The Impact of the COVID-19 Pandemic on Food Insecurity among U.S. College Students, a Systematic Review

A graduate project submitted in partial fulfillment of the requirements
For the degree of Master of Science in
Family and Consumer Sciences

by

Jenica Smith

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The thesis of Jenica M. Smith is approved:

Dr. Annette Besnilian, EdD, MPH, RDN, CLE, FAND

Date

Dr. Claudia R. Baquet, MD, MPH, PhD

Date

Dr. Nelida Duran, Ph.D., Chair

Date

California State University, Northridge
DEDICATION

This thesis is dedicated to:

I dedicate this thesis to my phenomenal parents, Bruce and Dianne Smith, for their unwavering, love and dedication to my success in all areas of life. I love you both!
ACKNOWLEDGMENT

I would like to thank my committee members who supported my efforts in writing this thesis – Dr. Nelida Duran, Dr. Claudia R. Baquet, and Dr. Annette Besnilian. All committee members read, reviewed, provided guidance and feedback, approved my final thesis manuscript, and provided inspiration throughout the process. A special thank you to Katherine Rawson, MPH, RD, for her support on this project.
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ABSTRACT

The Impact of the COVID-19 Pandemic on Food Insecurity among U.S. College Students, a Systematic Review

by

Jenica Smith

Master of Science in Family and Consumer Science

The purpose of this study was to investigate the impact of COVID-19 on food insecurity among undergraduate, graduate, and professional students enrolled at postsecondary institutions in the United States. The research objectives are to systematically review peer-reviewed and grey literature with the following goals: (1) to explore the impact of the COVID-19 pandemic on food insecurity among college students at a 2-year and 4-year institutions in the United States; (2) to compare the rate of food insecurity among college students at 2-year and 4-year institutions in the United States before and during the COVID-19 pandemic; and (3) to identify strategies to improve student hunger in higher education during distance learning during the COVID-19 pandemic. A systematic review was conducted in accordance with Preferred Reporting Items for Systematic Review and Meta-Analysis statement (PRISMA) protocols using PubMed, ScienceDirect (Elsevier), MEDLINE, Wiley Online Library, JSTOR, Google Scholar, other related articles, and grey literature. Researcher found that changes in employment and food environment were predictors of worsened food security status among college students during the COVID-19 pandemic. Further research is needed to determine the long-term impact and
prevalence of the COVID-19 pandemic on food insecurity among college students in the United States.

**Keywords:** Food Insecurity, Hunger, Coronavirus Disease 19, COVID-19 Pandemic, College Students, Higher Education
CHAPTER I – INTRODUCTION

Food insecurity is one’s inability to access adequate allowances of both nutritious and affordable food at all times to maintain a healthy life (USDA ERS, 2020). This condition of limited or unsure food access is linked to the subpar eating patterns, malnutrition, chronic disease, and other health-related issues (Owens et al., 2020; Soldavini et al., 2020, FAO Food Security Programme; 2008). According to the United States Department of Agriculture (USDA), the four classifications of food insecurity include: (1) high food security (no experience of issues with food access); (2) marginal food security (1-2 experiences of stress caused by lack of food with minimal to no changes in food intake); (3) low food security (experiences of decreased variety, quality, and appeal of diet with minimal to no evidence of decreased food intake); and (4) very low food security (multiple experiences of interrupted eating pattern and decreased intake of food) (USDA ERS, 2020).

The COVID-19 pandemic has brought many challenges and extremely detrimental impacts on wellbeing and health for American society (CDC, 2020). Aside from the unprecedented rate of death linked to COVID-19, state-level and local ordinances (i.e. social distancing, safer-at-home mandates) put in place to limit the spread of virus resulted in a rise in rates of food insecurity, hunger, job loss, and change in food environment (Huizar & Laddu, 2020; Lambert, 2020; Ziliak, 2020; Ahn & Norwood, 2020, Carethers, 2020; Niles et al., 2020; Lambert et al., 2020). Additionally, individuals vulnerable to food insecurity, such as those who are low-income (<250% federal poverty line), may be disproportionately affected by the pandemic (Lambert et al., 2020). U.S. students in higher education may also experience food insecurity at disproportionately higher rate compared to the general population during the COVID-19 pandemic (Owens et al., 2020; Soldavini et al., 2020).
Prior to the pandemic, food insecurity was a regular occurrence among U.S. students in higher education (Bruening et al., 2017; Cady, 2014; Crutchfield & Maguire, 2018; Dubick, 2016). In a 2019, Nazmi et al. (2019) reported that the average food insecurity prevalence among U.S. college students was 43.5%. With the implementation of distance learning and college campus closures, students no longer had access to university resources including employment and basic needs support (Soldavini, Andrew & Berner, 2020). Like the body, an active mind requires enough energy to perform at optimal capacity. College students who don’t have sufficient, nutritious food choices may experience poor academic performance, poor dietary intake, and worsened mental health (Bruening et al., 2017). Several factors contribute to U.S. college student’s susceptibility of becoming food insecure during the COVID-19 pandemic including changes in employment (Soldavini et al., 2020), lack of access to federal food aid and pandemic relief (Laska et al., 2020), campus closures and lack of access to student resources and dining options, (Lederer et al., 2020; Soldavini et al., 2020), and low food literacy (one’s ability to plan, shop, and cook nutritious meals) (Cuy Castellanos & Holcomb, 2020).

As of November 2020, only two peer-reviewed articles and 3 grey literature have examined the characteristics, prevalence, and impact of the COVID-19 pandemic on rates of food insecurity among U.S. college students. This systematic review aims to: (1) assess the prevalence of and impact on food insecurity among college students during the COVID-19 pandemic; and (2) examine current strategies to combat the ‘serving student’ experience during the COVID-19 pandemic.

STATEMENT OF PROBLEM

The benefit that this review will have on the higher education population is a potential minimization or elimination of the “starving student” experience for a brighter future through
discovery of effective strategies and policies during the “safer at home” distance learning of the COVID-19 Pandemic. The archetype of the starving student has become widely accepted in the United States, but at what cost. Food is a basic need. Food is fuel. Like the body, an active mind requires enough energy to perform at optimal capacity. If people don’t have nutritious food choices, they can’t be healthy or productive. The increasing percentage of food insecure students is a huge issue to their academic success and wellbeing.

PURPOSE

The purpose of this research was to investigate the impact of COVID-19 on food insecurity among college students in the United States.

DEFINITIONS

1. Food Insecurity is defined as a social and household level economic state in which one has an inability to access adequate allowances of both nutritious and affordable food at all times (USDA ERS, 2020). The four classifications of food insecurity include: (1) high food security (no experience of issues with food access); (2) marginal food security (1-2 experiences of anxiety caused by lack of food with minimal to no changes in food intake); (3) low food security (experiences of decreased variety, quality, and appeal of diet with minimal to no evidence of decreased food intake); and (4) very low food security (multiple experiences of interrupted eating patterns and decreased intake of food) (USDA ERS, 2020).

2. Hunger is an “individual level, physiological condition” generally refers to outcomes of food insecurity that, due to prolonged, unintentional periods of insufficient food, give rise to disease, distress, weakness, or agony that extend past typical discomforts (USDA, 2020).
3. Coronavirus Disease 2019 (COVID-19), also known as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), is a newly recognized, global, highly contagious viral pathogen that causes severe respiratory distress. There is no known pre-existing immunity in humans for this virus.

4. The four dimensions of food security are recognized as: (1) availability (having a reliable and consistent source of quality food); (2) utilization (having the knowledge and basic sanitary conditions to choose, prepare, and distribute food in a way that results in good nutrition); (3) stability (the ability to access and utilize food that remains stable and sustained over time. Climate change can affect stability); and (4) access (having sufficient resources to produce and/or purchase food) (FAO Food Security Programme, 2008).

5. Social determinants of health (SDOH) refer to social, physical and economic conditions in one’s environment that impact an array of quality of life, functioning and health outcomes and risks (U.S. Dept of HHS, 2020). The five domains of SDOH include economic stability, education access and quality, health care access and quality, neighborhood and built environment, and social and community context (U.S. Dept of HHS, 2020).

6. Malnutrition is defined as macro- and micronutrient deficiencies, imbalances, and excesses due to food insecurity or “non-food factors” such as living in an unhealthy food environment, poor childcare, and/or limited access to health care (FAO Food Security Programme, 2008).

THEORETICAL FRAMEWORK

The theoretical framework used in the study is the four dimensions of food security. The four dimensions of food security (having sufficient physical and economic access to affordable and nutritious food at all times) are availability, utilization, stability, and access. Availability
refers to having a reliable and consistent source of quality food (FAO Food Security Programme, 2008). Food production can affect availability. Utilization is having the knowledge and basic sanitary conditions to choose, prepare, and distribute food in a way that results in good nutrition. Having access to clean water can affect utilization. Stability refers to the ability to access and utilize food that remains stable and sustained over time. Climate change can affect stability. Access is having sufficient resources to produce and/or purchase food. Living in a food desert, a location that has limited availability to nutritious and affordable food, can affect access (FAO Food Security Programme, 2008). To be considered food secure, all dimensions of food security must be accomplished at the same time (FAO Food Security Programme, 2008).

RESEARCH OBJECTIVE

The aim of this research is to investigate the impact of COVID-19 on food insecurity among college students in the United States. To this end, the proposed systematic review for mixed-methods evidence (quantitative and qualitative) will examine the following research objectives: (1) to explore the impact of the COVID-19 pandemic on food insecurity among college students at a 2-year and 4-year institutions in the United States: (2) to compare the rate of food insecurity among college students at 2-year and 4-year institutions in the United States before and during the COVID-19 pandemic; and (3) to identity strategies to improve student hunger in higher education during distance learning during the COVID-19 pandemic.

ASSUMPTIONS

This research study was created based upon certain assumptions. No errors were made in the data entry. No errors were made in the data analyses.
CHAPTER II - REVIEW OF LITERATURE

Past literature examining the impact of the COVID-19 pandemic on food insecurity status among college students attending a 2-year or 4-year institution in the United States was explored.

ADULT FOOD INSECURITY DURING COVID-19

To date, there has been limited research on the effect of the COVID-19 pandemic on food insecurity in the United States (Soldavini et al., 2020; Owens et al., 2020). Compared to the 2019 prevalence rate of food insecurity among adults of 10.5%, research examining the prevalence rate of food insecurity before and during the COVID-19 pandemic have indicated an increase in individuals experiencing food insecurity than prior to the pandemic (Soldavini, Andrew, & Berner, 2020). Of the respondents from the U.S. Census Bureau’s Household Pulse Survey, 25.2% are estimated to have endured food insecurity between April 23, 2020 - June 20, 2020 (Schanzenbach, D, Tomeh, N., 2020). The Urban Institute (2020) discovered the estimates of food insecure adults was 20.9% between March-April 2020 and 17.7% in May 2020. Through a national online survey (N = 1478) on household food insecurity status among low-income adults (<250% of the U.S. federal poverty line), Wolfson, et al. (2020) reported respondents were 36% food secure, 20% marginally food secure, and 44% food insecurity (18.8% were very low food insecure).

Lambert et al. (2020) found that the COVID-19 pandemic has greatly affected the health and wellbeing of individuals worldwide. One of the major consequences of this pandemic has been an increase in food insecurity. 820 million people globally experienced chronic hunger in 2018. In 2019, the number of people experiencing crisis-level food insecurity increased from 113 million to 135 million. “COVID-19 could almost double this number to 265 million by the end of 2020”. Feeding America's “Map the Meal Gap” (MMG) has supplied sub-state-level
approximate rates of food insecurity for both the full population and children (Gundersen, 2020). In August 2020, it reported 54 million people in the United States are food insecure, which is a 31% increase since 2018. Lederer, et al. (2020) reported nearly 20 million students are enrolled in post-secondary education institutions, making up 40% of the United States population aged 18-24 pre-pandemic.

STUDIES ON FOOD INSECURITY OF COLLEGE STUDENTS DURING COVID-19

In the limited research on the impact of COVID-19 on higher education, rates of food insecurity increased compared to pre-pandemic rates. Owens et al. (2020) conducted a multistep food security assessment protocol accessing the prevalence and social determinants of food insecurity among college students during the COVID-19 pandemic. Students were surveyed May 12, 2020 to June 12, 2020 at three large, diverse, public universities in Texas located in the cities of Dallas, Houston, and Denton. Out of 502 college students, 20.2% reported having experienced low food insecure and 14.3% reported having experienced very low food insecure during the COVID-19 pandemic (Owens et al., 2020). Owens et al. (2020) suggested comprehensives strategies and policies are needed to better manage the impact of the COVID-19 pandemic on food insecurity among U.S. college students.

The Hope Center for College, Community, and Justice conducted a survey on undergraduate food insecurity during COVID-19 from April 20, 2020 to May 15, 2020 (Goldrick-Rab et al., 2020). They collected data from 54 U.S. universities and colleges, of which, 15 were four-year universities and 39 were two-year colleges. Goldrick-Rab et al. (2020) found that, over a 30-day period, food insecurity increased from 33% to 38% of students at four-year universities and increased from 42% to 44% at two-year colleges, compared to survey data from fall 2019.
Soldavini et al. (2020) administered an online survey to identify characteristics linked to changes in food security status during the COVID-19 pandemic to college students enrolled at a large public university in the Southeastern United States. The data collection period was July 12 to July 16, 2020 and used the 10-item U.S. Adult Food Security Module to determine student food insecurity status prior to and during the COVID-19 and other self-reported characteristics. Of the 2,039 students surveyed, food security worsened for 20% of students, improved for 12% of students, and stayed the same for 68% of students (Soldavini et al., 2020). Students were more likely to report worsened food security status who identified as Asian, international, disabled, and lost employment during COVID-19. Students were more likely to report improved food security status during COVID-19 who were first-generation, moved in with family during COVID-19, and received family financial support either before or during COVID-19. Both before and during COVID-19, students receiving family financial support were more likely to report both improved food security status than worsened food security status. Students who supplied family financial support before and during COVID-19 were more likely to report worsened food security status (Soldavini et al., 2020).

EMPLOYMENT OF COLLEGE STUDENTS DURING COVID-19

College campuses serve as a mini ecosystem (Kelly et al., 2020), offering a variety of resources and employment opportunities to its students (Lederer et al., 2020). Before the COVID-19 pandemic, Lederer et al. (2020) reported that 58% of college students were employed, 55% had financial independence, and many held jobs on campus. Owens et al. (2020) reported changes of employment status was directly associated with changes in food insecurity status among college students during COVID-19 ($p < 0.001$). Students were more likely to be food insecure if they experienced reduced income from being laid off, furloughed, having
reduced work hours, or quitting job due to safety concerns as a result to the pandemic (Owens et al., 2020). Unemployment was found to be a predictor of food insecurity during the COVID-19 pandemic (Ziliak, 2020). As a result of unemployment rates in April 2020 jumping up to 14.2% from 4.4% in March 2020, Feeding American predicted national food insecurity rates would increase by 5% (Ahn & Norwood, 2020). The higher rate of food insecurity predicted is based on predicted higher rate of poverty and income loss during COVID-19. If the price of food had significantly increased, these predicted rates of food insecurity would have been higher (Gundersen et al., 2020). On average, low-income households spend 70% of their income on food. Job losses and reduction of income due to the “pandemic-induced recession” can reduce these households’ means to purchase food (Carethers, 2020). Of students with financial independence, 42% live at or below the national poverty line (Lederer et al., 2020).

SOCIAL DETERMINANTS OF COLLEGE FOOD INSECURITY AND COVID-19

Wolfson et al. (2020) reported 44% of African American/Black and Hispanic/Latino, low-income adults were estimated to be food insecure in mid-March 2020. Lederer et al. (2020) found that students who identify as Black, Pacific Islander, and Latinx are at risk of disproportionately being affected by the COVID-19 pandemic due to inequities in pre-existing health status (at higher risk of contracting COVID-19), housing and working conditions, acquiring quality healthcare, and higher risk of experiencing trauma due to overwhelming unfair treatment by the police and social injustices. Lederer et al. (2020) suggested the use of student surveying to make informed, comprehensive decisions about necessary, equitable interventions to improve the student experience amid the pandemic.

Of the Social Determinants of Health, socioeconomic status is significantly associated with impacts to food security status (Carethers, 2020). Those living in poverty are the most
vulnerable to worsening consequences of COVID-19 on food systems across the world including disruptions in food production, processing, delivery, and safe food handling at local grocers. Diminished food production and disturbances in supply chains has been seen globally and within the United States. Low-income populations are disproportionately affected by these changes, worsening inequities (Carethers, 2020). Harper (2020) recommended that colleges have a well-established reopening plan to provide resources to underserved and disadvantaged students to reduce food inequities.

FOOD ENVIRONMENT OF COLLEGE STUDENTS DURING COVID-19

The COVID-19 pandemic forced the closure of many college campuses, leaving many college students who were dependent on access to campus dining and food aid program like food pantries, to buy and cook their own meals (Lederer et al., 2020; Soldavini et al., 2020). Low food literacy (one’s ability to plan, shop, and cook nutritious meals) is a predictor of college food insecurity during the COVID-19 pandemic (Cuy Castellanos & Holcomb, 2020). Huizar et al. (2020) found that behavioral and environmental/societal predictors of food insecurity, such as low food literacy, food desert, and poverty, may increase poor dietary intake, risk of malnutrition, and adverse health outcome, referred to as “the global food syndemic.”

FEDERAL LEGISLATION ON COLLEGE FOOD INSECURITY DURING COVID-19

The Coronavirus Aid, Relief, and Economic Security (CARES) Act was created in response to severe financial hardships brought on by federal and state mandates of the COVID-19 pandemic (Parrott et al., 2020). The CARES Act is comprised of an expansion to unemployment benefits and eligibility, a $1,200 “recovery rebate” stimulus check for most low-to-middle income adults, and creation of a Coronavirus Relief Fund of $150 for states and localities (Parrott et al., 2020). Additionally, the CARES Act allocated $14 billion in relief to
post-secondary institutions - $6.2 billion for emergency funds and institutional support and $1 million to minority-serving campuses (Kelly & Columbus, 2020).

Laska et al. (2020) reported that within the current 116th legislative session (2019–2020), 17 bills addressing higher education affordability were introduced. Of these bills, 12 address college food insecurity. Laska et al. (2020) found that, although the COVID-19 pandemic stimulus bills (P.L. 116-123; P.L. 116-127; P.L. 116-136; P.L. 116-139) did not precisely tackle college food insecurity, the Emergency Ensuring Access to SNAP (EATS) Act (H.R. 6565) and End Pandemic Hunger For College Students Act (H.R. 6756) have been introduced to help low-income students gain access to Supplemental Nutrition Assistance Program (SNAP) benefits throughout the course of the COVID-19 pandemic. Increases in food insecurity in the United States was correlated with a 98% increase in the need and dependency of access to food banks and a rise in enrollment in federal food aid program such as the Supplement Nutrition Assistance Program (SNAP) and the Supplement Nutrition Program for Women, Infants, and Children (WIC) (Lederer, 2020). The major challenge has been the lack of evidence to support these proposed legislations for college students during the pandemic (Laska et al., 2020).
CHAPTER III – METHODOLOGY

PROCEDURES

To examine the impact of the COVID-19 pandemic on food insecurity among college students in the United States, a systematic review was conducted in accordance with Preferred Reporting Items for Systematic Review and Meta-Analysis statement (PRISMA) protocols outlined in Table 1. (Moher et al., 2009; Tawfik et al., 2019). The research question was based on the PICo (Population, Intervention, Comparison, and outcome) approach and reads, “what are college students in higher education at 4-year universities and 2-year institutions, who are identified as food insecure, experiences during the COVID-19 pandemic in the United States?” (Systematic Review, 2020). Peer-reviewed literature was discovered by searching PubMed, ScienceDirect (Elsevier), MEDLINE, Wiley Online Library, and JSTOR databases, and Google Scholar. Grey literature and peer-reviewed journal articles related to primary topics were accessed to provide a comprehensive, wide-scope of available literature. Grey literature included government and non-profit reports.

SELECTION CRITERIA

The eligibility criteria used to select literature for this paper is detailed in this section. Articles published in English within any publication year were considered eligible. Only literature from the United States was accepted. Citation managers, a data management excel sheet, and google docs were utilized in combination to organize the data selection and extraction records. The aim of this research is to investigate the impact of COVID-19 on food insecurity among college students in the United States. To this end, the proposed systematic review for mixed-methods evidence (quantitative and qualitative) will examine the following research objectives: (1) to explore the impact of the COVID-19 pandemic on food insecurity among
college students at a 2-year and 4-year institutions in the United States: (2) to compare the rate of food insecurity among college students at 2-year and 4-year institutions in the United States before and during the COVID-19 pandemic; and (3) to identity strategies to improve student hunger in higher education during distance learning during the COVID-19 pandemic.

The search strategy to identify literature was developed using the formulated research question, the determined eligibility criteria, key search terms and their synonyms, and search limitations. For types of study, studies that used qualitative methodology and questionnaires or surveys as data collections tools were included. To make certain an extensive review of literature was conducted and reduced risk of bias, an explicit manual search of the reference lists of eligible studies and “related-to” articles in PubMed and Google Scholar indicated through the search were scanned. Grey literature was identified by searching Google Scholar using the above search terms with the inclusion of “and” in the search text.

Preliminary searches revealed there are no existing systematic reviews on this topic in any of the journal databases by conducting a simple search on PubMed with search terms COVID-19 AND food insecurity AND college students. Both quantitative and qualitative studies were desired. The search terms and their synonyms were COVID-19, COVID-19 pandemic, and SARS-CoV-2 in conjunction with/and, food insecurity, food hardship, hunger, university, college, post-secondary education, higher education, and college students. The specific search strategy for PubMed was COVID-19 AND food insecurity AND college students. The limits that were applied to this search strategy were to only include studies whose population was adults, written in English, for all years of publication. After completing searches in PubMed, a search strategy was adopted and used on all other databases to ensure a high amount of eligible literature was found.
The process of selecting literature for this review included a two-step screening process for titles and abstracts, then full-text fields. Records were excluded after screening if they either did not meet the inclusion criteria, were irrelevant, no full-text was available, or were abstract-only. Duplicates were removed during each step of the screening process.

DATA EXTRACTION

For the method of data extraction, the principal investigator (J.S) reviewed the included literature and pulled out the following information: population, data collection frame, study methodology and statistical approach, setting, sample demographic characteristics, food insecurity measures, outcome measure(s), prevalence of food insecurity, impact of the COVID-19 Pandemic on food insecurity, and results. All results were extracted and categorized into demographic (e.g., race/ethnicity and age), health (e.g., eating behaviors, mental health, and weight status), and academic (e.g., grade point average and retention) outcomes. J.S. reviewed the grey literature for source type (e.g., report, student thesis, abstract, website, or press article), year data were collected, sample size, prevalence of food insecurity, and factors associated with changes in food security status among college students during the COVID-19 pandemic. Themes for suggested strategies and interventions in practice were categorized across the peer-reviewed and grey literature by the four dimensions of food insecurity.
CHAPTER IV – RESULTS

OVERVIEW OF STUDY SELECTION

A total of 2,223 records were identified through peer-reviewed databases (n = 233), Google Scholar search (n = 1990), and other peer-reviewed sources (n = 4) (see Figure 1). After all duplicate records were removed, the remaining records were identified (n = 2,213 peer-reviewed). Of these records, records were excluded (n = 2,186) after title and abstract analysis revealed they did not meet inclusion criteria detailed in the methods. The remaining full-text articles (n = 17 peer-reviewed, n = 8 grey literature) were then screened. Fifteen peer-reviewed articles were excluded for not meeting the inclusion criteria and irrelevant, no full-text available, or duplicated, and 2 grey literature sources were already included among the peer-reviewed literature, resulting in a total of 19 excluded full-text articles. The remaining 2 peer-reviewed papers and 3 grey literature were found to meet all inclusion criteria and were included in the analysis. In total, this systematic review examined the findings from 5 peer-reviewed articles and/or grey literature assessing the impact of and factors contributing to changes in food security status among U.S. college students, as well as provided an in-depth exploration of proposed strategies to combat college student food insecurity.
Figure 1: Preferred Reporting Items for Systematic Reviews (PRISMA) and Meta-Analyses flow diagram of peer-reviewed and grey literature on COVID-19 and food insecurity in higher education
Of the peer-reviewed literature included in this review, there were 26 4-year institutions, 1 vocational, 43 community college, 13 research institution, 4 unknown institutions, 22 located in an urban location, 1 located in a mixed location, 54 located in an unknown, and 11 publicly funded, and 1 non-profit funded.

Table 1: Descriptive statistics of postsecondary institutions in the US examining the impact of the COVID-19 Pandemic on food insecurity among their students from peer-reviewed and grey literature

<table>
<thead>
<tr>
<th>Description</th>
<th>Peer-reviewed</th>
<th>Grey literature</th>
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<tbody>
<tr>
<td><strong>Location</strong></td>
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<td></td>
</tr>
<tr>
<td>Type</td>
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<tr>
<td>4-year institution +</td>
<td>2</td>
<td>24</td>
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<tr>
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<tr>
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<tr>
<td>Community college</td>
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<tr>
<td>Mixed</td>
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<td>-</td>
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<tr>
<td>Unknown</td>
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<td>-</td>
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<tr>
<td><strong>Demographics</strong></td>
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</table>

Dash (-) = no data available
OVERVIEW OF INDIVIDUAL STUDIES

Table 2 is used to describe the summary of peer-reviewed literature and grey examining food insecurity among postsecondary students during the COVID-19 pandemic including author(s), reference, and publication date, data collection time frame, setting, sample demographic characteristics, study design and statistical approach, food insecurity measures, and results. The results section was further divided to include change(s) in food insecurity status and sociodemographic characteristics and related factors. Table 3 is used to describe the factors that predict impacts on the change in food security status among college students survey as identified by the literature included in statistical analysis. Table 4 is used to describe the themes of suggested solutions in practice to address postsecondary food insecurity during COVID-19, using the four dimension of food security, as identified by the literature included in statistical analysis.

Table 2: Summary of peer-reviewed and grey literature on food insecurity among postsecondary students during the COVID-19 Pandemic

<table>
<thead>
<tr>
<th>Author(s), reference, publication date</th>
<th>Data collection time frame</th>
<th>Setting</th>
<th>Sample demographic characteristics</th>
<th>Study design and statistical approach</th>
<th>Food insecurity measures</th>
<th>Results</th>
</tr>
</thead>
</table>

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| Soldavini, J., Andrew, H., & Berner, M., 2020 | June 12–July 16, 2020 | large public university in the Southeastern United States | N = 2,039 Women = 73%, Ethnicity = 93% non-Hispanic, Race = 67% White, Program type = 96% residential program, Undergraduate = 57%, Non-international = 94%, Non-first generation student = 81%, Marital status = 80% single, No dependents = 95%, Non-disabled = 71%, Spring semester off-campus housing = 60%, No meal plan in spring semester = 67%, Moved in w/ family = 53%, Spring semester employment = 46% worked part-time and 66% had no loss of employment, Students on financial aid = 74%, Did not receive SNAP during pandemic = | CS convenience of survey to undergraduate, graduate, and professional students Eligibility Criteria: at least 18 and enrolled in college during the Spring 2020 semester (typically January 8, 2020-May 6, 2020) Response rate: 6.8% χ2 tests, descriptive, multinomial logistic regression | 10-item U.S. Adult Food Security Module Pre-COVID: 74% High food security, 15.3% marginal food security, 6.4% low food security, 4.4% very low food security During COVID: 69.1% high food security, 16.5% marginal food security, 7.7% low food security, 6.8% very low food security Students were more likely to report worsened food security status who identified as Asian (AOR: 1.60, 95% confidence interval [CI]: 1.10, 2.32), international (AOR: 1.82, 95% CI: 1.04, 3.20), disabled (AOR: 2.01, 95% CI: 1.53, 2.64), lost employment during COVID-19 (AOR: 2.24, 95% CI: 1.62, 3.10), and lost employment w/n household during COVID-19 (AOR: 1.81, 95% CI: 1.38, 2.35). Students were more likely to report improved food security status during COVID-19 who were first-generation (AOR: 1.58, 95% CI: 1.00, 2.49), moved in w/ family during COVID-19 (AOR: 2.36, 95% CI: 1.34, 4.15), and received family financial support either before COVID-19 (AOR: 3.31, 95% CI: 1.07, 10.18) or during COVID-19 (AOR: 1.84, 95% CI: 1.04, 3.27), Both before and during COVID-19, students receiving family | Change(s) in Food Insecurity status Sociodemographic characteristics and related factors |
Women = 88%, White = 41%, From Denton campus = 52%, Graduate class level = 55% | CS convenience of online survey to undergraduate and graduate students at all three campuses  
Eligibility Criteria: 18 years or older, were fluent in English, and had access to the internet | 2-item Food Sufficiency Screener and 6-item USDA Food Security Survey Module (FSSM) | 66% of respondents failed the 2-item food sufficiency screener. Of these, 30.8% were low food and 21.9% were very low food insecure | Food Insecure = 86% women, 14% men, 32% White, 21% Black, 32% Hispanic, 45% graduate class level, 55% undergraduate class level, 70% experienced impact to employment due to COVID-19, 45% living with roommate and/or spouse |
| Goldrick-Rab, S., 2020) | April 20, 2020-May 15, 2020 | 54 institutions (39 two-year colleges and 15 four-year institution) | N = 38, 602  
Attending 2-year institution = 80% (n = 30, 721)  
Attending 4-year university = 20% (n = 7881) | CS convenience of online survey to undergraduate | 6-item USDA Food Security Survey Module (FSSM) | Reported being food insecure at 2-year institution = 44%  
Reported being food insecure at 4-year university = 38% | 2-year institutions = 43% couldn’t afford to eat balanced meals, 40% food didn’t last and had no more money for more, 35% cut meal size or skipped meals due to limited money, 23% cut meal size or skipped meal 3 or more times due limited money, 36% ate less |
| Blankstein, M., et al, 2020 | Mid-April-Mid-May | 21 US higher education institutions (includes 4 research, 9 4-year, and 4 2-year) | N = 15,677
Undergraduate = 82%, 2nd year students = 29%, Women = 69%, White = 75%, Lived off campus pre-pandemic = 53%, Health Professions major = 21%, Not a care giver = 85%, Not receiving or not sure if eligible for Pell Grant = ~38%, Doctoral Universities = 38%, | CS convenience of online survey to students at all participating higher education institution | N/A | American Indian or Native Students over 30 days = ~45% won’t have enough food to eat days, ~55% won’t have enough money to buy food, Asian or Asian American students over 30 days = ~43% won’t have enough food to eat days Black or African American Student over 30 days = ~42% won’t have enough food to eat days | American Indian or Native Students over 30 days = ~55% won’t have enough money to buy food, Asian or Asian American students over 30 days = ~55% won’t have enough money to buy food, Black or African American Student over 30 days = ~55% won’t have enough money to buy food, Hispanic or Latino or Latina or Latinx students over 30 days = ~58% won’t have enough money to buy food, Middle Eastern or North African students over 30 days = ~55% won’t have enough money to buy food, | due to limited money, 25% went hungry due to limited money 4-year institution = 37% couldn’t afford to eat balanced meals, 33% food didn’t last and had no more money for more, 31% cut meal size or skipped meals due to limited money, 20% cut meal size or skipped meal 3 or more times due limited money, 32% ate less due to limited money, 22% went hungry due to limited money |
| Study: Soria, K.M., et al, 2020 | May 18, 2020 - July 20, 2020 | Nine large, public research institutions | N = 2,112 identified as low-income or poor = 7%, identified as working-class = 16%, identified as middle-class = 42%, 32% identified as upper-middle or professional-middle class = 32%, 3% identified as wealthy = 3% | CS convenience of online survey to students at all participating higher education institution | Response rate: 14-41% | Students experiencing food insecurity during COVID-19 = 58% low-income or poor, 40% working class, 20% middle, 10% upper middle/professional, 8% wealthy | N/A |

| | | | | | | Hispanic or Latino or Latina or Latinx students over 30 days = ~45% won’t have enough food to eat days | Middle Eastern or North African students over 30 days = ~45% won’t have enough food to eat days |

| | | | | | | Native Hawaiian or Other Pacific Island students over 30 days = ~32% won’t have enough food to eat days | White students over 30 days = ~26% won’t have enough food to eat days |

<p>| | | | | | | Native Hawaiian or Other Pacific Island students over 30 days = ~44% won’t have enough money to buy food, | White students over 30 days = ~36% won’t have enough money to buy food, |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th>$\chi^2$ tests descriptive, multinomial logistic regression</th>
</tr>
</thead>
</table>

CS = cross sectional

AOR = Adjusted Odds Ratio

CI = Confidence Ratio

N/A = Not Applicable
Table 3: Factors impacting Change in Food Security Status Among College Students Before and During the COVID-19 Pandemic

<table>
<thead>
<tr>
<th>Factors</th>
<th>Before COVID-19</th>
<th>During COVID-19</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Employment</strong></td>
<td>Positively impact on food security status (58% of students employed)</td>
<td>No significant impact on food security status</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2-year college student (32% reduced hours, 33% lost job, 36% no change in job)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4-year college students = 28% had reduced hours, 42% lost job, 37% no change in job</td>
</tr>
<tr>
<td><strong>Access to campus dining/food pantry</strong></td>
<td>Positively impact on food security status</td>
<td>Negative impact on food security status</td>
</tr>
<tr>
<td><strong>Low-Income, person of color (Black or African America; Hispanic or Latino; Pacific Islander or Asian)</strong></td>
<td>Disproportionally impacted</td>
<td>Disproportionally impacted</td>
</tr>
<tr>
<td><strong>Financially supported family</strong></td>
<td>-</td>
<td>Negative impact on food security status</td>
</tr>
</tbody>
</table>

Dash (-) = no data available
Table 4: Themes of suggested solutions in practice to address postsecondary food insecurity during COVID-19, using the four dimension of food security

<table>
<thead>
<tr>
<th>Dimension of Food Insecurity</th>
<th>Common Examples</th>
<th>Peer Reviewed Literature Suggested (n = 2)</th>
<th>Grey Literature Suggested (n = 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Availability</td>
<td>Food production</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Utilization</td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Stability</td>
<td>Pricing of food</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Access</td>
<td>Campus food aid (i.e. food pantry), financial aid (i.e. SNAP)</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

Dash (-) = no data available

RISK OF BIAS IN STUDIES

Of the literature included in statistical analysis, all data was reported, significant or non-significant. The risk of bias in these studies are some studies did not use a validated tool to access food insecurity. Additionally, there is an underrepresentation of rural colleges in comparison to urban colleges and an overrepresentation of 4-year institution in comparison to 2-year institutions. Lastly, without having comprehensive data of factors influencing change in food security status, it is difficult to determine the degree in which the COVID-19 pandemic has impacted changes in college food insecurity in the United States.
CHAPTER V – DISCUSSION

SUMMARY OF THE FINDINGS

Food insecurity is a major health problem among college students, which has been exacerbated by the COVID-19 Pandemic. This review sought to uncover the impact and prevalence of food insecurity among U.S. 2-year and 4-year college students during the COVID-19 pandemic. In a 2019, Nazmi et al. (2019) reported that the average food insecurity prevalence among U.S. college students was 43.5%. Following the onset of the COVID-19 pandemic, a review of literature reveals that the COVID-19 pandemic has exacerbated the already high rates of food insecurity among U.S. college students. It is estimated that prevalence of college students experiencing food insecurity has increased by 15% (Owens et al., 2020). The major predictors of changes in food security status were correlated with changes in employment, changes in food environment, and changes in federal food aid. Several important questions remain unanswered in the literature. Research suggests students were more likely to be food insecure if they experienced reduced income from being laid off, furloughed, having reduced work hours, or quitting due to safety concerns as a result to the pandemic (Owens et al., 2020). These changes in employment can directly impact college student’s eligibility for federal financial and food aid (Laska et al., 2020). With the closure of college campuses, students lost access to valuable resources such as student dining options and food pantries and were forced to purchase and prepare meals on their own (Lederer et al., 2020; Soldavini et al., 2020). Low food literacy is a predictor of food insecurity among college students (Cuy Castellanos & Holcomb, 2020). The major strength of the studies was most studies used a validated tool to access food insecurity, but the exception of one study (Blankstein, 2020).
LIMITATIONS

This review will add to the comprehension of the impact of the COVID-19 pandemic on food insecurity among college students in the United States. However, certain limitations in the studies reviewed exist. Some studies only surveyed college students attending 4-year urban institutions (Owens et al., 2020), which can limit generalizability. Additionally, Owens, et al (2020) were unable to determine a correlation between the prevalence of food insecurity among the sampled group and the COVID-19 pandemic, had selection bias from participants opting out of the survey, and did not assess for nutrition and food literacy as determinants of food insecurity. Future research is necessary to investigate the impact of the COVID-19 pandemic on dietary quality as well as food access, selection, and preparation of college students.

Additionally, of the studies included, survey response rate was low (Soldavini et al., 2020; Owens et al., 2020; Soria, 2020; Blankstein, 2020). In one study, the researchers (Soldavini et al., 2020) determined study limitations were due to self-reporting, demographics of the sampled group differed from the overall population of students, and the evaluation tool used was not validated. Lastly, of the studies used to investigate federal legislation on college student food insecurity during the COVID-19 pandemic, there was found that federal funding from the CARES Act did not include undocumented students (Laska et al., 2020). Again, further studies are needed to determine food insecurity changes and determine strategies to combat food insecurity among college students during COVID-19 (Soldavini et al., 2020; Owens et al., 2020; Soria, 2020; Blankstein, 2020, Goldrick-Rab, 2020).

IMPLICATIONS

As the COVID-19 pandemic remains a public health threat and college campuses remain closed for in-person learning, there is a need to develop new strategies to help ease the burden of
food insecurity among U.S. college students. Literature suggests access to campus resources such as food pantries and meal swipe programs (Soldavini et al., 2020) may not be as useful as the need for social distancing and distance learning continues. Goldrick-Rab (2020) proposes several solutions to combat college student food insecurity: (1) colleges with campus food pantry should consult with local food banks on how to better serve its students while following CDC health guidelines during the COVID-19 pandemic; (2) effectively communicate with students about alternative places to purchase food prior to closing campus dining sites; and (3) prepare meals that students can take-home or have delivered to ensure access to food. Harper (2020) recommends that colleges have a well-established reopening plan to feed students who depended on campus dining and food pantries during the distance learning era of the COVID-19 pandemic. For example, Compton College partnered with companies like EveryTable and GrubHub to ship meals to their students while campus is closed during the pandemic. Lastly, policies are needed that incorporate long-term strategies to help college students obtain sufficient, nutritious meals during and post-COVID-19 pandemic (Soldavini et al., 2020).

CONCLUSION

The review of literature reveals that the COVID-19 pandemic has exacerbated the already high rates of food insecurity among U.S. college students. Further research is needed to determine the correlation between changes in food security status and COVID-19, long term impact on food insecurity during distance learning, assessing the actual prevalence of food insecurity among college students during the COVID-19 pandemic, and examining approaches and legislations to combat food insecurity among U.S. post-secondary students during the COVID-19 pandemic.
REFERENCES


Blankstein, M., Frederick, J. K., & Wolff-Eisenberg, C. (2020). Student experiences during the pandemic pivot. Ithaka S+R.


