know and you feel lethargic and like you don't feel like getting up and doing things
Skipping Meals	7	I definitely I think I definitely skip lunch a lot.

Unawareness

One of the top themes in both phase 1 and 2 was unawareness of programs students could use. Interviewee #18 (First-Generation and Urban) described being completely unaware of resources saying,

“I honestly don’t see a lot of programs or anything like that. I know last year I got an email. Actually I didn’t even get an email. One of my friends told me about the market and he like sent a thing you know to sign up for it and I actually did that last school year and it was it was pretty good. But like that how come I didn’t get it you know an email like why did I get that information and why did he have to tell me about it? So there are things like things like that. I feel like people like the information isn’t out there. I guess you have to go looking for it. I feel like they talk about all the other support except like the food.”

The next interviewee, #9, discussed just not seeing the programs available unless they looked for it and how the stigma of asking for help plays into using services by expressing,

“I think part of it is it's not really public. Like you kind of have to dig for it. And the only reason you really dig for it is if you're desperate enough. And sometimes some people are like, well, it's not that bad. There's other people worse than me. I kind of wish it was more welcoming that help. And there wasn't this constant judgment of failure. And trying to live when it's not really your fault. It's just the situation.”

Interviewee #1 (Urban) discussed the stigma of voicing one's food access concerns stating,

“I think like nobody wants to be the person to be like, I have trouble buying my own food because that's such like a necessity. Um, and then like get looked down on. Not always, but like that's definitely a possibility. And then, like I said, food is a touchy subject in general just because of our society today. So people don't really want to bring up food in any context because it can get a lot of different unwanted reactions.”

Quality of Life

In the cross-sectional survey for phase 1, the multiple linear regression showed a significant p-value for food access being associated with QoL. In addition, in the open-ended questions of the survey, students discussed how their physical health, psychological health, social relationships, and environment were impacted by food access. One student said their physical health was impacted by stating,

“Yes, I feel extremely tired most days, especially when I haven't eaten enough that day and it is hard to get through classes, work, and then homework at the end of the night.”

Another student discussed mental health being affected by saying,

“Food access has impacted my feelings because I feel anxious thinking about if I will be able to afford to buy the groceries I need and still afford rent.”

When concerning relationships, one student stated,

“Yes, I constantly make excuses not to hang out with some of my colleagues because I don't have the funds to eat out. When I do hang out with them at restaurants, or food places, I'm constantly calculating to the cent of how much the food will impact my overall ability to stay out of debt.”

Lastly, a student comments on having a busy academic and work schedule expressing,

“Some days I go straight from class to work and only have time to eat a few chips.”

In phase 2, interviewees were asked to explain more about the impacts of food access on QoL from what was found in the survey. Interviewee #16 (International) described how their physical health is a concern for them due to lack of food by saying,

“So during lunch, like if I don't have lunch, I physically like crumble and like I cannot concentrate whatsoever.”

While interviewee #14 (First-Generation and Urban) expresses having low energy to complete tasks,

“I feel like yeah when I'm like really hungry and like you know and you feel lethargic and like you don't feel like getting up and doing things”

Another cause for concern when it comes to physical health is accessibility and affordability of needed foods for people with allergies (Ebisawa et al., 2015). Interviewee #13 (Urban) has a gluten allergy which creates barriers in accessing the foods they need. They state,

“So with the allergy-based access, I'd say yes, definitely physical. I've seen a bunch of doctors over winter break about some issues that I've had recently that are likely related to nutrition and likely related to not being able to afford healthier food because I'm gluten-free.”

In addition to having barriers regarding accessibility and affordability, Interviewee #13 (Urban) also had difficulty with availability on campus. They describe a specific situation with a fast-food restaurant on campus,

“When they're understaffed, they stop making all grilled items. So if you're gluten free and they're not making grilled items, I simply can't eat there. And like that information is not posted anywhere. So I was emailing back and forth with someone from dining and they were explaining that because of the understaffing, they decided that the grilled items were what needed to go. So when I basically wrote back and was like, well, there is a whole population of people that now can't eat.”

In phase 1, students identified experiencing stress, depression, concentration, learning, self-esteem, and body image concerns in their psychological health. The participants were asked how their psychological health had been impacted by low food access and interviewee #3 (Urban) noted,

“There is a lack of concentration and classes because I'm kind of starving.”

Students are expected to take notes, participate in class discussions, and ask questions while attending class, however, as interviewee #3 said, this is a challenge on an empty stomach. Interviewee #2 (First-Generation and Rural) explained their experiences with low food access and psychological health stating,

“I would say it's kind of concerning because I'm diagnosed with depression, so there have been several times at least this semester where I've gone weeks without eating three meals a day. It's like between one and two meals a day according to like dining dollars and I'm still running out.”

Interviewee #9 (Rural) described handling the stresses of balancing everyday life with low food access voicing,

“So trying to handle the stress of the bills constantly living paycheck to paycheck, that definitely really wears me down. Concentration, there are some days where it's like, yeah, I did not learn a thing today. I'm constantly just thinking about what I needed to do to be able to move to the next day. So stress really got me.”

Lastly when concerning psychological health, Interviewee #17 (International) talked about the stresses of making enough to live on by stating,

“So now, credit card is on the roof. Last year, I was going to donate plasma to get some extra income just to pay a couple of bills. So this is something that I did for a couple of months. And I probably need to do it again.”

The cross-sectional survey showed students' relationships were affected due to not being able to have dinner with friends, attend social events that required food, or have dinners at their homes with guests. During the interviews, the participants brought to light some of the

challenges food access brings when having a social relationship with people. Interviewee #12 (Rural) described trying to hang out with friends saying,

“My friends don't really care about finances. So they'll go out and eat all the time. But I do care about finances. So I don't want to, I don't want to go out and eat with them, or I'd have to eat beforehand. And then that causes like a backwards, well, now I have to plan it all out. And that's, that's more time out of my day.”

Another person, interviewee #19 (First-Generation, Urban, and International), indicated they stopped hanging out with people completely explaining,

“At some point, I was not attending any social events and not going out with my friends, because I was embarrassed that I would not be able to pay for food (among other things).”

While food access can have a negative impact for people worrying about how to provide food or spending too much money, social gatherings that offer free food are a tremendous relief for students. Interviewee #9 (Rural) was more likely to attend more seminar events because of free food expressing,

“And there are times when food is low, where I may end up going to more seminar events that have free food available. If it's like a really big event where you're expected to bring like a meal then I'm more likely to decline.”

Likewise, interviewee #8 (Urban), voiced being persuaded in attending more events because of free food saying,

“I know I do get more persuaded to attend other meetings that aren't like for like a potluck like it's just like, oh, they're providing food. I'll definitely like be more persuaded to go because they're providing food. Free food.”

In the cross-sectional survey, students were asked what barrier affected them most and schedule was the number one response. During the interview process, students were asked to explain the difficulties in dealing with environmental barriers such as transportation, location, and schedule. Interviewee #11 (Urban), discussed the barrier of their class schedule determining when they could eat by expressing,

“I usually try and have like meals with me and the classes definitely determine when I eat. If I have class I'm not eating during class most of the time. Sometimes I'll be hungry and like I keep the bars I'll try and like eat in there like drink some water before class ends I just don't want to like draw attention on me. I like to be very loudly or anything in class. I think class definitely determines when I eat because I won't be able to cook or eat while I'm being taught.”

Transportation was mentioned by interviewee #18 (First-Generation and Urban) as a barrier to them since they didn't own a car, stating,

“I don't have a car so that would that's definitely something that's a that's a big barrier honestly because well I actually have a food line that's a walking distance but I can't get as much food as I want because I have to walk that. So that that's yeah that's pretty big barrier for me. I also wouldn't want to have a lot of bags and stuff on the bus either because there isn't a lot of space.”

In addition to barriers of scheduling and transportation, interviewee #17 (International) explained how they were affected culturally with not being able to purchase the same type meals as back home saying,

“I don't have access to the steaks that I used to have at home. That's for sure. So, you know, Brazilian steak houses, right? You've been, probably you've been one at some point. That's like that kind, that setup is like every weekend in Brazilian homes. Like you have that at home. Like that's celebration. That's how families start like a party. There is like you account for two meat per person to organize a party. That's how you plan. Like here, when I started dating my wife, she's American. And I said, I'm going to do a barbecue. A tray with three steaks and we are four of us. So this doesn't make any sense. I would eat that alone. So culturally, that was a huge shock.”

Similarly, interviewee #16 (International) expressed their experiences as an international student at Virginia Tech in telling,

“Internationals in general have a little bit more struggle. I think it's because of where we are, like as a campus so we're definitely on a mountain like kinda in the middle of nowhere so it's, it makes it difficult to access, especially I love seafood, but like over here we have just frozen seafood, we'll have good quality seafood at all, and like if we want some better food we have to drive to Rona which is 45 minutes away and we cannot do that every day.”

Meal Plan Money

Each student was asked if they had run out of meal plan money. Interviewee #2 explained running out of meal plan money every time by stating,

“Yep, every time. It’s always like a month before when you’re in the middle of final season just like okay.”

While another interviewee #1

“I have to text my mom every so often and be like, hey mom, I’m running outta dining dollars. Um, and she’s like, what are you eating? And I’m like, I’m literally only eating like two meals a day out.”

Interviewee #15 stated,

“My freshman year when I had a meal plan on campus, I actually had a big surplus of money and I had like the I had the minimum one, but I just like would only have like one meal a day.”

Furthermore interviewee #7 explained eating breakfast on their own helped not running out of meal plan money staying,

“Like the only reason I don’t run out of money on my dining plan is because I do make my own breakfast, and I like, I also make fruit smoothies a lot with like frozen fruit and like yogurt and OJ stuff like that. And, um, yeah, I feel like, I don’t know I, I don’t run out of money but I know that happens all the time.”

Virginia Tech Support

Lastly, a finding in the interviews was the concern that students don’t feel like food access on campus is being acknowledged. Interviewee #17 student stated that,

“I think the number one is acknowledge there is the issue. That’s the number one, they need to make it aware, the same way they do with the diversity inclusion, they need to have the same, the same, give the same visibility, give you awareness, and create more solidarity to be a community, more solidarity or more sensitive

to this matter like for example, it's not always the answer is not always putting money on something."

Interviewee #7 expressed wanting to see change by mentioning,

"I don't really know any like resources that's like kind of why I wanted to do this interview was like, just kind of, I don't know, like I do want to see change, so I was like, I don't know, I think it's important to get input from like the people who are actually like affected by it. But I don't, there aren't really any like resources besides the market that I know of, and that's like for people who, like, are like food insecure and like do need access to more ready. But, yeah, there needs to be a lot of change."

In addition to hoping for change, interviewee #12 talked about actually focusing on what we are selling students on campus saying,

"Giving students food that's not healthy, feel like there needs to be some focus on what are we actually selling to students on campus. If we're a huge nutrition campus, which we are, and you know one of our, our campus is considered to have the best food."

Lastly, concerning not feeling heard, interviewee #13 has had experiences of simply not having food meeting their dietary needs. The student talked about one of those of experiences saying,

"Chick-fil-A that's in Hokie Grill, they, when they're understaffed, they stop making all grilled items. So if you're gluten free and they're not making grilled items, I simply can't eat there. And like that information is not posted anywhere. So a lot of times I'll show up expecting to be able to get my grilled chicken and be

on my way. I asked to speak with the manager at one time that I was there and they directed me to have an email conversation. So I was emailing back and forth with someone from dining and they were explaining that because of the understaffing, they decided that the grilled items were what needed to go. So when I basically wrote back and was like, well, I there is a whole population of people that now can't eat. Like, how can that be communicated in advance? So and she never responded. So that was unfortunate.”

Discussion

Awareness

One of the major causes for concern in phase 1 was the lack of awareness of food resources for students at Virginia Tech. Phase 2 supported phase 1's findings that students lack awareness of food resources on and off campus. Peterson et al. (2022) and Hagedorn-Hatfield et al. (2022) have found that unawareness of support was a leading factor in students not accessing resources. If they don't know the resources available to them, how do we expect students to use them? The stigma of talking about needing support for a basic need such as food has long been a problem and has caused people to not speak out for fear of being judged (Peterson et al., 2022).

Physical Health, Psychological Health, Social Relationships, and Environment

Physical health has been shown to have an impact on the success of a student academically (Martinez et al., 2019). If a student is not eating the amount of food that is needed for completing daily tasks, their energy levels will be affected. In this study, students voiced feelings of fatigued, lethargic, and lack of motivation to participate in daily activities. Food access was shown to affect a college student's psychological health negatively by causing added stress, depression, and lack of concentration or learning, which is documented in other studies as

well (Maroto, 2013; Pourmotabbed et al., 2020). A person's QoL will be influenced by their psychological health and how they participate in daily living (WHO, 2012). If a student is stressing about where their next meal will come from, or if a lack of eating impacts their concentration and learning, how can we expect the student to be successful while in school?

Meaningful social relationships were important to students that participated in the interviews. In the literature, having social relationships while in school was an indicator of success for a student and a key component in one's QoL (Jorgenson et al., 2018; WHO, 2012). A student that lacks social connection while in school could potentially drop out of school. Connecting with friends, family, mentors, leadership, faculty, and staff can help students navigate the hardships they may face. Higher education institutions know the importance of social connections while students are in school. The ability to "lean" on someone during instances of difficulties has been shown to increase the likelihood of a student staying in school (Schmidt, 2020; Stadtfeld et al., 2019). Food access is a contributing factor to making and maintaining these vital social connections.

Additionally, as voiced in the interviews, the environment in which one lives impacts food access (Mockshell & Villarino, 2019; Ogot, 2021). A student's environment influences the quantity and quality of food available and accessible to them. If students do not have access to the foods they want and need, their QoL can be impacted (Frongillo et al., 2017; Hanmer et al., 2021; Sok et al., 2018).

Running Out of Meal Plan Money

A theme not mentioned in the survey was running out of meal plan money. Students participating in the interviews discussed concerns about running out of meal plan money. Of the 19 students participating in the interviews, 15 had meal plans, and 11 had run out of their meal plan money at some point in their college career. When interviewed, the two students who didn't

run out of meals mentioned only having two or fewer meals daily. Other students would put more money into their meal plan if they could afford it. The students that ran out of meal plans and couldn't afford to put more money into their accounts were faced with living on the bare minimum for the rest of the semester.

The University Acknowledging Food Access Concerns

Another theme students brought to attention in the interviews was food access concerns not being acknowledged on campus or by leadership. Hall et al. (2019) found that food insecurity exists on campus at Virginia Tech, while The Hope Center (2021) has been researching food insecurity on college campuses nationwide from 2015-2021. We know that students face food access concerns; however, the resources on campus at Virginia Tech are limited and do not support the number of students experiencing food insecurity. In addition, college and university leadership may not be addressing food access concerns due to other competing priorities that factor in. Taylor et al. (2021) surveyed 348 college and university presidents during the spring of 2021 and asked what the most pressing issue was to them. The top three matters stated by presidents were the mental health of students (72%), the mental health of faculty & staff (58%), and long-term financial viability (41%), while food and housing insecurity (15%) came in at number 13 out of 19 issues. Mental health is an important issue to address on campus, but so is food access. This research showed the importance of food access and how it can impact one's psychological health. Glantsman et al. (2022) state, "Adequate food and housing are essential to college students' general well-being and academic achievement."

Students Voice How to Support Food Access Concerns

The last question asked to participants was how Virginia Tech and the community could support their food access concerns. After conducting this research project and listening to each participant in interviews, I wanted to include how each student envisioned improved support for food access. Their summative voices can provide a starting point for improving food access at Virginia Tech. The following are their voices:

Interviewee #19 (First-Generation, International, Urban)

"Show that you care about the students (provide a clean and supportive environment for them). During exam weeks, ensure you provide at least some coffee/tea, and snacks for students not to worry about what/when/where to eat when they are already extremely worried about the exams."

Interviewee #18 (First-Generation and Urban)

"I think just communicating that they have support because like I mentioned earlier I didn't even know they had those type of programs out there so I think just you know. Just getting the information out there to students that need it and I feel like the students that actually show that they actually need it. Yeah that's pretty much it just communicating."

Interviewee #17 (International)

"They have trainings right well that they can do about diversity, inclusivity, to give you awareness. So, this is my number one recommendation. And events, events that could increase the solidarity between the students and between faculty and for all the community. I think those events put people together and can make a difference."

Interviewee #16 (International)

“In terms of food, I don't know like, maybe they can specify an area, just for like, like a specific type of food that comes from like a specific geographical destination.”

Interviewee #15 (First-Generation and Rural)

“I know I was in the engineering LLC my freshman year and I know they did like a canned food drive at some point for community service. So I'm sure getting different student programs involved in helping those resources out could also spread awareness on those resources for students.”

Interviewee #14 (First-Generation and Urban)

“Just letting people know because I feel like Shiffer and Cook Counseling are very good at showing what their resources are. But in this aspect, the food access, I have no idea what the resources are until now.”

Interviewee #13 (Urban)

“From like an educational standpoint, like if we had more access, more direct access through the university to information for food insecurity, because I feel like it's not always easy to find.”

Interviewee #12 (Rural)

“I feel like there needs to be some focus on what are we actually selling to students on campus.”

Interviewee #11 (Urban)

“I think it should be in the syllabus for people. That'd be a great idea, because like they have the mental health resources this these resources that's something I think it should be there.”

Interviewee #10 (Urban)

“I definitely think we're a land grant university. Like we should be having, I feel like more locally sourced options.”

Interviewee #9 (Rural)

“Maybe be more open, like even like something as simple as if undergrads or graduate students are coming in, have like a nice welcome packet, like take care packet with all the information. Like here's where you can get food if you need food. Find a way that people shouldn't feel ashamed in the situations they're in, and make it more of a happier environment, less judgment, more acceptance.”

Interviewee #8 (Urban)

“There was a time where, like, I forgot how much money I had and I didn't have too much. And I was like in line trying to check out, like instead of like them being like, oh, like you don't have enough money. You have to put stuff back, like maybe like have it like charge later or something.”

Interviewee #7 (Urban)

“More options for people with like dietary restrictions or like vegetarians and stuff. That would be a big way that they could support.”

Interviewee #6 (Urban)

“Like food corporations that could offer scholarships that know hey if you know you're going to be tight on money this semester apply for, you know, whatever \$2,000 of free food, you know, or, I mean money for groceries or something perhaps, because I mean we definitely know the money is out there with a lot of these corporations.”

Interviewee #5 (First-Generation and Urban)

“Being more present I guess like making this issue more present because I don't think anyone really like I know I don't really think about it until like that time rolls around I'm like yeah there I guess there are people who don't have any money right now to eat so.”

Interviewee #4 (Urban)

“Didn't even know they had those type of programs out there. I think just you know just getting the information out there to students that need it and I feel like the students that actually show that they actually need it.”

Interviewee #3 (Urban)

“I think advertising it more would be a lot of help. Or even like advisors telling their students about it because they have a more personal connection with each student. And so they'll know about situations and they can recommend things like that.”

Interviewee #2 (First-Generation and Rural)

“Make campus options more affordable, make them more accessible for sure, whether that's opening more options on the residential side, whether that's expanding what we currently have something to make the workers more comfortable, the workers more efficient and then make the system more efficient as a whole. Because it just, it doesn't work as it does right now.”

Interviewee #1 (Urban)

“Just talking about it more, just it is not something that's talked about and the resources that like we do have nobody knows about because no one talks about it.”

Implication and Recommendation

A college student is seen as privileged in society; however, that doesn't mean they do not experience barriers to accessing food. Higher education institutions, like Virginia Tech, can provide a place for students to break down these barriers that can help prevent them from going hungry. Faculty, staff, and leadership can be trained on what resources are available on campus to students through department meetings, training, or even in packets at the beginning of the semester. Furthermore, residential advisors and residential housing on college campuses can provide resources to students living on campus.

In addition, Virginia Tech leadership and dining administration can explore ways of ensuring students are not running out of meal plan money. Finding a solution to prevent students from running out of money will take time, but starting the conversation could help find a solution to support students. Lastly, if we expect students to purchase meal plans, ensuring there are food options for everyone at dining options on campus (and students know where to find those options) is imperative for students with allergies or food preferences.

Conclusion

Research has provided sound evidence that food insecurity is prevalent on college campuses (Broton & Cady, 2020; Goldrick-Rab et al., 2018; Hall et al., 2019; Leung et al., 2021; Martinez et al., 2019; Regan, 2020). In this mixed-method study, students mentioned running out of meal plan money, unawareness of food resources on and off campus, effects of food access on QoL, effects of food access on academics, and wanting Virginia Tech to acknowledge that food access is a problem on campus. Furthermore, showing that food access is a multidimensional problem to grasp.

If higher education institutions want to retain students, alleviating food access barriers should be prioritized. Advocating and providing awareness for resources is imperative to create

change and tackle food access concerns. Furthermore, higher education will need to move forward by seeking to listen to the voices of its students on this ever-evolving issue. The change will be crucial to better-serving students.

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Chapter 6

Conclusion

The following chapter consists of a summary of the overall dissertation work. In addition, the researcher included the study's limitations and recommendations for future practice and research.

Need for Study

The effects of food insecurity on college campuses have been brought to attention over the years from various research studies at community colleges, 2-year institutions, and 4-year institutions (Goldrick-Rab et al., 2017; Payne-Sturges et al., 2018; Peterson & Freidus, 2020; The Hope Center for College, Community, and Justice, 2021). In addition, a study conducted at Virginia Tech by Hall et al. (2019) found that 29% ($\pm 3.8\%$) of undergraduate and 35% ($\pm 7\%$) of graduate students had low or very low food security.

As stated, studies have shown that we have food insecurity on college campuses. However, studies indicating food access barriers and how they affect QoL on college students are limited. In addition, research on food access barriers and QoL has yet to be done on agriculture students specifically. The researcher wanted to explore what barriers were affecting CALS students and the effects of low food access on the QoL of these students. The researcher wants to bring to light food access impacts on the QoL of agriculture students at Virginia Tech.

Summary of Manuscripts

Manuscript 1

Title

Supporting all students: Exploring how food access contributes to the quality of life for students in the College of Agriculture and Life Sciences.

Purpose Statement

This quantitative research study aimed to explore how food access impacted the QoL of students in the College of Agriculture and Life Sciences (CALs) at Virginia Tech.

Findings

The overall multiple regression model proved to be statistically significant with a p -value=.017, which is less than .05. The adjusted R square explains .277 or 27% of the variance in the dependent variable QoL to be affected by the independent variables. The model predicts that food access, Asian race/ethnicity, first-generation, and senior classification influence QoL. The model did not show significance for individual international, rural, or urban student predictors. Secondly, when exploring the relationship of department/schools QoL scores of students in CALs, all six stepwise multiple linear regression models were significant and had food access as a significant predictor variable in each. Lastly, the significant independent variables found in the department/schools QoL scores were then used to explore their own QoL scores. Asian, Hispanic/Latino, first-generation, international, rural, and undergraduate senior status were the QoL scores explored. All of the QoL scores examined had food access as a primary predictor to affect QoL.

Manuscript 2

Title

“I eat less because I do not have consistent access to food, and this decreases my quality of life”:
How does food access and quality of life interact with one another for College of Agriculture and
Life Science students?

Purpose Statement

This qualitative research study aimed to explore how food access and QoL impacted students in the College of Agriculture and Life Sciences (CALS). At Virginia Tech.

Findings

This qualitative study found that students who were facing low food access had many factors that contributed to their limited access. Additionally, when food couldn't be obtained, their QoL was impacted. The themes contributing to low food access for students were demanding work and academic schedules, low food availability/options, cost of living, location, transportation, and lack of overall awareness of support programs. The factors contributing to QoL were low energy, lack of concentration, lack of learning, negative mental and physical health, and limited social relationships.

Manuscript 3

Title

Student voices: A Mixed Method approach to understanding the Quality of Life of students living
with Food Access concerns at Virginia Tech.

Purpose Statement

This mixed-method research study aimed to understand how food access impacted the QoL of College of Agriculture and Life Science students at Virginia Tech. The researcher examined multiple-choice and open-ended questions from a survey that was then compared to responses in interviews conducted with students.

Findings

Phase 1

The findings in the cross-sectional survey were that the overall multiple regression model proved to be statistically significant, with a p -value=.017. In addition, the adjusted R square explained .277 or 27% of the variance in the dependent variable QoL to be affected by the independent variables. The model predicted that food access, Asian race/ethnicity, first-generation, and senior classification influenced QoL. In the open-ended questions, themes contributing to low food access for students were demanding work and academic schedules, low food availability/options, cost of living, location, transportation, and lack of overall awareness of support programs. Furthermore, effects seen on QoL were low energy, lack of concentration, lack of learning, negative mental health, negative physical health, and limited social relationships.

Phase 2

The findings in the cross-sectional survey in phase 1 were then compared and contrasted with the findings in interviews from phase 2 to show a more comprehensive explanation as to how and why food access (accessibility, availability, affordability, awareness) impacts QoL (physical health, psychological health, social relationships, environment) of CALS students at Virginia Tech. There were nine themes found in the student interviews: barriers to food access

(n=113), supporting food access for Virginia Tech students (n=40), unawareness of resources (n=35), social relationships (n=22), psychological health (n=20), running out of meal plan money (n=19), limited options (n=18), physical health (n=12), and skipping meals (n=7).

Synthesis of Manuscripts

The focus of this mixed-method approach research study was to understand how food access plays a role in the QoL for CALS students at Virginia Tech. Students experiencing food insecurity on college campuses have been brought to attention over the years from research conducted at community colleges, 2-year institutions, and 4-year institutions (Goldrick-Rab et al., 2017; Payne-Sturges et al., 2018; Peterson & Freidus, 2020; The Hope Center for College, Community, and Justice, 2021). Specifically, at Virginia Tech, Hall et al. (2019) found that 29% ($\pm 3.8\%$) of undergraduate and 35% ($\pm 7\%$) of graduate students had low or very low food security. The researcher used the information on food insecurity at Virginia Tech to explore how food access (accessibility, availability, affordability, and awareness) impacts students' QoL (physical health, psychological health, social relationships, and environment) in the CALS at Virginia Tech.

Manuscript 1 explored the potential independent variables of food access, physical health, psychological health, social relationships, environment, first-generation, international, rural, urban, department/school within CALS, degree selection, undergraduate classification, and graduate classification to the dependent variable QoL. The adjusted R square explained .277, or 27% of the variance in the dependent variable, QoL, to be affected by the independent variables. The independent variables of food access, first-generation, Asian, and senior undergraduate classification were significant in the overall stepwise linear regression model. The six stepwise multiple linear regression models that focused on QoL scores sorted by department/schools

showed a significant p-value in each model. In addition to the significant p-value for each model, food access was found to be a significant predictor value in all six models. An additional six stepwise multiple linear regression models were performed to examine the significant predictor values from the department/school QoL scores. The predictor values explored were Asian, Hispanic/Latino, first-generation, international, rural, and undergraduate senior status. All additional QoL scores examined listed food access as a factor that impacts the QoL scores of students.

Manuscript 2 brought to light students' voices in CALS by introducing open-ended questions to students on the cross-sectional survey. Students were able to detail their experiences with food accessibility, availability, affordability, and awareness, as well as the effects food access had on their QoL (in terms of their physical health, psychological health, social relationships, and environment). Students that experienced food access-related barriers were affected in their ability to do daily tasks such as concentrating in class, studying, attending social events, and maintaining a positive physical and mental health status.

Manuscript 3 expanded on findings in manuscripts 1 and 2. Students were asked questions formed from themes in phase 1 to understand food access and QoL better. The nine themes discussed were barriers to food access (n=113), supporting food access for Virginia Tech students (n=40), unawareness of resources (n=35), social relationships (n=22), psychological health (n=20), running out of meal plan money (n=19), limited options (n=18), physical health (n=12), and skipping meals (n=7). Students expressed their concerns about the barriers that impacted them in accessing food, the effects on their QoL, and what can be done to help improve their food access and QoL. Like in manuscript 1, students expressed how much their schedules impacted when they ate or if they completely skipped meals. This tremendously impacted their

ability to have success in school because of a lack of concentration or energy. In addition, international students found it hard to have culturally suitable meals because of affordability or availability. Lastly, students that participated in the interviews discussed concerns about running out of meal plan money. Some students had only two meals a day to avoid running out of meal plan money, while others needed to put more money into their meal plan if they could afford it. The students who ran out and couldn't afford to add more meal plans faced living on the bare minimum for the rest of the semester. Of the 19 students interviewed, 15 had meal plans, and 11 ran out of meal plan money at some point in their college careers.

One continuous thread in all three manuscripts was a lack of awareness of food access resources on campus. The lack of awareness of students in the studies proves that more measures need to be taken to make sure the available resources can be used. Resources are only helpful if people know they exist and how to access them. Faculty, staff, leadership, and residential housing can be trained on the resources students can use on and off campus. In addition, training can be provided on how to converse with students experiencing food access concerns. In addition, faculty can add resources to syllabi and discuss them at the beginning of the semester. Lastly, when students attend orientation, staff can hand out resources available to students attending.

In addition to a lack of awareness, students voiced how their schedule impacts their ability to eat. Whether it was work or academic schedule, it determined when they could eat. Some classes and labs did not allow them to eat during the classroom session. So, if a student had back-to-back classes, this caused them to have to skip meals, thus creating a lack of energy and concentration in class. It is imperative that faculty understand that students are at the mercy

of their schedule and to give accommodation whenever possible, especially during typical eating times.

Another underlying issue students voiced in all three manuscripts was experiencing a lack of options and availability of the foods they preferred. Preferences were based on having an allergen, liking certain foods, foods that were affordable, or foods that were nutritional to consume. The concern for not having many food options impacted their QoL because low food availability leads to students being unable to eat what is needed to succeed. People with allergens were limited to what was provided if they had a meal plan. The lack of options for them hindered their ability to eat adequately. International students were affected differently because the foods that are a part of their culture were hard to find or too expensive to afford, forcing them to eat other options. Not having culturally suitable food impacted their ability to have a positive QoL perception.

In summary, food access is a multidimensional concept that was shown to impact the QoL of CALS students at Virginia Tech. More research can be done to alleviate the barriers to food access and thus improve the QoL of students. Food access is not a problem to solve overnight. The process will take time and dedication from leadership, faculty, staff, and students. While addressing this issue, it is essential to remember that just because you may not be currently experiencing low food access, it doesn't mean you never will, or your friends are not. Showing love, empathy, and kindness when confronting this hunger problem will be needed if we hope to overcome it.

Limitations

The first limitation of the research study was that only one school of agriculture was involved in the study. Multiple schools could have provided a more extensive scope of study. The second limitation of the research study was that only agriculture students were measured. Having other students across campus and departments could have expanded the research findings.

Recommendations for Future Practice

The researcher provides the following practical recommendations for improving food access and QoL for agriculture students.

- ❖ Expanding awareness of resources and programs at Virginia Tech and the community is crucial in helping with food access difficulties.
 - Training courses can be provided to train leadership, faculty, and staff about food access resources and destigmatizing requests for help. The following are suggestions for how to implement this:
 1. Department heads can provide resources in departmental meetings. The required training Virginia Tech has for faculty and staff (like diversity, equity, and inclusion training) can include a short module on what resources are available to students and how to have conversations with students on food access.
 2. Resource packets can contain all the services available for students in need during new faculty and staff orientations, including food resources.
 - Residential housing on campus can have a training session for students and staff about promoting food resources and destigmatizing asking for resources.

- Faculty can implement food resources to their syllabus and review the resources at the beginning of the semester.
- ❖ Virginia Tech can introduce a food scholarship students can use.
 - On giving day, donations can be made to a food scholarship for students in need on campus. The following is how a food scholarship can be in the form:
 1. A debit card to swipe at dining facilities on campus can be distributed similarly to the one at Bunker Hill Community College (Goldrick-Rab et al., 2020).
 2. A scholarship can be created for students to apply for that are in need. The scholarship can be used to purchase meal plans specifically.
- ❖ Students participating in orientation events can be given a packet of available food resources on campus by staff.
- ❖ The dining halls and other places that take meal plan money, such as Chick fil A, can ensure students with allergens or food preferences have a variety of food to access.
- ❖ Virginia Tech can investigate ways to reduce students' long lines while trying to access food in places that take meal plan money, such as dining halls and off-campus restaurants. The long lines prevent some students from being able to purchase food based on their schedule.

Recommendations for Future Research

From the perspective of the researcher, the following is recommended to expand on the research conducted in this study.

- ❖ Expand this research to implement campus-wide barriers to food access and its effects on the QoL of students at Virginia Tech. The current campus-wide study focuses on food

insecurity, but we know that food insecurity exists. The barriers and effects on a student's QoL can be explored to support students accessing food and improving their QoL.

- ❖ Research on food access and QoL can be conducted at other colleges and universities, including other land-grant institutions, Historically Black Colleges and Universities (HBCUs), Tribal Colleges, and community colleges, and compare the results across different institutional types. Research has been conducted on basic needs security at HBCUs and Tribal Colleges and Universities, but not food access impacting QoL (Dahl et al., 2022; The Hope Center for College, Community, and Justice, 2019).
- ❖ Explore effective ways to ensure students are not running out of meal plan money.
 - A conversation can begin with leadership at Virginia Tech (such as dining facilities, student affairs, and food resource programs staff) and the students that are running out of meal plan money.
- ❖ A longitudinal study on students that identify as facing food access concerns could be performed to track retention rates of students in school.

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Appendices

Appendix A: Food Access and Quality of Life Survey

Survey Summary

- o The objective of this survey is to examine how food access has an impact on the quality of life of College of Agriculture and Life Science students.
- o The survey will take ~10 minutes to complete.
- o Your responses to the survey will remain anonymous.
- o If you have questions, concerns, or complaints or think the research has hurt you, talk to the research team at lanap20@vt.edu.

This research has been reviewed and approved by the Virginia Tech Institutional Review Board (IRB). You may communicate with them at 540-231-3732 or irb@vt.edu if:

- o You have questions about your rights as a research subject
- o Your questions, concerns, or complaints are not being answered by the research team
- o You cannot reach the research team
- o You want to talk to someone besides the research team to provide feedback about this research

By selecting yes below, you indicate your consent to participate in this research study. Do you agree to participate in the study?

Yes

No

Q2

Are you 18 years or older?

Yes

No

Q3

Are you a student in the College of Agriculture and Life Sciences?

Yes

No

Q4

What is your department/school within the College of Agriculture and Life Sciences?

Agricultural and Applied Economics
Agricultural, Leadership, and Community Education
Agricultural Technology Program
Animal and Poultry Sciences
Biochemistry
Biological Systems Engineering
Entomology
Food Science and Technology
Human Nutrition, Foods, and Exercise
School of Plant and Environmental Sciences
Dairy Science
Other

Q5

What degree are you currently seeking?

Undergraduate
Graduate (M.S., Ph.D., OMALS)
Associate
Other

Q6

What is your undergraduate status?

Freshman
Sophomore
Junior
Senior
5th year senior
Other

Q7

What is your graduate status?

M.S.

Ph.D.

OMALS

Other

Q8

How would you identify your race/ethnicity? (Select all that applies)

American Indian or Alaskan Native

Asian

Black or African American

Caribbean

Hispanic or Latino

Middle Eastern or North African

Native Hawaiian or Pacific Islander

White or Caucasian

Self-identify as another race/ethnicity

Q9

What is your living situation?

On-campus

Off-campus

No housing or couch surfing

Q10

Are you a first-generation student? (Someone who is first in their family to go to college)

Yes

No

Don't know

Q11

Are you an international student?

Yes

No

Don't know

Q12

How would you classify the geographic location where you grew up?

Rural area

Urban area

Don't know

Q13

What is your current overall GPA?

Multiple Row Answer text

Q14

This assessment asks how you feel about your quality of life, health, or other areas of your life. Please answer all the questions. If you are unsure about which response to give to a question, please choose the one that appears most appropriate. This can often be your first response.

Q15

Question Text

	Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
How would you rate your quality of life?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How satisfied are you with your health?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q16

Question Text

	Not at all	A little	A moderate amount	Very much	Extremely
To what extent do you feel that (physical) pain prevents you from doing what you need to do?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How much do you need medical treatment to function in your daily life?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How much do you enjoy life?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To what extent do you feel your life to be meaningful?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q17

Question Text

	Not at all	A little	A moderate amount	Very much	Extremely
How well are you able to concentrate?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How safe do you feel in your daily life?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How healthy is your physical environment?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do you have enough energy for everyday life?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Are you able to accept your bodily appearance?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do you have enough money to meet your needs?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How available to you is the information that you need in your day-to-day life?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To what extent do you have the opportunity for leisure activities?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q18

How well are you able to get around?

Very poor

Poor

Neither poor nor good

Good

Very good

Q19

Question Text

	Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
How satisfied are you with your sleep?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How satisfied are you with your ability to perform your daily living activities?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How satisfied are you with your capacity for work?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How satisfied are you with yourself?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How satisfied are you with your personal relationships?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How satisfied are you with the support you get from your friends?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How satisfied are you with the conditions of your living place?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How satisfied are you with your access to health services?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How satisfied are you with your transportation?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q20

How often do you have negative feelings such as blue mood, despair, anxiety, or depression?

Never

Seldom

Quite often

Very often

Always

Q21

The following questions pertain to food access. If you are unsure which response to give to a question, please choose the one that appears most appropriate.

Q22

Question Text

	Not at all	A little	A moderate amount	Very much	Extremely
Do you have access to the choice of food you want?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Are you aware of the resources on campus for food assistance?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do you have barriers that restrict your access to food?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How often do you put other expenses before purchasing food?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Are you able to acquire the amount of food you want?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Are you aware of the community resources for food assistance?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q23

The following questions will allow you to talk about food access in your own words.

Q24

What food do you typically eat and is it the food you prefer to eat?

Multiple Row Answer text

Q25

If you are aware, please list food assistance resources available to you on campus and in the community.

Multiple Row Answer text

Q26

What barriers, if any, restrict you access to food? (Examples would be transportation, location, academic and work schedule)

Multiple Row Answer text

Q27

Can you typically purchase nutritious food without forgoing other basic needs in life?

Multiple Row Answer text

Q28

Has limited food access impacted your ability to carry out daily life tasks? If yes, in what way?

Multiple Row Answer text

Q29

Has limited food access impacted your feelings, thinking, learning, concentration, self-esteem, or body image? If yes, in what way?

Multiple Row Answer text

Q30

Has limited food access impacted the relationships in your life, such as personal or social? If yes, in what way?

Multiple Row Answer text

Q31

In what way does Virginia Tech and your community provide resources to support your need to access food?

Multiple Row Answer text

Q32

Would you be willing to participate in a follow-up 15-20 minute discussion about the impacts of food access on quality of life? The first 15 interview participants will receive a \$33 gift card to Kroger.

Yes

No

Q33

Are you any of the following demographics? (Please select all that apply)

First-generation student

International student

Rural student

Urban student

Q34

Contact Information

First Name

Last Name

Phone

Email Address

Thank you Page

Thank you for taking part in the survey. If you or someone you know is experiencing food access concerns, please use the resources provided.

- The Dean of Students office: The office offers emergency grants that help with issues such as food and housing needs. Contact the team at 540-231-3787 (after-hours number: enter 540-231-6411 then press 1) or dean.students@vt.edu.
- 209 Marketplace at Virginia Tech: VT students can shop for food, toiletries, and school supplies each week at this pantry. While the organization is located inside a Methodist campus ministry, all are welcome. [Learn more on their website.](#)
- Interfaith Food Pantry: qualified residents of Blacksburg and McCoy are welcome to shop at this pantry, which is open weekly Monday and Tuesday from 4–6 p.m. and Wednesday and Friday from 10–11:30 a.m.

- [The NRV Food Assistance Directory](#): Provided by NRV THRIVE, this directory provides resources located throughout the New River Valley that can be utilized to increase access to food.

Appendix B: Recruitment Flyer

CALS FOOD ACCESS AND QUALITY OF LIFE



The survey
closes on
November 16th

The first 15
interview
participants
get a \$33 gift
card to
Kroger

Survey Link

CALS Food Access
and Quality of Life
Survey

QR Code



Appendix C: Recruitment Email

Hello {FIRST_NAME}!

I am surveying undergraduate and graduate students in the College of Agriculture and Life Sciences on how food access impacts the quality of life for students as part of my Ph.D. research. If you agree to participate, the survey should take approximately 10 minutes to complete. The answers you provide in the survey will be confidential and not be associated with your email.

At the end of the survey is an option to participate in a follow-up interview. The first 15 interview participants will receive a **\$33 gift card to Kroger**.

The survey can be accessed from the link: <SURVEY_LINK>

On November 16th at 11:59 pm, the survey will close. If you have any questions, please feel free to reach out to lanap20@vt.edu.

Thank you for your time,

Lana

Appendix D: Reminder Email

Hello {FIRST_NAME}!

This is a friendly ***LAST*** reminder to participate in the CALS Food Access and Quality of Life survey. If you agree to participate, the survey should take approximately 10 minutes. The answers you provide in the survey will be confidential and not be associated with your email.

At the end of the survey is an option to participate in a follow-up interview. The first 15 interview participants will receive a ***\$33 gift card to Kroger.***

The survey can be accessed from the link: <SURVEY_LINK>

The survey will close tonight at 11:59 pm. If you have any questions, please feel free to reach out to lanap20@vt.edu.

Thank you for your time,

Lana

Appendix E: Request for Interview Email

Hello {FIRST_NAME}!

First, thank you so much for participating in my survey and wanting to do the follow-up interview!

You are one of the first 15 participants to complete the survey! You will be receiving a \$33 gift card to Kroger. I will need you to fill out the attached W9 before we can process the gift card. Let me know if you have any questions about this process.

As for the interview, I want to start on them after Thanksgiving break. What would be the best day and time for you during **November 28th- December 9th?** I would be available on weekends as well to conduct the interview. If you could provide at least **3 times** that work best for you, I can make sure one of them works for me. The interviews will be 20-30 minutes long.

Again, thank you for wanting to participate in this!

Let me know if you have any questions,

Lana

Appendix F: Interview Questions

Interview Questions

Student Name:

Demographics:

Date of Interview:

Hi. I'm Lana. Thank you for agreeing to speak with me today. [Go over consent form or flier]. I am interested in understanding more about your experience as a student in the College of Agriculture and Life Sciences with food access.

First, I would like to ask you about how access to food impacts your life.

1. How does access to food affect your energy or ability to participate in everyday life activities while in school?
 - a. Probes: attending class, studying, grades, receiving academic support, seeing friends, clubs, recreational activities
2. How does money affect your ability to make financial decisions for your basic needs, such as food?
 - a. Probes: rent, textbooks, meal plan, childcare
 - b. Have you run out of campus meal plan money?
3. How does access to food affect your physical and mental health?
 - a. Probes: body image, concentration, stress, depression, weight, sleep
4. How does not having food or being able to purchase food impact your ability to attend social events?
 - a. Expand on bringing food to events, going out to eat with friends
5. How does your class schedule determine what and how often you eat in a day?
 - a. Probes: do you skip meals, do you have time to cook, are lines too long, do you have classes back to back

Now, I would like to switch gears a little bit and ask about the resources available on the Virginia Tech campus and what factors impact whether students can access those resources.

6. Have you ever felt comfortable talking with someone about not having access to food? If not can you explain why?
7. What are your perceptions on why students don't know what resources are available on and off campus?
8. What is the biggest barrier you have to accessing the amount or types of food you want?
9. In what ways do you think Virginia Tech can support students?
 - a. Probe: particularly around food access
 - b. At the school, college, and/or department level

Appendix G: IRB Approval Letter



Division of Scholarly Integrity and
Research Compliance
Institutional Review Board
North End Center, Suite 4120 (MC 0497)
300 Turner Street NW
Blacksburg, Virginia 24061
540/231-3732
irb@vt.edu
<http://www.research.vt.edu/sirc/hrpp>

MEMORANDUM

DATE: October 12, 2022
TO: Rick Rudd, Lana Petrie, Sarah Anne Misyak
FROM: Virginia Tech Institutional Review Board (FWA00000572)
PROTOCOL TITLE: The impact of food access on quality of life for students
IRB NUMBER: 22-913

Effective October 12, 2022, the Virginia Tech Human Research Protection Program (HRPP) determined that this protocol meets the criteria for exemption from IRB review under 45 CFR 46.104 (d) category(ies) 2(ii).

Ongoing IRB review and approval by this organization is not required. This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made and there are questions about whether these activities impact the exempt determination, please submit an amendment to the HRPP for a determination.

This exempt determination does not apply to any collaborating institution(s). The Virginia Tech HRPP and IRB cannot provide an exemption that overrides the jurisdiction of a local IRB or other institutional mechanism for determining exemptions.

All investigators (listed above) are required to comply with the researcher requirements outlined at:

<https://secure.research.vt.edu/external/irb/responsibilities.htm>

(Please review responsibilities before beginning your research.)

PROTOCOL INFORMATION:

Determined As: **Exempt, under 45 CFR 46.104(d) category(ies) 2(ii)**
 Protocol Determination Date: **October 12, 2022**

ASSOCIATED FUNDING:

The table on the following page indicates whether grant proposals are related to this protocol, and which of the listed proposals, if any, have been compared to this protocol, if required.

Invent the Future