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To Feed and Nourish:
A Quantitative Study Examining the Relationship Between Food Insecurity and Perceptions of Well-Being Among SNAP-Enrolled Recipients Living in Rural Georgia Communities

By

Emily Leung
MPH

Department of Behavioral, Social, and Health Education Sciences

_____

Regine Haardörfer, PhD, MEd
Committee Chair

_____

Michelle Kegler, DrPH, MPH
Committee Member

_____

Cam Escoffery, PhD, MPH, CHES
Department Chair

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By

Emily Leung

Bachelor of Arts | Psychology, Secondary Major: Business Management
Case Western Reserve University
2018

Thesis Committee Chair: Dr. Regine Haardörfer, PhD, MEd
Thesis Committee Member: Dr. Michelle Kegler, DrPH, MPH

An abstract of
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Abstract

To Feed and Nourish:
A Quantitative Study Examining the Relationship Between Food Insecurity and Perceptions of Well-Being Among SNAP-Enrolled Recipients Living in Rural Georgia Communities

By Emily Leung

Introduction: Food insecurity, recognized as an important social determinant of health, is linked to challenges such as accessibility and social acceptability. Existing literature highlights the association between food insecurity and physical and emotional well-being. Multi-level theoretical frameworks offer insights into the multitude of socio-demographic factors related to food security status. Food insecurity challenges among rural communities characterize the widening gap of health disparities and inequities that set rural areas further behind their urban counterpart. The Emory Prevention Research Center is conducting an evaluation of *The Two Georgias Initiative* to understand the process of 11 community health coalitions in rural Georgia addressing health inequities, like food insecurity, through the initiative.

Objective/Aim: This study examines the relationship between food insecurity and perceptions of well-being among SNAP-enrolled recipients living in rural Georgia communities, as well as whether racial and gender membership moderate this relationship.

Methods: Secondary data analysis was conducted from a 2019 cross-sectional, baseline population-based mail survey from *The Two Georgias Initiative*. Restriction to SNAP participants and inclusion of eight of the 11 counties that completed food survey modules resulted in an analytic sample of N=286. Descriptive statistics were gathered for the overall sample, as well as for racial, gender, and intersectional subgroups. Bivariate, multivariable, and moderation analyses were also conducted to address the study aims.

Results: Most SNAP-enrolled individuals (87.4%) reported experiencing food insecurity in the past 12 months and respondents were on average more than somewhat satisfied when reporting well-being measures. Compared to food secure individuals (*FS*), those reporting food insecurity (*FI*) scored on average 1.89 and 1.63 points lower on general well-being and the eight-item composite scales, respectively (*FI vs. FS* general/single-item: 95% CI: (-2.87, -0.90), p= .0002; 8-item composite: 95% CI: (-2.44, -0.83), p< .0001). For every one unit increase in general well-being, the odds of food insecurity are 27.0% lower (95% CI: (0.61, 0.87); p= .0006); similarly, the odds of food insecurity are 35.7% lower (95% CI: (0.51, 0.81); p= .0003) for every one unit increase in the eight-item well-being composite score. A significant interaction was found between race and food insecurity in the model with the eight-item composite as the well-being outcome. Only associations among white respondents were statistically significant; food insecure white respondents reported lower well-being compared to their food secure counterpart.

Conclusion: A positive relationship, varying among racial groups, was demonstrated between food insecurity and lower well-being. Subgroups assessed in the study differentially experienced evidence-based protective and risk factors of food insecurity and well-being. Future research of stress and coping mechanisms, as well as intersectionality studies, is recommended.

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I would like to thank the Emory Prevention Research Center (EPRC) for granting me permission to access the data from *The Two Georgias Initiative*. I am especially grateful to April Hermstad, Lead Public Health Program Associate at the EPRC, for creating a dataset specific to my project and always answering any data-specific questions I had to better inform the data analysis process.

Importantly, I would like to honor my thesis committee members for their time investment, academic expertise, and professional guidance that has strengthened my development as a public health professional. My utmost respect and appreciation go to my thesis chair, Dr. Regine Haardörfer, for accepting and exceeding the role and responsibilities that accompany the title. In addition to her patience and accessibility, Dr. Haardörfer's methodological expertise informed data analysis decisions in this project and helped refine my quantitative skillset. Her mentorship was truly humbling and insightful. I would also like to thank my committee member and the director of the EPRC, Dr. Michelle Kegler, for her unwavering support demonstrated by her thorough feedback offered in thesis drafts, as well as the insights and resources shared to ensure that the present study was grounded in theory and conceptual perspectives.

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Lastly, a huge round of warm hugs goes to my family and friends for their unwavering love and support for me for every moment in life, and especially this year. I credit my success as a public health student to you. And to my partner, thank you for reminding me of my strength when I lose sight of it, and for exuding love in everything you have done for me.

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INTRODUCTION

Introduction and Rationale

Food insecurity, an ever-present national public health crisis, is defined by the United States Department of Agriculture (USDA) as "a lack of consistent access to enough food for an active, healthy life" (Gregory & Todd, 2021; United States Department of Agriculture, 2021). A positive relationship, both on unidirectional and bidirectional causal pathways, between food insecurity and negative emotional well-being results in exacerbated physical and mental health conditions among those who cannot afford or access healthy foods, such as fresh produce, whole grains, as well as lean proteins and dairy products (Bruening et al., 2017; Leung et al., 2015; Pak & Kim, 2020).

An examination of the multitude of socio-demographic factors related to food security status is critical in identifying vulnerable populations. The complexity of food insecurity challenges is not fully captured without embedding individual and interpersonal determinants in the food environment perspective, a holistic view illuminating systemic challenges at the community, organizational, and policy levels. Affordability, accessibility, and perceived quality of food systems are collective factors that contribute to health disparities among perpetually disadvantaged food insecure communities. Although field-specific terms, such as "food deserts" and "food swamps" have previously described communities' accessibility to affordable and nutritious foods, a more accurate and inclusive term, "food apartheid" is becoming widely used, given its utility in capturing the racial and class discrimination fueling structural inequities among food insecure communities (Cooper, 2017; Lu, 2020; Yakini, 2020). In addition to existing literature about food insecurity that focuses on the structural and social determinants of

race, income, and age, there is evidence suggesting gender , another social determinant, is significantly associated with food insecurity (Brady et al., 2021).

According to 2018 statistics, compared with their urban counterparts (10.8%), rural communities (12.7%) face greater rates of food insecurity (Coleman-Jensen et al., 2017; Haynes-Maslow et al., 2020). These greater rates of food insecurity contribute to higher rates of mortality, chronic disease, and obesity prevalence (Befort et al., 2012; Monnat & Beeler Pickett, 2011; Morton, 2004; Trivedi et al., 2015). The shift in food practices in rural America, from independently growing and preserving food on family farms to dependency on commercial food suppliers with a declining number of farms, is a product of changing demographics (Lloyd, 2019; Perdue & Hamer, 2019). In addition to some individuals' lack of awareness of existing community resources, a nutrient-depleted food landscape can influence dietary consumption, shopping patterns, and health status (Holston et al., 2020; Jackson et al., 2005).

The Supplemental Nutrition Assistance Program (SNAP) is the largest federal funded nutrition program in the United States that contributes to food security, economic security, improved nutritional status, and better overall health among individuals facing food insecurity (DeWitt et al., 2020; Lloyd, 2019). Research continues to reflect, however, both the differential and underutilization of SNAP services by eligible populations regarding race/ethnicity, marital status, and education (Meyers et al., 2001; Radcliff et al., 2018). Despite addressing food insecurity, SNAP participation continues to yield high rates of food insecurity because of environmental factors, including economic disparities; this has impacted SNAP recipients' ability to redeem their benefits for consistent nutrition nourishment (DeWitt et al., 2020; Rigby et al., 2012). Similarly, while SNAP may be considered a critical lifeline for many populations, challenges exist regarding program operations and policies.

SNAP serves as a "crucial stop-gap program" among food insecure, low-resource rural families (Haynes-Maslow et al., 2020). As such, a growing trend between rural residency, SNAP participation, and food insecurity has illuminated a persistent participation gap between SNAP eligible communities in rural versus urban neighborhoods (DeWitt et al., 2020; Rigby et al., 2012). Like general SNAP populations, rural SNAP recipients encounter barriers characterized by operational and structural factors, which exacerbate food security and result in differential program enrollment across the nation (Lloyd, 2019).

Problem Statement

Although the current food literature provides a rich contextualization of food insecurity issues that are commonly experienced by historically marginalized communities amidst a complex food environment, well-being is often operationalized using health-related quality of life (HRQOL) measures (Gholami et al., 2017; Hanmer et al., 2021; Kihlström et al., 2019). Specifically, there is a lack of studies measuring positive emotional health outcomes, highlighting the value in examining well-being on a satisfaction measure (Bruening et al., 2017). This study addresses the need to unveil other components of well-being, which includes general and more specific domains of satisfaction, to provide a greater holistic understanding of food insecure individuals utilizing food assistance benefits in rural settings. Additionally, while there is evidence supporting racial and gender differences regarding food insecurity experiences, existing literature has encouraged future investigations to examine the link between gender and food insecurity in rural environments (DeWitt et al., 2020). Similarly, racial disparities are ubiquitous and impact many facets of life for Americans, regardless of location. As a result, the present study aims to provide new insights by analyzing the intersectionality of gender- and race-based patterns that may vary the association between food insecurity and well-being outcomes

among rural SNAP participants. Acknowledgement of the impact of societal gendering and racializing on how individuals are categorized into constructed categories also frames this study.

Theoretical Frameworks

Figure 1 shows a summary theoretical framework with compiled theories that has informed the current study. Two main theoretical frameworks are used to enrich understanding of the multi-level scope of food insecurity as a public health issue: 1) the social-ecological model and 2) the "Double or Triple Jeopardy" framework. Analysis of the factors associated with food insecurity through a social-ecological lens not only emphasizes the interconnectedness between the individual, their relationships, and their built environments, but it also grounds the issue on systemic influences (Byker Shanks et al., 2020). Examination of the "Double or Triple Jeopardy" model offers another perspective with which food insecurity acts a risk factor for mortality and morbidity as well as a health outcome of harmful exposures (Gee & Payne-Sturges, 2004; Institute of Medicine, 1999; Morello-Frosch & Shenassa, 2006; Morello-Frosch et al., 2011; O'Neill et al., 2003; Smarr, 2020). Thus, theoretical constructs of the Social Cognitive Theory (e.g., attitudes, self-efficacy, and behaviors) and Theory of Planned Behavior (e.g., intentions) that are often utilized in food health promotion are contextualized in multi-level frameworks that account for unjust and racist systems. Social disorganization theories are also supported, as they describe the intersection between community structures of poverty and residential instability resulting in a non-sustainable healthy food environment (Bethea et al., 2012; Monnat & Beeler Pickett, 2011).

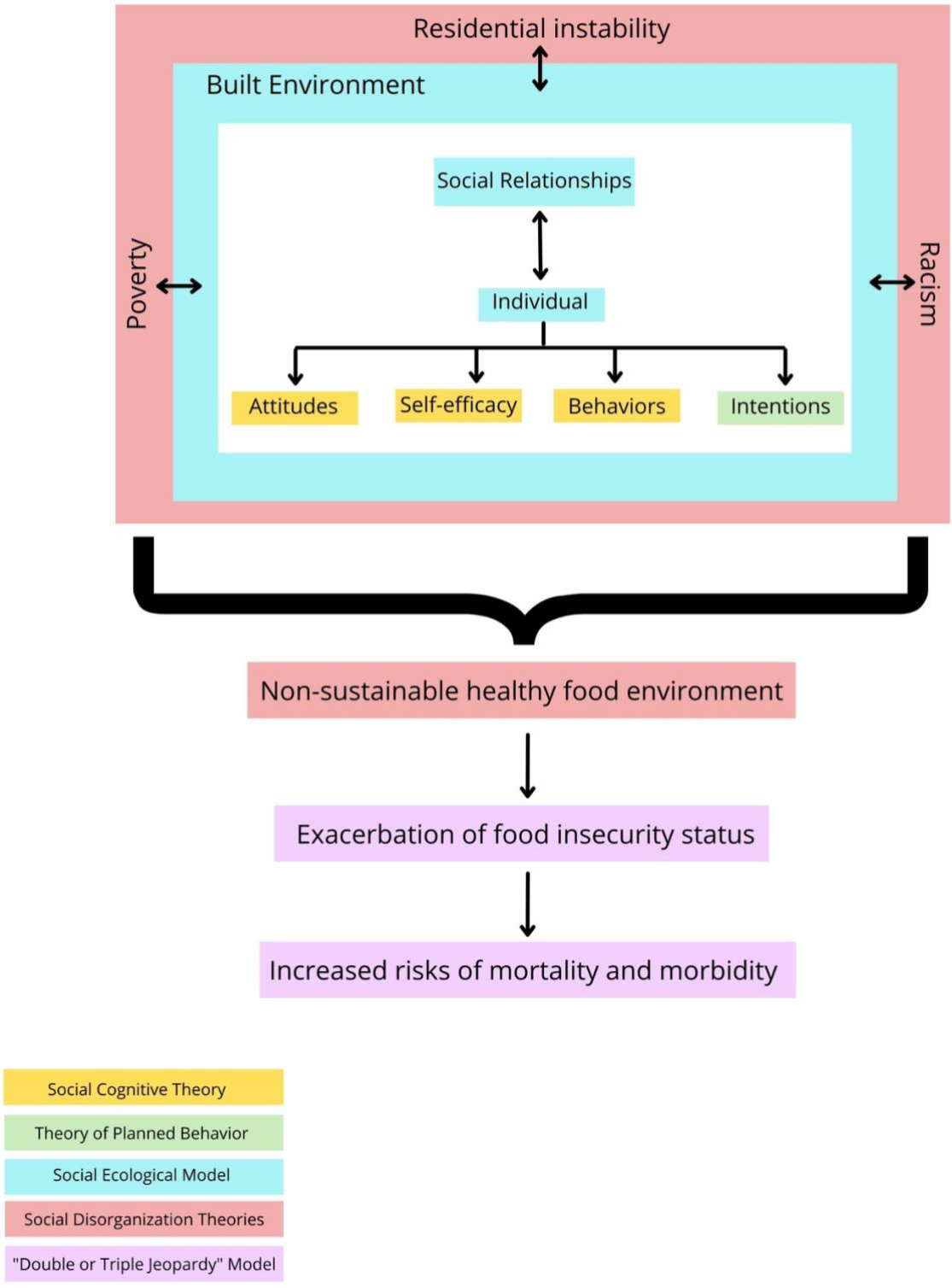

Figure 1. Theoretical models compiled together

Purpose Statement

The purpose of this study is to contribute to the mission and values of *The Two Georgias Initiative,* which strives to achieve greater health equity among rural populations, improve health and healthcare for rural Georgians, build healthier rural communities, improve social conditions that impact the health of rural populations, and build community, organizational, and individual leadership capacity in rural Georgia.

Research Question

This study aims to address the following research questions: (1) What is the relationship between food insecurity and perceptions of well-being among SNAP-enrolled recipients living in rural Georgia communities? (2) How does racial and gender membership moderate the relationship between food insecurity and well-being?

Significance Statement

The findings from this project may directly address the initiative's efforts to promote a healthier rural Georgia. Future investigations, development of health-equity programs, or policies may ensue to mitigate food insecurity and improve well-being among rural residents. By contextualizing current injustices of the food environment in rural Georgia, this study may also inform future directions in other rural communities across the United States regarding grant funding and policy endeavors that strive to achieve health equity.

Definition of Terms

The following definitions will be used when referring to field-specific terms throughout this report:

- A food desert is used to describe a low-income area without easy access to supermarkets or grocery stores that sell healthy foods (Wright, 2021).
- A food swamp refers to areas proliferated with fast food- and junk-food options, thereby resulting in an absence of fresh produce (Hager et al., 2017).
- The food apartheid is an emerging, highly complex term in the food systems literature. U.S. food activists posit that the term addresses the racial, class, and gender discrimination fueling structural inequities among food insecure communities (Kitch et al., 2021; Lu, 2020).
- Health-Related Quality of Life (HRQOL) measures individual or group perceptions of their physical and mental health over a period of time (Centers for Disease Control and Prevention (CDC), 2021).
- Supplemental Nutrition Assistance Program (SNAP) is the largest federal funded nutrition program in the nation that contributes to food security, economic security, improved nutritional status, and better overall health among individuals facing food insecurity (DeWitt et al., 2020; Lloyd, 2019).

LITERATURE REVIEW

Overview of Food Insecurity

Food insecurity, an ever-present public health crisis in the United States, is recognized as an important social determinant of health throughout the life course (Kihlström et al., 2019). According to the United States Department of Agriculture (USDA), food insecurity is defined as "a lack of consistent access to enough food for an active, healthy life" (Gregory & Todd, 2021; United States Department of Agriculture, 2021). In addition to accessibility, the term also highlights challenges of affordability, availability, social acceptability, and choice, indicating the multi-level influences present (Bickel et al., 2000; "Core indicators of nutritional state for difficult-to-sample populations," 1990). In 2020, an estimated 10.5% (13.8 million) of American households experienced food insecurity, with 3.9% (5.1 million) of households reporting very low food security; this was characterized by reduced food intake and disrupted eating patterns for at least one household member, resulting from limited funds and resources. Prevalence rates of household food insecurity and very low food security have declined, and trends have leveled out over recent years (Coleman-Jensen et al., 2021).

Food Insecurity and Guiding Theoretical Frameworks

An examination of the multitude of socio-demographic factors related to food security status is critical in identifying vulnerable populations. Marginalization of historically underserved communities is a product of unjust and racist systems; this can be better understood through critical analysis two theoretical frameworks: the social-ecological framework and the "Double or Triple Jeopardy" model.

The social-ecological model continuum (**Figure 2**) considers the interconnectedness between the individual, their relationships, the communities in which they live, work, and play, and the societal factors that have systemic influences (Byker Shanks et al., 2020). These are represented by five levels: 1) individual; 2) interpersonal; 3) organizational; 4) community; and 5) public policy.

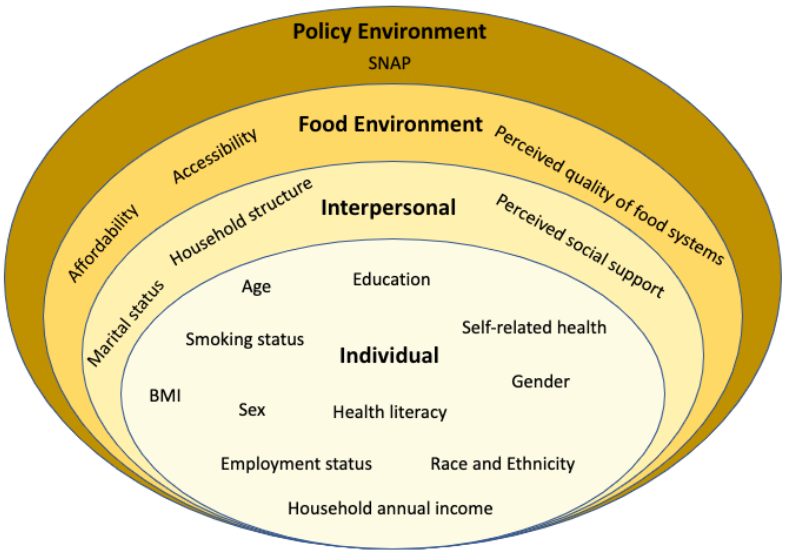

Figure 2. Factors associated with food insecurity on various levels of the social-ecological model

Individual characteristics related to food and nutrition security include age, sex and gender, race and ethnicity, education, employment status, and household annual income. Standard BMI categories, smoking status, health literacy, and self-rated health are also associated with food security status (Brady et al., 2021; De Marco et al., 2009; Gregory & Todd, 2021; Kihlström et al., 2019; Leung et al., 2015; Sharkey et al., 2011; Zhang et al., 2021).

Interpersonal forces at play with individual factors regarding food security include marital status, household structure (e.g., household size and number of children), and perceived social support and loneliness (Kihlström et al., 2019; Leung et al., 2015; Sharkey et al., 2011; Zhang et al., 2021). Social networks are significant in strengthening social capital, given that

friends and family members serve as primary sources for information about access to food (Byker Shanks et al., 2020; Holston et al., 2020).

The complexity of food insecurity as a public health issue in the United States is not fully captured without embedding individual and interpersonal determinants in the food environment perspective, a holistic view illuminating systemic challenges at the community, organizational, and policy levels. Theories of social disorganization describe the intersection between community structures of poverty and residential instability that result in poor health promoting infrastructure and inefficacy; this amounts to an unproductive cycle that does not foster a sustainable healthy food environment (Bethea et al., 2012; Monnat & Beeler Pickett, 2011). Existing literature commonly supports four main elements that impact individuals navigating their food environments: 1) affordability; 2) accessibility; and 3) perceived quality of food systems. These factors collectively contribute to health disparities and showcase perpetually disadvantaged food insecure communities.

Firstly, the food environment is defined by what is considered affordable (Davy et al., 2015; Lloyd, 2019; Sharkey et al., 2011). The financial ability to purchase food is a crucial predictor of household food insecurity (Zhang et al., 2021). Joint consideration of food accessibility and affordability is critical in understanding one's ability to purchase food accessible to them, given the vast differences of price and quality across neighborhood types. For example, in a study among Iowa's Medicaid expansion population, prevalent food insecurity rates were reported, thus providing evidence that financial needs for food determine healthy food consumption (Brady et al., 2021). Secondly, accessibility and mobility to food sources are household barriers to adopting healthier eating behaviors and acquiring food (Byker Shanks et al., 2020; Davy et al., 2015; Lloyd, 2019; Sharkey et al., 2011). Distinction between whether

food access is more individual or community-based is important when considering one's distance to food stores, reliable transportation and travel funds, and location of residence (Byker Shanks et al., 2020; Lloyd, 2019; Sharkey et al., 2011; Zhang et al., 2021). Accessibility is especially an issue for older food insecure adults experiencing negative health outcomes, as they may be affected by their ability to remain at home (Lloyd, 2019). Lastly, perceived quality of the community food environment increases risks for food insecurity and adverse health outcomes. The perceptions toward healthy food of individuals residing in disadvantaged, low-resource neighborhoods are influenced by both the variety and quality of food that is available to them. When food variety and quality are lacking, individuals may perceive these foods to be of lower quality than less healthy foods; thus, this may impact eating habits and decision-making around food choices (Sharkey et al., 2011). Individual eating behaviors and dietary norms are informed by the societal relevance of common, nutritious foods and perceived changes in the food supply over time. Thus, ethnic-specific groups are at odds with food environments that lack healthy and culturally appropriate foods (Byker Shanks et al., 2020; Lloyd, 2019; Sharkey et al., 2011). This is especially relevant among Native American populations that experience a variety of individual and community health inequities, as evidenced by their high diet-related non-communicable disease rates (Byker Shanks et al., 2020). To address these challenges of food environment perceptions, some communities turn to alternative food sources, which include purchasing prepared food from neighbors or friends, as well as mobile food vendors and flea markets. However, study findings demonstrating lower utilization of alternative food sources among food insecure households compared to their food secure counterparts reflects barriers in affordability, neighborhood variation, and limited social capital. As a result, food insecure individuals may

prefer reciprocity-based food acquisition systems, which provide food at no cost (Sharkey et al., 2011).

Emerging from the environmental health discipline, the "Double or Triple Jeopardy" framework supplements the theoretical mechanisms identified in the social-ecological model to describe how adverse health effects of environmental hazards stem from individual- and community-based levels (Gee & Payne-Sturges, 2004; Institute of Medicine, 1999; Morello-Frosch & Shenassa, 2006; Morello-Frosch et al., 2011; O'Neill et al., 2003; Smarr, 2020). According to the model (**Figure 3**), differences in environmental hazard exposures among various racial and socioeconomic groups perpetuate social inequality issues, which amplify negative health risks. Thus, there are social and ecological underpinnings leading to widening health disparities of certain diseases (Smarr, 2020). As reflected in the model, relationships between disparities in environmental exposures, social vulnerability, and biological susceptibility demonstrate how food insecurity is positioned as a risk factor for mortality and morbidity as well as a health outcome of harmful exposures. Like the social-ecological model, utilization of the "Double or Triple Jeopardy" paradigm draws potential connections between mechanisms like race/racism, gender roles, underlying health conditions, and harmful living situations to better understand the complexities of food insecurity.

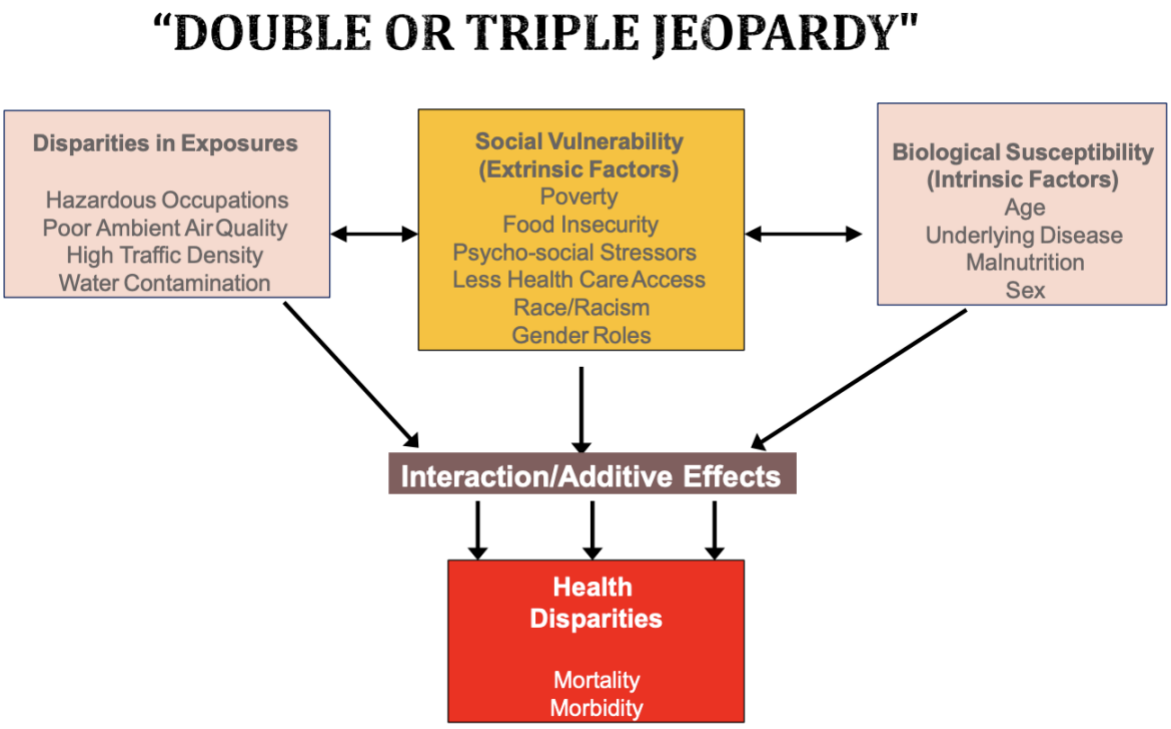

Figure 3. Contextualizing food insecurity in an interconnected web of risk factors and outcomes (Gee & Payne-Sturges, 2004; Institute of Medicine, 1999; Morello-Frosch & Shenassa, 2006; Morello-Frosch et al., 2011; O'Neill et al., 2003; Smarr, 2020)

Relationship Between Food Insecurity Status and Well-Being

Existing literature highlights the association between food insecurity and physical and emotional well-being on the individual level (Bruening et al., 2017; Hanmer et al., 2021; Lloyd, 2019). Self-health assessments demonstrate food insecure individuals' poor perceptions of their physical and mental health status (Pak & Kim, 2020). Health indicators such as obesity/high body mass index (BMI) and poor dietary intake commonly result in greater risks of prevalent diet-related chronic diseases, like diabetes, hypertension, and cardiometabolic risk (Byker Shanks et al., 2020; Davy et al., 2015; Rivera et al., 2019; Scott et al., 2020). This seeming contradiction of food insecurity and obesity, an issue well-established in high income countries, broadens the scope of problems experienced by food insecure individuals, in which nutrient adequacy is equally critical as the amount of food consumed. As such, a study investigating

HRQOL among an older adult population found that food insecure individuals had a higher likelihood of reporting more than 14 physically unhealthy days and activity limitations (Kihlström et al., 2019). These health outcomes reflect a negative effect of food insecurity on overall physical well-being.

Furthermore, there is a positive relationship, both on unidirectional and bidirectional causal pathways, between negative emotional well-being and food insecurity over time that exacerbates physical health conditions (Bruening et al., 2017; Leung et al., 2015; Pak & Kim, 2020). Depressive symptoms commonly reported by low and very low food secure adults include: 1) experiencing feelings of hopelessness, depression, stress, and anxiety; 2) having trouble sleeping or oversleeping; and 3) lacking energy and feeling tired (Bruening et al., 2017; Leung et al., 2015). Consequently, food insecurity is associated with high, avoidable healthcare expenditures at an organizational and policy level (Berkowitz et al., 2017).

As evidenced by discussions focused on food insecure communities, HRQOL is commonly utilized to measure well-being; however, there are other emotional health terms that are useful (Bruening et al., 2017; Gholami et al., 2017; Hanmer et al., 2021; Kihlström et al., 2019). In a systematic review examining food insecurity and emotional health in the US, researchers discovered a lack of studies measuring positive emotional health outcomes, including happiness, satisfaction, or contentment (Bruening et al., 2017). This gap in the literature will be later discussed when presenting the current study's purpose.

Food Insecurity and the "Food Apartheid"

Field-specific terms, like "food deserts" and "food swamps" are commonly used in food systems literature to describe communities' accessibility to affordable and nutritious foods. Flip sides of the same coin, a food desert census tract is "a low-income tract where a substantial

number or substantial share of residents does not have easy access to a supermarket or large grocery store," while a food swamp is a spatial metaphor characterizing fast food- and junk-food dense neighborhoods with limited healthy food options (Hager et al., 2017; Wright, 2021). Such language to describe the American food system has raised recent concern over its problematic and limiting implications when describing the nation's food insecurity challenges. In a digital video, Detroit food activist Malik Yakini identified four issues of using "food desert" in the food arena. The term "food desert": 1) portrays a bleak neighborhood, which further marginalizes vulnerable communities; 2) falsely assumes a sparse food environment, while the reality is that there is high concentration of convenience and corner stores; 3) uses harmful language not used by residents; and 4) dismisses the intentionality of "public policy and economic practices [that] have created these areas that have low access to foods" (Yakini, 2020).

Instead, the term "food apartheid" has recently emerged as a more accurate and inclusive way of capturing the racial, class, and gender discrimination fueling structural inequities among food insecure communities (Kitch et al., 2021; Lu, 2020). Although drawing away from its original context, utilization of this term in the food systems context aims to continue the dialogue of how power differentials have historically played a negative role in society, rather than invalidate the magnitude of such a problematic atrocity. From the era of government-sanctioned slavery on plantations to current marginalized, low-income, and low-resource neighborhoods, communities of color are continually being economically and socially oppressed. Moreover, the intersectionality of race, gender, and class leaves powerless communities voiceless amidst societal views on traditional roles and expectations. Access to healthy food, while seemingly trivial, is a core determinant of one's health; whether someone has the ability, affordability, and choice to obtain healthy options is a product of discriminatory and classist systemic forces at

which they are always at odds. Additionally, use of the term yields many nuances and complexities, as it contradicts the earlier claim positing the lack of use of the term "food desert" by community residents. This may be similarly true for "food apartheid," in which this term may not be internally used by affected communities. However, it is likely that residents may agree with some of the core concepts of what the term stands for. U.S. food activist Dara Cooper (Cooper, 2017) defines the "food apartheid" as "a blatantly discriminatory corporate controlled food system that results in [communities of color] suffering from some of the highest rates of heart disease and diabetes of all time". Moreover, the term is also characterized by "the systematic destruction of black self-determination to control [their] food" as well as the "hyper-saturation of destructive foods and predatory marketing" (Cooper, 2017). As a reflection of inequitable systems perpetuated by racism and gender disparities, both race and gender will be further analyzed in this study to assess whether there is a difference in the impact of food insecurity on well-being based on racial and gender categories.

Food Insecurity Prevalence in Rural Communities

As evidenced thus far, there is differential risk and impact of food insecurity that have contributed to health inequities, particularly in rural communities. According to 2018 statistics, compared with their urban counterparts (10.8%), rural communities (12.7%) face greater rates of food insecurity (Coleman-Jensen et al., 2017; Haynes-Maslow et al., 2020). Moreover, differences in socioeconomic status between rural and urban America exacerbate health inequities, and thereby contribute to an endless cycle characterized by disparities (Harnack et al., 2019). As a result, rural communities are burdened by higher rates of mortality, chronic disease, and obesity prevalence (Befort et al., 2012; Monnat & Beeler Pickett, 2011; Morton, 2004; Trivedi et al., 2015). The widening gap between nutritional need and nutritional resources

experienced by low-income, food insecure rural residents results in a decreased likelihood to meet daily dietary recommendations and worsened HRQOL measures (Befort et al., 2012; Gholami et al., 2017; Sharkey et al., 2011; Trivedi et al., 2015). Specifically, many rural low-income, older adults, who are not self-sufficient in growing and preserving their own food, suffer from food insecurity that has adverse outcomes on their health, functionality, healthcare costs, and overall quality of life. Older women, African Americans and Native Americans residing in rural areas are particularly vulnerable; this highlights the intersectionality of risk factors contributing to food insecurity (Lloyd, 2019).

The shift in food practices in rural America, from independently growing and preserving food on family farms to dependency on commercial food suppliers with a declining number of farms, is a product of changing demographics, as a result of industrialization which drew working individuals from rural to urban areas (Lloyd, 2019; Perdue & Hamer, 2019). As discussed in the previous section, the social-ecological model can be used as a guiding framework to understand and address the complex role of social and natural environments on food security status (Byker Shanks et al., 2020; Holston et al., 2020; Rivera et al., 2018). In addition to some individuals' lack of awareness of existing community resources, a nutrient-depleted food landscape can influence dietary consumption, shopping patterns, and health status (Holston et al., 2020; Jackson et al., 2005). For example, a study documenting the retail food environment's influence on household food supply and consumption among Texas border colonia households found that despite frequent purchasing behaviors at supermarkets or dollar stores, spatial accessibility and utilization of convenience stores greatly reflect household nutrient availability (Sharkey et al., 2013). These results significantly contribute to the literature on rural health, given that colonias are limited-resource rural communities lacking adequate and

safe living conditions within the US-Mexico border region (HUD Exchange, n.d.; Sharkey et al., 2011; Sharkey et al., 2013).

In addition to existing literature about food insecurity that focuses on structural and social determinants (e.g., race, income, and age), there is evidence suggesting gender is significantly associated with food insecurity (Brady et al., 2021). Studies examining gender patterns regarding food insecurity have demonstrated females being more likely to report being food insecure; in comparison to male-headed households, female-headed households were more vulnerable to food insecurity (Pak & Kim, 2020; Zhang et al., 2021). Additionally, a qualitative study conducting interviews with rural food insecure caregivers reported a disproportionate number of female participants (Haynes-Maslow et al., 2020). While this may indicate a gender difference evident in rural settings, it is possible that the study sample was impacted by the tendency for women to participate in studies more than men, or by the increased likelihood for women to work as caregivers. Traditional gender roles suggest that females, especially in rural settings, commonly assume house/caretaker roles in the private sphere, which may reflect frequent food preparation and purchasing behaviors for their household (Reiheld, 2014). With females serving as gatekeepers of food consumption for households, experiences of food insecurity may be detrimental to their physical health, as evidenced by the existing positive relationship between food insecurity and high BMI prevalent among low-income women (Adams et al., 2003; Jilcott et al., 2011; Jones & Frongillo, 2006; Townsend et al., 2001). As with race, the role of gender will be further analyzed in this study to measure whether there is a difference in the impact of food insecurity on well-being among males and females.

Benefits of the Supplemental Nutrition Assistance Program (SNAP)

Although existing food security literature offers various perspectives on communities most at risk for food insecurity, commonly marginalized groups are perpetually impacted. When compared to food secure adults, those facing food insecurity are more likely to be non-white, be a current smoker, have lower educational attainment, and participate in the Supplemental Nutrition Assistance Program (SNAP), one type of food and nutrition assistance program (Leung et al., 2015). This differs from another finding that households of white and other races are more likely to be in the food insecurity categories compared to black households, suggesting that racism, classism, and other institutional stigmas may contribute to health disparities (Zhang et al., 2021). A study conducted among Mexican-origin households in rural colonias along the Texas-Mexico border explored the socioeconomic disadvantages of participants (78%) experiencing food insecurity at the level of household, adult, or child (Sharkey et al., 2011). Respondents reported high unemployment rates and single-parent households, as well as low household income and food assistance program participation rates. Current literature has linked participation in federal and community food and nutrition assistance programs to food insecurity and describes both positive and negative implications faced by enrolled individuals (Kihlström et al., 2019; Sharkey et al., 2011).

SNAP is the largest federal funded nutrition program in the United States that contributes to food security, economic security, improved nutritional status, and better overall health among individuals facing food insecurity (DeWitt et al., 2020; Lloyd, 2019). Formerly known as food stamps, the electronic benefits transfer (EBT) system was established in 2004, allowing enrolled SNAP recipients to make purchases at EBT-accepting outlets with a debit card (Hingle et al., 2020; Rivera et al., 2019). The program's original mission was to help communities navigate

through difficult times during the Great Depression when excess crop supply from American farms was distributed to hunger relief agencies across the nation (Lloyd, 2019; SNAP To Health!, n.d.). Yet today, SNAP is widely used with the goal to reduce food insecurity for those who lack adequate funds for healthy, nutritious foods and helps free up money to allocate toward other essentials (Byker Shanks et al., 2020; Lloyd, 2019). The nutrition promotion component of SNAP, referred as the Supplemental Nutrition Assistance Program-Education (SNAP-Ed), aims to improve dietary intake and reduce food insecurity through nutrition education among low-income U.S. populations (Rivera et al., 2019). SNAP-Ed has delivered effective state-wide multi-level diet and physical activity interventions utilizing the social-ecological framework and health behavior change theories, such as the Social Cognitive Theory (Rivera et al., 2018; Rivera et al., 2019). Therefore, theoretical constructs that are central to the Social Cognitive Theory (e.g., attitudes, self-efficacy, and behaviors) and Theory of Planned Behavior (e.g., intentions) are notable drivers of improving diet quality and time management (Beatty et al., 2014; Rivera et al., 2019).

Participation in federal food assistance programs, specifically SNAP and SNAP-Ed, are generally associated with reduced severity of food insecurity (De Marco et al., 2009; Rivera et al., 2018; Rivera et al., 2019; Sharkey et al., 2011). However, reports have raised concerns of downward bias in estimates of food insecurity prevalence measures, and thus bias perceptions of SNAP efficacy (Gregory & Todd, 2021; Sharkey et al., 2011). Nonetheless published findings about food assistance programs demonstrate SNAP's positive impact on family health and physical well-being (Ettinger de Cuba et al., 2019; Pak & Kim, 2020). Additionally, SNAP serves as a protective factor against adverse mental health conditions, like depression (De Marco et al., 2009; Leung et al., 2015). Furthermore, SNAP participation is associated with lower

organizational healthcare expenditures; off-loading food budgets with welfare benefits promotes disease self-management through medication purchases, reduced stress, and lower cognitive load (Berkowitz et al., 2017; Seligman & Schillinger, 2010).

While food insecure and food secure households differ by a variety of socio-demographic measures, both SNAP nonparticipants and participants are characterized similarly (Zhang et al., 2021). This demonstrates that food insecure, SNAP-eligible populations may share similar socio-demographic backgrounds. As an example, in a sample of rural residents eligible to receive at least one food assistance program, there were predominately black and female participants (Holston et al., 2020). Similarly, certain subpopulations are more likely to enroll in SNAP. However, there is a distinction between eligibility and enrollment of assistance, where the former is dependent on demographic measures and policy environments, while the latter may be motivated by individual choice and stigmatization of utilizing food assistance. It is noteworthy to highlight how existing literature about food assistance programs and populations who utilize services oftentimes lack clarity in differentiating eligibility and enrollment status. In an evaluation that offered SNAP application assistance and assessed the characteristics of SNAP-eligible individuals who either accepted or rejected application support, when compared to their white counterparts, African Americans were more likely to be interested in receiving this assistance, while eligible Native Americans/Alaska Natives were more likely to enroll in SNAP (Kelly et al., 2020). Additionally, eligible African Americans are proportionally more likely to be enrolled in SNAP compared to their white and Hispanic racial and ethnic counterparts (Radcliff et al., 2018). In the same study, eligible males were 40% more likely to be interested in receiving assistance to apply for SNAP benefits compared to females, yet there was no significant gender difference in enrollment likelihood (Kelly et al., 2020). Other studies,

however, have reported contrary results where females were proportionally more likely to use SNAP compared to males (Berkowitz et al., 2017; Pak & Kim, 2020). Furthermore, previous findings demonstrating a stronger effect of SNAP participation on food insecurity for females reflect the connection between gender and food insecurity, especially among rural populations (DeWitt et al., 2020).

There is some inconsistency among existing literature regarding specific age groups that are more likely to use SNAP, where some findings report younger SNAP recipients (<24 years old) while others report older populations (>40 years old) as likely SNAP users (Berkowitz et al., 2017; Kelly et al., 2020; Radcliff et al., 2018). This observance may be based on differences in study scope (e.g., state versus national), as well as differences in measuring and scaling age as a variable (e.g., continuous versus categorical). On the contrary, there is supporting evidence that individual characteristics, such as low income, disability, high school diploma or lower, or use of public insurance or no insurance, are related to greater likelihood of receiving assistance (Berkowitz et al., 2017; Radcliff et al., 2018; Rigby et al., 2012). Studies have also found that unmarried individuals, as well as rural residents, were more likely to use SNAP services (Kelly et al., 2020; Radcliff et al., 2018).

Challenges of SNAP

Recent shifts in SNAP participation alter the food welfare landscape. For example, it has been well-established up until a couple years ago that eligible rural elderly populations and populations with limited English proficiency were less likely to enroll in SNAP (Hingle et al., 2020; Rank & Hirschl, 1993; Smith et al., 2017). Despite evolving patterns, however, research continues to reflect both the differential and underutilization of SNAP services by eligible populations regarding race/ethnicity, marital status, and education (Meyers et al., 2001; Radcliff

et al., 2018). Furthermore, deterrents to SNAP participation include age, work hours and household income, college education, as well as being a marital household (Radcliff et al., 2018; Zhang et al., 2021). A study examining the associations between neighborhood characteristics of racial composition, income, and rurality with the distribution of SNAP-accepting stores provided evidence of structural mechanisms (e.g., lack of supermarkets) that manifest into disparities in distribution of SNAP-accepting stores, and thus availability and affordability of healthy foods (Rigby et al., 2012).

Thus, despite addressing food insecurity, SNAP participation continues to yield high rates of food insecurity because of environmental factors, including economic disparities; this has impacted SNAP recipients' ability to redeem their benefits for consistent nutrition nourishment (DeWitt et al., 2020; Rigby et al., 2012). In a study conducted within a SNAP-eligible and low-income, highly obese rural Appalachian community, SNAP participants were twice as likely to report food insecurity compared to their SNAP-eligible nonparticipant counterparts, thus illuminating the compounded intricacies of the food environment (DeWitt et al., 2020). Raising SNAP benefits in an effort to reduce food insecurity in children yielded a null finding regarding children food insecurity and other food insecurity measures (Chojnacki et al., 2021). Furthermore, previous studies measuring the effectiveness of SNAP and other food-assistance benefits on ameliorating food insecurity among children, adults, and households suggested differential effects (e.g., harmful and protective) on certain groups, where food insecure categories for specific groups saw improvement at the expense of other populations' food insecurity status (Burke et al., 2021; Zhang et al., 2021). Specifically, one study reported that SNAP participation reduced food insecurity among adults, but increased the likelihood of low and very low food security among children (Zhang et al., 2021). On the other hand, a school-

based nutrition assistance program saw decreased levels of the most severe form of child food insecurity, but increased levels of less severe forms of food insecurity among children, adults, and households (Burke et al., 2021).

SNAP operations and policies also impede program participation and alleviation of food insecurity. Firstly, SNAP recipients with an increased income experience subsequent economic hardships due to SNAP benefits reductions; with welfare cutoffs, budgets previously reserved for housing and health/dental care are allocated towards food spending (Ettinger de Cuba et al., 2019; Haynes-Maslow et al., 2020). In addition to perceived reductions in monthly SNAP benefits as disproportional to wage increases, SNAP participants have reported inadequate monthly allotment to feed their families and expressed concern and confusion about stretching food dollars and monthly credit, respectively (Haynes-Maslow et al., 2020). As such, existing literature reporting the positive association between BMI and food insecurity has noted the negative health implications of lower SNAP benefit amounts (Jilcott et al., 2011). In addition to competing priorities, non-financial factors such as transportation and administrative procedures not only specifically deter at-risk, food insecure elderly populations from participating in SNAP, but also impact their perceived HRQOL (Kihlström et al., 2019; Zhang et al., 2021). For both married and single households, time allocated to household meal procurement has a significant association with SNAP participation; while food preparation time differs among household type, both cohorts spend less time eating if they are food insecure or receiving SNAP benefits (Beatty et al., 2014). This demonstrates that while SNAP may be considered a critical lifeline for many populations, challenges exist within the larger system. In a study that examined the perceptions of SNAP among rural, food insecure residents, poor customer service and a long application process were identified as two primary barriers to participation (Haynes-Maslow et al., 2020).

Furthermore, stigma and negative self-attitudes associated with SNAP participation have the potential to offset the program's psychological well-being benefits (Pak & Kim, 2020). In addition to perceived stress being linked to food insecurity, SNAP participation continues to yield unhealthy food consumption behaviors due to low health guidance (Davy et al., 2015; Jilcott et al., 2011). A study conducted in 2015 measuring food insecurity and depression among SNAP participants and SNAP-eligible nonparticipants found that program enrollment modifies this relationship with a protective effect (Leung et al., 2015). A more recent study has contributed to existing literature, highlighting findings that there are no differences for the association between food insecurity and depressive symptoms when considering different SNAP enrollment statuses (Pak & Kim, 2020).

SNAP Participation in Rural Communities

A growing trend between rural residency, SNAP participation, and food insecurity has illuminated a persistent participation gap between SNAP eligible communities in rural versus urban neighborhoods (DeWitt et al., 2020; Rigby et al., 2012). Specifically, in a 2016 study examining factors contributing to SNAP utilization at farmers markets, findings revealed a two- to three-fold increase of weekly SNAP sales and transactions in rural areas compared to their metropolitan counterparts (Food and Nutrition Service, 2019; Food Research & Action Center, 2018; Freedman et al., 2019).

Existing literature investigating the role of SNAP on rural households has demonstrated the program's positive impact on alleviating food insecurity. A "crucial stop-gap program," SNAP serves as a key resource for food insecure, low-resource rural families by providing food dollars that increase access to healthier foods (Haynes-Maslow et al., 2020). In addition to addressing hunger and nutrient deficiencies, accessibility and proximity of SNAP retailers in

large, rural areas is associated with reduced child maltreatment report rates and well-being (Bullinger et al., 2021). Despite improving food insecurity regardless of location type, expansion of SNAP-Ed in rural areas has the potential to reduce the rural-urban gap by supporting food access and reducing food insecurity prevalence measures (Rivera et al., 2018).

Rural SNAP recipients encounter similar barriers experienced by general SNAP populations, which exacerbate food security. Specifically, price gouging, food quality, and transportation are factors that negatively impact already food insecure SNAP recipients (Holston et al., 2020). To counteract the lack of store choices with affordable prices and better quality, individuals practice outshopping methods by acquiring foods other than at grocery stores (Holston et al., 2020). Such inefficiency not only worsens the food security issue, but it may also compromise other components of an individual's well-being.

As discussed, there are low SNAP participation rates among eligible older adults compared to other eligible groups (Lloyd, 2019). Despite the surge of SNAP participation in U.S. rural communities, rural states in the South and Southwest have a lower proportion of enrolled older adults, while the Pacific Northwest and New England regions yield the highest proportion of enrollment (Lloyd, 2019). This provides evidence that weakened structural components of SNAP, ranging from less developed public benefit programs and enrollment mechanisms to low funding, act as barriers for vulnerable populations, those of whom experience adversity in the face of exploitation. Furthermore, low-income rural residents, either SNAP-enrolled or SNAP-eligible nonparticipants, may face isolation from lacking SNAP-related resources and stigmatization in their communities that do not prioritize their needs (Bullinger et al., 2021). Thus, in the face of institutional privilege, enrollment in food assistance is limited in its effectiveness, which may discourage SNAP recipients and eligible non-recipients from

participating in food assistance programs. There are exceptions: a study observing the relationship between neighborhood characteristics and the distribution of SNAP-accepting retailers in Leon County, Florida reflected a higher proportion of stores in black, low-income, and rural communities compared to their counterparts (Rigby et al., 2012). Overall, however, urban counties, compared with rural counties, are reported to have a significantly greater number of SNAP-authorized stores, thereby furthering widening the health gap for rural America (Rivera et al., 2018).

Current Problem/Study Relevance

Existing research on food security and food systems provides a solid framework and promising direction for new studies that build the field. While previous studies have extensively contextualized food insecurity issues using theoretical mechanisms to address health disparities among vulnerable populations, well-being is a construct that is less explored due to its elusive nature and focus on HRQOL measures. To address this gap in the literature, the present quantitative study applies household-level data to examine the relationship between food insecurity and perceptions of well-being, utilizing satisfaction measures, among SNAP-enrolled recipients living in rural Georgia communities. Additionally, differences in the effect of food insecurity on well-being by race and gender will be assessed, given that there is evidence supporting racial and gender differences regarding food insecurity experiences. Prioritization of this intersectional lens may contribute to existing food security research that has encouraged future investigations to examine the link, particularly in rural settings, between gender and food insecurity (DeWitt et al., 2020). Likewise, racial disparities are prevalent among the social determinants of health, including food insecurity. Overall, the present study aims to provide new insights into gender- and race-based patterns regarding food insecurity and well-being among

rural SNAP recipients in the state of Georgia. A conceptual framework was created to clearly represent the research aims (**Figure 4**). The focal variables consist of the main relationship under examination, gender, race/ethnicity, and the intersection of both as potential moderators of this hypothesized relationship, and demographic and food environment characteristics as covariates considered in this study.

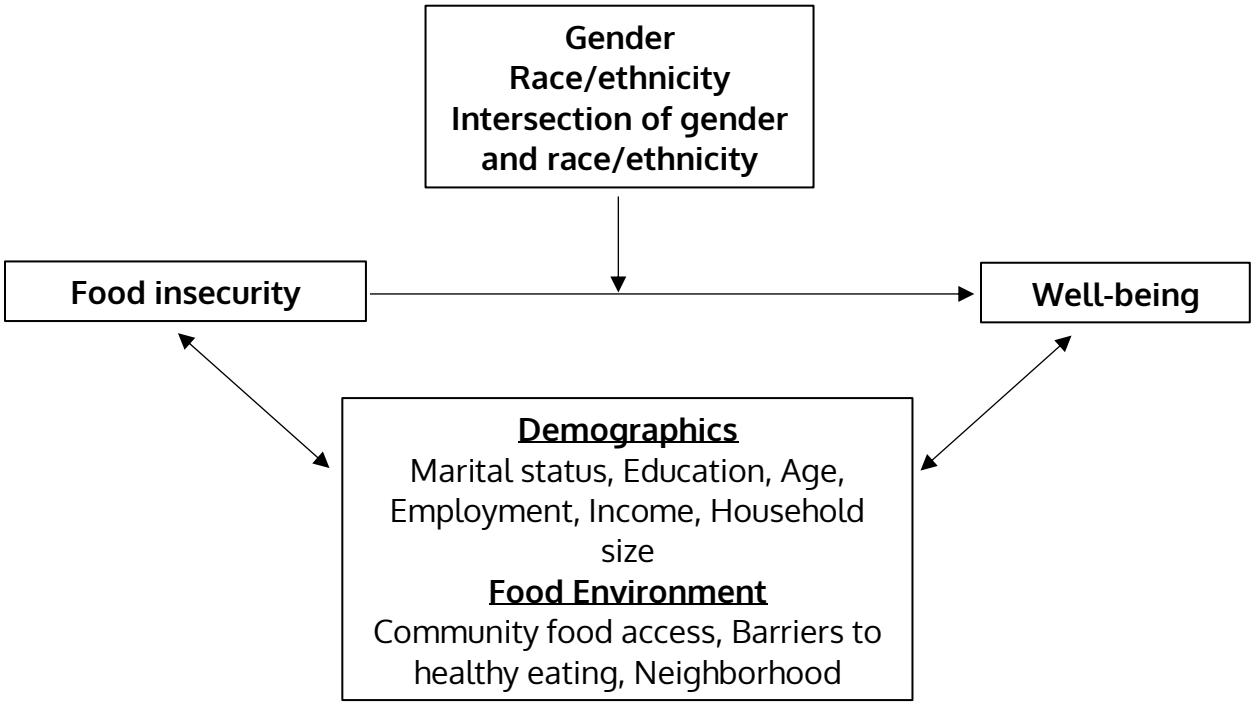

Figure 4. Conceptual framework representing the main study aims

METHODOLOGY

Introduction

In Spring 2021, I reached out to a faculty member at the Department of Behavioral, Social, and Health Education Sciences (BSHES) at Emory University's Rollins School of Public Health to share my research interests and inquire about potential opportunities to pursue a masters-level thesis. As a team researcher on an evaluation of the Healthcare Georgia Foundation's *Two Georgias Initiative*, she referred me to her colleagues on the project, Dr. Michelle Kegler and Dr. Regine Haardörfer, director and lead statistician of the Emory Prevention Research Center (EPRC), respectively. *The Two Georgias Initiative* is a place-based grantmaking initiative developed and funded by the Healthcare Georgia Foundation in 2017 with the mission to achieve greater health equity among rural Georgians through the elimination of health inequities and reduction of the rural-urban divide. There was an opportunity to utilize a 2019 cross-sectional community-based survey for my thesis project. Under the guidance of my thesis committee (Committee Chair: Dr. Haardörfer; Committee Member: Dr. Kegler), I conceptualized this secondary data quantitative study by identifying a research question to drive the methodology and data analysis process. All writing and figure/table development are my own, unless otherwise explicitly stated.

Background of *The Two Georgias Initiative*

The Two Georgias Initiative was developed and funded in 2017 by Healthcare Georgia Foundation, a statewide charitable organization with a vision of health equity within the state. The Foundation's five stated goals of the initiative are: 1) to achieve greater health equity among rural populations; 2) improve health and healthcare for rural Georgians; 3) build healthier rural

communities; 4) improve social conditions that impact health of rural populations; and 5) build community, organizational, and individual leadership capacity in rural Georgia.

The initiative had three phases over a five-year funding period, during which individual Coalitions in rural Georgia participated. Phase one consisted of a planning year when Coalitions conducted a community health needs assessment and developed a Community Health Improvement Plan (CHIP) as well as an evaluation plan to address health equity in their respective communities. During Phase two, the second through fourth years, each Coalition implemented and evaluated their CHIP. Coalitions implemented a sustainability plan and transitioned to sustainable funding in the third and final phase during year five. Throughout the initiative, each Coalition received up to $100,000 per year and technical assistance and support from a designated community coach, an external evaluation team, and a team of equity experts.

The Foundation funded 11 Community Health Coalitions in rural Georgia counties, totaling 195,471 individuals, or 1.9% of the state's population (US Census, 2019). Coalitions were encouraged to embrace local autonomy, broad community engagement, and evidence and innovation in identifying locally appropriate strategies. While coalition efforts were wide-ranging, some common priority areas included increasing food access and food security, as well as improving eating behaviors. The EPRC is conducting this initiative evaluation to understand the process of coalitions addressing health inequities through the initiative and what outcomes result from these efforts.

Data Collection Procedures: Study Design, Participants, and Recruitment

This study uses cross-sectional data from a 2019 baseline population-based mail survey, which explored behaviors and environments related to common coalition priority areas in rural Georgia. Thus, secondary data analysis was conducted. Adults living in a household receiving

the mail survey were identified as being eligible to participate. The Emory Institutional Review Board (IRB) determined that this study was a non-research program evaluation and thus did not require IRB approval. Commercial lists of randomly selected residential mailing addresses in each coalition county were purchased and used to identify households for the sampling frame. The evaluation team initially set a target sample size of 2,750 total completed surveys and assumed that they would have a 20% response rate based on publicly available response rates of national mail and phone surveys. Baseline surveys were mailed in waves between December 2018 and June 2019 to a total of 11,406 randomly selected households across the 11 coalition counties (**Figure 5**).

Each survey mailing included an introductory letter describing the study and project incentive, along with a copy of the survey and a stamped return envelope. To maximize our response rate, over a one-month period, each household first received an initial survey mailing, followed by a postcard reminder about the survey, and a second survey mailing, depending on how quickly completed surveys were returned. A total of 2,788 individuals completed the survey (24.4% response rate). For this survey, we defined a complete survey as one with at least 50% of questions answered. The time commitment for this study was approximately 15 minutes. Participants who returned a completed survey received a $15 gift card.

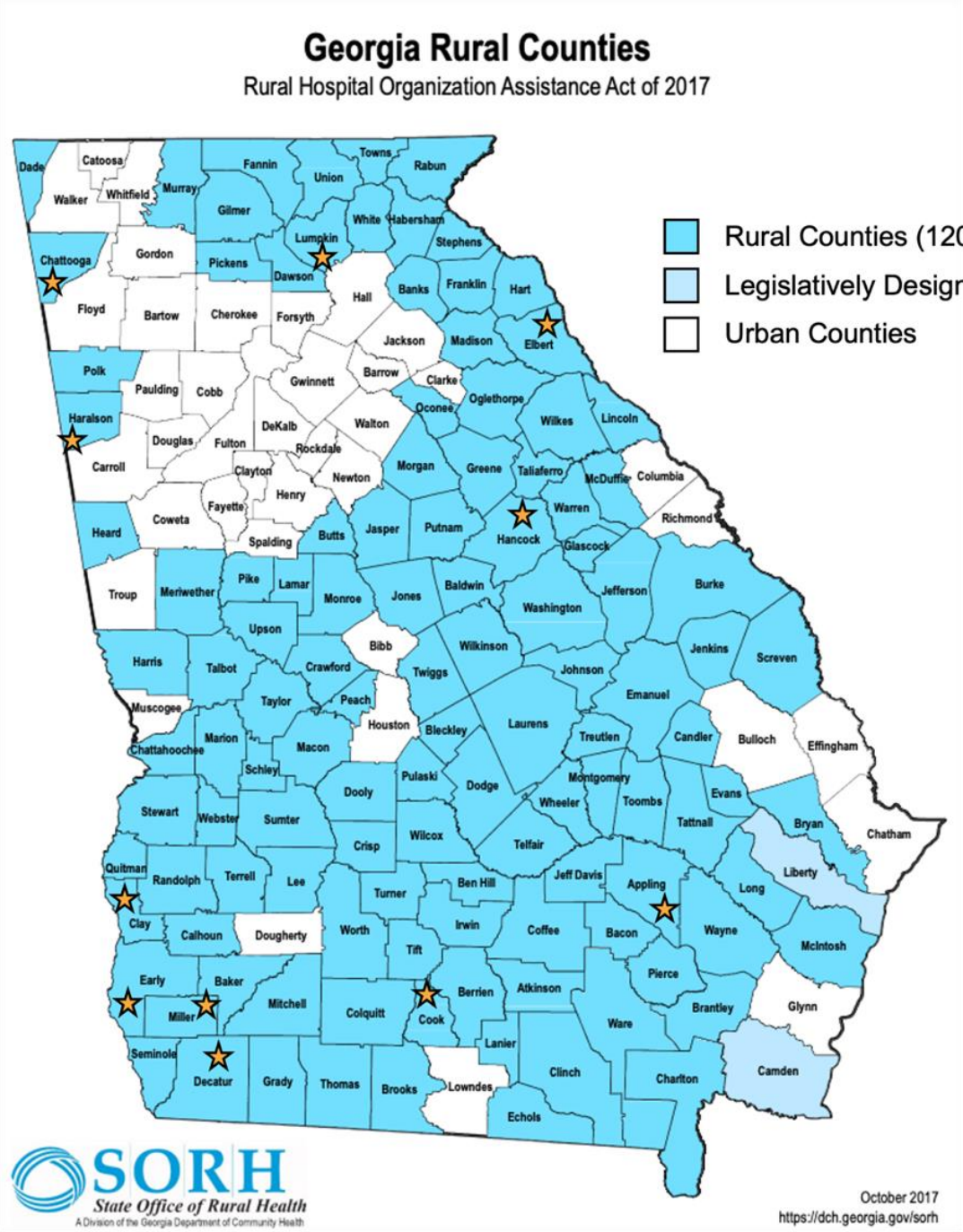

Figure 5. A map of the 11 rural coalitions participating in *The Two Georgias Initiative (*State Office of Rural Health (SORH), 2017)

Measures

Supplemental Food Assistance Program (SNAP) Participation

One item was used to assess benefits/assistance received. Participants were asked to choose all that applied from a list of programs: SNAP; TANF; Medicaid; Medicare; Disability, unemployment, child support or alimony; Other public assistance. Non-recipients indicated their status with the Not Applicable option. Given the current study's focus on SNAP, responses for the SNAP answer choice were examined (coded: 0 (not enrolled in SNAP); 1 (enrolled in SNAP)).

Focal Variables

Well-being

The well-being construct was assessed using the Personal Wellbeing Index (PWI) (International Wellbeing Group, 2013). Participants were asked to rate their level of satisfaction on nine levels; specifically, their life as a whole and eight specific life domains: standard of living, personal health, achieving in life, personal relationships, personal safety, community-connectedness, future security, and spirituality or religion. The rating scale ranged from 0 (no satisfaction at all) to 10 (complete satisfaction). For the current study, all nine items in this measure were used to measure well-being as the outcome. For analysis, the eight specific life domain items were averaged and scored separately from general life satisfaction.

Food insecurity

The food insecurity construct as the exposure/focal variable was measured using two items that have demonstrated adequate validity (Gundersen et al., 2017). There were two statements requesting that participants indicate how often in the past 12 months the following situations affected them: I worried whether my food would run out before I got money to buy

more; The food that I bought just didn't last and I didn't have money to get more. There were three response options: never; sometimes; often. Those who reported never to both survey items were coded as food secure, while participants providing affirmative responses to either item were considered food insecure.

Potential Moderators

Gender

Along with the benefits/assistance measure described above, gender was adapted from the Behavioral Risk Factor Surveillance System (Centers for Disease Control and Prevention (CDC), 2017) or the U.S. Census Bureau's American Communities Survey (U. S. Census Bureau, 2015). There were two possible choices to select, female or male, indicating its binary nature.

Race/ethnicity

The survey item gathering information about individual race/ethnicity was also adapted from the Behavioral Risk Factor Surveillance System (Centers for Disease Control and Prevention (CDC), 2017) or the U.S. Census Bureau's American Communities Survey (U. S. Census Bureau, 2015). Participants were prompted to identify their race or ethnicity from the following list: White, not of Hispanic origin; African American or Black, not of Hispanic origin; Hispanic; More than one race; Other, please specify. While these options may reflect how individuals self-identify, racial categories are socially constructed and thus there is an external influence to conform to societal norms. For example, Latinidad has been racialized. As demonstrated in the data, populations in the counties from which the data are gathered reflect predominately black and white races, with little representation from other races and ethnicities, which justifies a focus on these two races.

Intersectional gender and racial groups

Although not explicitly measured in the survey, respondents' combined gender and race/ethnicity identities were examined in the analysis phase, given that identities are not one-dimensional and are influenced by many facets of one's background and experiences. There were four intersectionality subgroups: white females, black females, white males, and black males.

Demographic Covariates

In addition to items for gender and race/ethnicity, questions documenting individual and household characteristics such as age, marital status, employment status, educational attainment, household income, and household size were adapted from the Behavioral Risk Factor Surveillance System (Centers for Disease Control and Prevention (CDC), 2017) or the U.S. Census Bureau's American Communities Survey (U. S. Census Bureau, 2015). Respondents were prompted to provide information regarding their age and household size through write-in responses. They also indicated their marital status from the following: Married; Not Married, living with a partner; In a relationship, not living together; Separated; Divorced; Widowed; Single. Employment status was indicated by selecting the most appropriate choice: Working, full time; Working, part-time; Retired; Not employed/Homemaker/Student/On disability; Other, please specify. Survey choices to measure educational attainment were: 8th grade or less; Some high school; High school or GED certificate; Some college or technical school; College graduate; Post-graduate or professional degree. Respondents indicated their total yearly household or family income from all sources by selecting choices ranging from $10,000 or less to more than $75,000; a survey option to opt out of providing this information was provided. For analyses, employment status categories were recoded as a two-level variable organized by currently working versus not working. Similarly, marital status was recoded to represent co-

habitancy with a partner. Educational attainment categories were also combined and recoded for conciseness. For parts of the analyses, household income was recoded to accommodate issues of small subgroups. Lastly, household size accounted for outliers within the dataset.

Food Environment Covariates

Community food access

Six items, using a 5-point opinion scale ranging from strongly disagree to strongly agree, were adapted from Green and Glanz (2015) to measure agreement with the following statements regarding the foods in participants' communities: It is easy to get fresh fruits and vegetables; The fresh fruits and vegetables are of high quality; The fresh fruits and vegetables cost too much; There is a large selection of fresh fruits and vegetables; It is easy to buy good quality meats and dairy; There is a large selection of good quality meats and dairy. Complexity of food access is evidenced by the diverse topics (e.g., food quality, affordability, and availability) encapsulated by this measure. A food accessibility score for each observation was computed by reverse coding negative items and calculating an average of the survey items.

Barriers to healthy eating

Seven items, each on a scale ranging from Never/rarely to very often (coded 0 to 3), measured participants' perceptions of the frequency of main barriers related to healthy eating. These were adapted from the Waltham Healthy Food Access Survey (Waltham, 2015). Participants selected how frequently they experienced the following barriers: Access to fresh fruits and vegetables; Cost of fresh fruits and vegetables; Convenience/no time to cook; Limited cooking skills; Not being sure what foods are healthy; Limited access to transportation; Cultural tradition. While this barrier question complements the Community Food Access measure, these are distinct constructs.

Neighborhood

Assessment of the type of neighborhood (the area within about a 20-minute walk from participants' homes): In town; In the country or rural area with neighbors close by; In the country or rural area with very few neighbors close by reported information describing rurality, a key construct of the present study. The survey item was adapted from the Behavioral Risk Factor Surveillance System (Centers for Disease Control and Prevention (CDC), 2017) or the U.S. Census Bureau's American Communities Survey (U. S. Census Bureau, 2015).

Data Analysis Methodology

I began the data analysis process by cleaning the data (e.g., recoding variables), restricting the data, and investigating the missingness of the data.

Although 11 coalition counties participated in the survey, for this current study, the analytic sample was reduced to the eight counties that opted to include both the Food Access and Food Security and the Healthy Eating modules. Only responses from participants from these eight counties with complete data on the two food insecurity items were included (**Table 1**). Additionally, after restricting the sample to SNAP participants to reflect the research aims, the final study sample consisted of 286 SNAP-enrolled individuals, with a majority identifying as female (75.9%) (**Table 2**). There was a relatively equal distribution of white (47.6%) and black individuals (46.5%). The breakdown of the intersectionality of gender and race was influenced by missingness in the data, primarily of racial and ethnic identities. Overall, there were 108 white females, 102 black

	Food Security & Access	Healthy Eating
Appling	276	276
Chattooga	299	299
Cook	253	253
Clay	205	205
Decatur	251	251
Early		184
Elbert	232	232
Hancock	242	242
Haralson	303	303
Lumpkin	333	
Miller		
	2394	2245

Table 1. Completed modules by county

females, 28 white males, and 29 black males in the analytic sample (**Table 3**). Those not identifying as white or black, totaling 9 individuals, were not included in the analysis.

Data cleaning and subsequent descriptive, bivariate, and multivariable analyses were conducted using SAS 9.4. Descriptive analyses (e.g., means, standard deviation, and frequency distributions) were conducted for all variables of interest to examine characteristics of study households. Specifically, prevalence calculations for key variables across the sample as well as subgroups were calculated. For example, food insecurity patterns were assessed for the overall sample, as well as across gender, race, and combined gender and race subgroups (**Tables 2 & 3**).

Bivariate relationships between potential moderators (e.g., race, gender, and the race and gender intersectional identities) and key variables (e.g., focal variables, demographic covariates, and food environment covariates) were assessed using appropriate statistical tests (e.g., independent t-tests and chi-square tests). Other bivariate relationships between key variables of interest and food insecurity and well-being, both focal variables, were assessed using simple logistic and linear regressions, respectively. All regressions, bivariate and multivariable, were cluster adjusted at the county level through indicator variables.

In addition to the conceptual framework informing the study, a directed acyclic graph (DAG) guided the modeling strategy by informing which covariates were confounders and effect measure modifiers based on existing literature (**Figure 6**). Confounders included: barriers to healthy eating; marital status; community food access; household income; educational attainment; household size; age; rurality/neighborhood; and employment status. Gender, race/ethnicity, and the intersection of both were tested as effect measure modifiers. Potential variation of the relationship between food insecurity and well-being by race/ethnicity reflected the mechanism of racism in this study, as the challenge of food insecurity is contextualized in a

racist built environment. Moderation analysis also assessed the evidence of statistically significant interactions between food insecurity and the potential effect measure modifiers, as described by the DAG. This was completed by determining whether the product term of each exposure-outcome relationship was statistically significant. Furthermore, multivariable statistics were used to examine relationships between food-related and well-being variables. The final model consisted only of one of the well-being variables, specifically the eight-item well-being composite, given that a statistically significant interaction was found between race and food insecurity in the model with the eight-item composite as the well-being outcome.

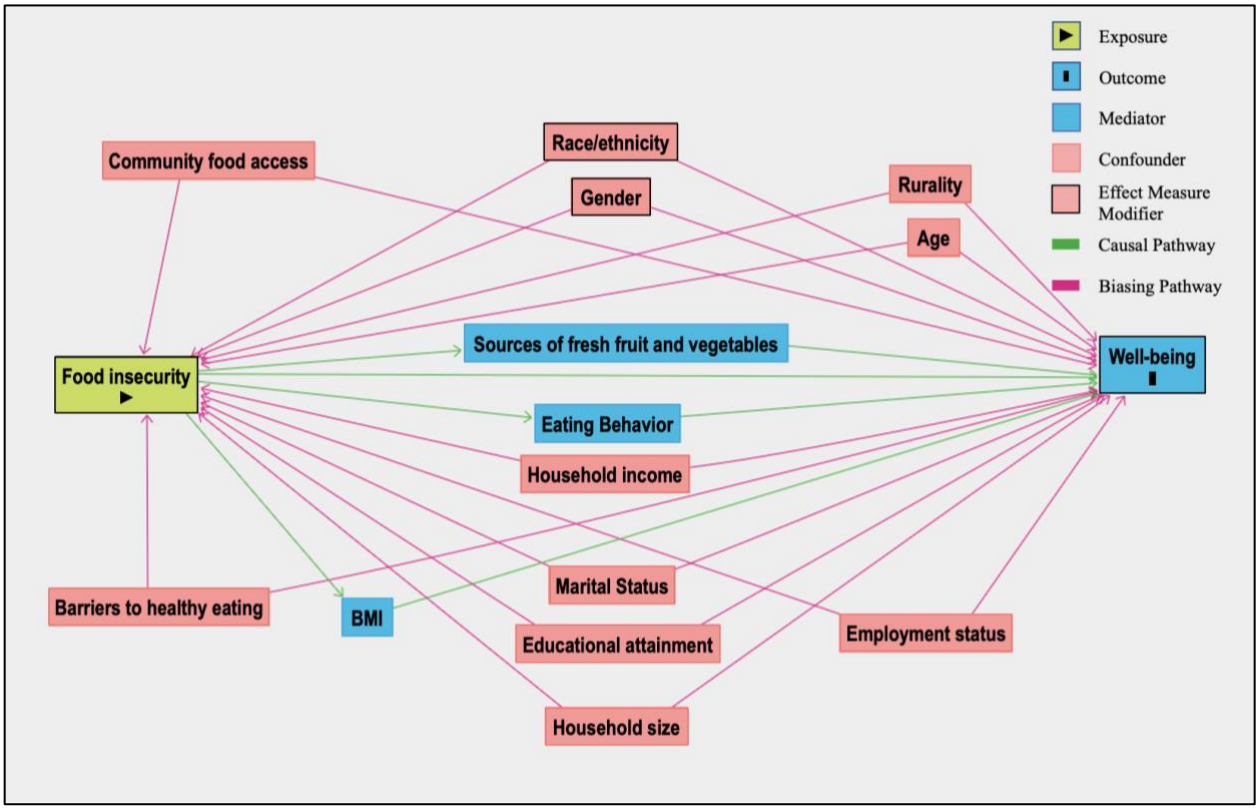

Figure 6. DAG informing modeling decisions of the present study created in DAGitty v3.0

RESULTS

Descriptive Statistics

In the following sections, descriptive statistics and comparisons among the overall sample as well as subgroups will be presented for the variables of interest in the current study. These subgroups include racial, gender, and the intersectional racial and gender categories. Variables are organized into three distinct groups: 1) focal variables (e.g., well-being and food insecurity); 2) demographic covariates (e.g., age, marital status, employment status, highest educational attainment, total yearly household income, and household size); and 3) food environment covariates (e.g., community food access; barriers to healthy eating; and neighborhood type). Presentation of these key findings is consistent with the label categories from the conceptual framework.

Focal Variables

Well-Being

Reported levels ranged from zero to ten for general well-being, and one to ten for the eight-item composite of more specific areas indicative of well-being. For both well-being measures, the overall sample reported average scores above 5 (general/single item: M=6.54, SD= 2.77; eight-item composite: M=6.48, SD=2.20), indicating respondents were on average more than somewhat satisfied (**Table 2**). Compared to males, females reported lower eight-item composite well-being scores on average (M=6.30, SD=2.30, p= .01). Similarly, white individuals (*W*) had lower average well-being scores than black individuals (*W* general/single item: M=6.11, SD=2.83, p= .004; *W* eight-item composite: M=6.07, SD=2.34, p= .001). Across the race/gender intersectionality groups, white females (*WF*) demonstrated the lowest average well-being scores for both general well-being and the eight-item well-being composite (*WF* general/single item:

M=5.85, SD=2.84, p= .004; *WF* eight-item composite: M=5.79, SD=2.41, p= .0003) (**Table 3**). In contrast, compared to other racial and gender groups, black females (*BF*) and black males (*BM*) reported the highest average general well-being score and eight-item composite well-being score, respectively (*BF* general/single item: M=7.15, SD=2.61, p= .004; *BM* eight-item composite: M=7.39, SD=1.42, p= .0003). The association between general well-being and gender was not statistically significant (**Table 2**).

Food Insecurity

Most SNAP-enrolled individuals (87.4%) reported experiencing food insecurity in the past 12 months (**Table 2**). Gender-, racial-, and cross-classified-specific strata demonstrated disproportionate patterns of food insecurity. Although none of the associations between food security and gender, race, or gender and race were statistically significant due to insufficient power, there were meaningful differences. For example, females (87.6%) and white individuals (88.2%) were more likely to report food insecurity compared to males (86.4%) and black individuals (85.7%), respectively. White males (89.3%) were proportionately more likely to report food insecurity status than other combined gender and racial groups (**Table 3**). Similar proportions of white females (88.0%) and black females (86.3%) were food insecure when looking across intersectionality subgroups. Although the least likely to report food insecurity compared to other groups, most black males (82.8%) were food insecure.

Demographic Covariates

Age

The average age of the sample was 58.07 (SD=16.50) years, with females averaging younger ages compared to their gender counterpart (M=56.67 years, SD=17.16, p= .007) (**Table 2**). As such, when looking across race and gender intersectional groups, white females averaged

56.46 (SD=16.78) years, while the average age of black males was 65.04 (SD=10.28) years (p= .047) (**Table 3**). Race was not statistically significantly associated with age (**Table 2**).

Marital Status

Among overall respondents, there was a fair distribution of individuals reporting being married (20.1%), divorced (20.1%), widowed (19.8%), and single (23.7%), with remaining respondents as not married but living with a partner (6.5%), in a relationship but not living together (3.2%), or separated (6.5%) (**Table 2**). Assuming marital status reflected cohabitation, most of the overall sample did not live with a partner (73.4%) compared to those who did (26.6%). This general pattern was evident among gender- and race-specific strata, although white individuals (*W*) were proportionally more likely to reside with a partner compared to black respondents (*B*) (*W*: 36.0%; *B*: 16.5%; p= .0003). Across combined race and gender groups, only 12.7% of black females reported living with a partner, while 42.9% of white males indicated either being married or living with a partner (p= .0006) (**Table 3**). Chi-square tests conducted to assess potential relationships between marital status and strata-specific groups demonstrated a non-statistically significant association between marital status and gender (**Table 2**).

Employment Status

Many respondents in the sample reported either being retired (37.7%) or not employed (45.2%), with remaining responses as working full-time (7.9%) and working part-time (9.1%) (**Table 2**). For purposeful analysis, employment status was categorized into two groups—employed and not employed. Strata-specific patterns (e.g., gender, race, and combined race and gender groups) were similar to trends characterized by high unemployment observed in the overall sample. Specifically, white individuals (*W*) were proportionally more likely to report unemployment status compared to black respondents (*B*) (*W*: 90.8%; *B*: 76.6%; p= .003). When

considering the intersectionality of gender and race, however, 92.8% of white females were not employed, while 72.9% of black females reported unemployment (p= .002) (**Table 3**). Interestingly, black males (*BM*) were more likely to be unemployed compared to white males (*WM*) (*BM*: 88.5%; *WM*: 82.6%; p= .002). Chi-square and Fisher's exact tests were conducted; gender was not statistically significantly associated with employment status (**Table 2**).

Highest Educational Attainment

Highest educational attainment was measured with four categories: some high school or less; high school or GED certificate; some college or technical school; college and above. In the overall sample, nearly 40% of respondents reported high school or GED certificate as their highest educational attainment, with less than 10% earning a college and/or post-graduate degree (**Table 2**). Associations between highest educational attainment and gender, race, as well as combined gender and race subgroups were not statistically significant.

Total Yearly Household Income

Total yearly household income was organized into three levels: less than $20,000; between $20,001 and $50,000; greater than $50,000. Among the SNAP-enrolled sample, individuals (87.8%) predominately reported annual household earnings less than $20,000 (**Table 2**). This overall income distribution was similar across gender- and race-specific strata, in which most respondents reported earning less than $20,000, while the proportion of those exceeding $50,000 per year was less than 2%. Associations between total yearly household income and gender, race, and the cross-classified gender and race variable were all not statistically significant; these were measured by conducting Fisher's exact tests (**Tables 2 & 3**).

Household Size

The average household size among the overall sample was 2.23 (SD: 1.14) individuals, including the survey respondent (**Table 2**). Compared to males (*M*), female respondents (*F*) reported a higher average household size (*M*: M=1.73, SD= 0.98; *F*: M=2.37, SD=1.50; p= .003). Additionally, among the cross-classified groups, white females reported the largest average household size (M=2.45, SD=1.53), while black males reported the lowest average (M=1.67, SD=0.92) (**Table 3**). The relationship between household size and race had a p-value above the pre-determined alpha level of 0.05 (**Table 2**).

Food Environment Covariates

Community Food Access

The average composite score of the overall sample was 2.10 (SD=0.88), which reflected relatively neutral responses (range: strongly disagree (0) to strongly agree (4)) (**Table 2**). White individuals (*W*) had higher average composites compared to their racial counterpart (*B*) (*W*: M=2.27, SD=0.81; *B*: M=1.93, SD=0.93; p= .003). Across intersectional racial and gender groups, on average, white males (*WM*) reported the highest agreement of accessibility and quality of foods, while black females (*BF*) reported the lowest agreement (*WM*: M=2.55, SD=0.55; *BF*: M=1.90, SD=0.93; p= .004) (**Table 3**). Gender was not statistically significantly associated with community food access (**Table 2**).

Table 2: Characteristics of Study Population in Percentage, Stratified by Gender and Race ‡

	Overall SNAP-enrolled (N=286)	Female only (N=217)	Male only (N=59)	White only (N=136)	African American or Black only (N=133)	Gender P-value	Race P-value
Well-being score (mean (SD))							
General	6.54 (2.77)	6.50 (2.78)	6.67 (2.75)	6.11 (2.83)	7.08 (2.56)	.68[A]	.004[A]
8 item composite	6.48 (2.20)	6.30 (2.30)	7.19 (1.59)	6.07 (2.34)	6.99 (1.99)	.01[A]	.001[A]
Food Security Status (%)						.82[C]	.54[C]
Food Insecure	87.4	87.6	86.4	88.2	85.7		
Community Food Access (mean (SD))	2.10 (0.88)	2.07 (0.90)	2.27 (0.85)	2.27 (0.81)	1.93 (0.93)	.16[A]	.003[A]
Barriers to Healthy Eating (mean (SD))	0.93 (0.58)	0.95 (0.59)	0.84 (0.58)	0.81 (0.55)	1.07 (0.60)	.25[A]	.0008[A]
Age (mean (SD))	58.07 (16.50)	56.67 (17.16)	63.31 (13.10)	57.68 (16.42)	59.22 (16.33)	.007[A]	.44[A]
Marital Status (%)						.08*[C]	.0003*[C]
Married	20.1	17.6	30.5	27.9	12.0		
Not married, living with a partner	6.5	6.5	5.1	8.1	4.5		
In a relationship, not living together	3.2	2.8	5.1	1.5	3.8		
Separated	6.5	6.0	8.5	4.4	9.0		
Divorced	20.1	21.8	15.3	26.5	14.3		
Widowed	19.8	23.2	8.5	20.6	19.6		
Single	23.7	22.2	27.1	11.0	36.8		
Employment Status (%)						.46*[C]	.003*[C]
Working, full-time	7.9	7.5	9.8	4.2	11.3		
Working, part-time	9.1	10.6	3.9	5.0	12.1		
Retired	37.7	32.7	56.9	41.7	33.9		
Not employed	45.2	49.3	29.4	49.2	42.7		
Highest Educational Attainment (%)						.33[C]	.10[C]
Some high school or less	26.0	25.0	29.3	25.0	27.3		
High school or GED certificate	39.2	37.5	44.8	36.0	42.4		
Some college or technical school	26.7	28.2	22.4	33.1	20.5		
College and above	8.2	9.3	3.5	5.9	9.9		

Total Yearly Household/Family Income (%)						.60[D]	.61[D]
<$20,000	87.8	88.1	85.2	85.5	89.7		
$20,001-$50,000	11.1	10.9	13.0	12.9	9.5		
>$50,000	1.2	1.0	1.9	1.6	0.9		
Neighborhood (%)						.78[C]	.15[C]
In town	40.9	40.9	39.0	33.8	45.0		
In the country or rural area with neighbors close by	41.6	42.7	40.7	47.8	37.2		
In the country or rural area with very few neighbors close by	17.4	16.4	20.3	18.4	17.8		
Household Size (mean (SD))	2.22 (1.14)	2.37 (1.50)	1.73 (0.98)	2.33 (1.46)	2.14 (1.41)	.003[A]	.28[A]

‡ Values may not sum to the total due to missing data; * Variable categories were collapsed when conducting chi-square tests; [A] t-test; [B] ANOVA; [C] Chi-square; [D] Fisher's

Table 3: Characteristics of Study Population in Percentage, Stratified by Combined Gender and Race ‡

	White Female only (N=108)	African American or Black Female only (N=102)	White Male only (N=28)	African American or Black Male only (N=29)	Gender & Race P-value
Well-being score (mean (SD))					
General	5.85 (2.84)	7.15 (2.61)	7.11 (2.61)	6.71 (2.39)	.004[A]
8 item composite	5.79 (2.41)	6.85 (2.12)	7.12 (1.70)	7.39 (1.42)	.0003[A]
Food Security Status (%)					.89[C]
Food Insecure	88.0	86.3	89.3	82.8	
Community Food Access (mean (SD))	2.19 (0.86)	1.90 (0.93)	2.55 (0.55)	2.04 (0.96)	.004[A]
Barriers to Healthy Eating (mean (SD))	0.82 (0.53)	1.13 (0.61)	0.79 (0.63)	0.85 (0.54)	.002[A]
Age (mean (SD))	56.46 (16.78)	57.66 (17.49)	62.39 (14.28)	65.04 (10.28)	.047[A]
Marital Status (%)					.0006*[B]
Married	25.0	8.8	39.3	24.1	
Not married, living with a partner	9.3	3.9	3.6	6.9	
In a relationship, not living together	0.9	4.9	3.6	0.00	
Separated	5.6	6.9	0.0	17.2	
Divorced	28.7	14.7	17.9	13.8	
Widowed	22.2	24.5	14.3	3.5	
Single	8.3	36.3	21.43	34.5	
Employment Status (%)					.002[C]
Working, full-time	3.1	11.5	8.7	11.5	
Working, part-time	4.1	15.6	8.7	0.0	
Retired	37.1	28.1	60.9	53.9	
Not employed	55.7	44.8	21.7	34.6	
Highest Educational Attainment (%)					.18[B]
Some high school or less	24.1	26.7	28.6	31.0	
High school or GED certificate	36.1	38.6	35.7	55.2	
Some college or technical school	34.3	22.8	28.6	13.8	
College and above	5.6	11.9	7.1	0.0	

Total Yearly Household/Family Income (%)					.62[C]
<$20,000	85.7	91.0	84.6	84.6	
$20,001-$50,000	13.3	7.9	11.5	15.4	
>$50,000	1.0	1.1	3.9	0.0	
Neighborhood (%)					.55[B]
In town	35.2	43.9	28.6	48.3	
In the country or rural area with neighbors close by	48.2	38.8	46.4	34.5	
In the country or rural area with very few neighbors close by	16.7	17.4	25.0	17.2	
Household Size (mean (SD))	2.45 (1.53)	2.26 (1.50)	1.85 (1.06)	1.67 (0.92)	.03[A]

‡ Values may not sum to the total due to missing data; * Variable categories were collapsed when conducting chi-square tests; [A] ANOVA; [B] Chi-square; [C] Fisher's

Barriers to Healthy Eating

The overall sample reported an average composite of 0.93 (SD=0.58), demonstrating barriers to healthy options were experienced occasionally, on average (range: never/rarely (0) to very often (3)) (**Table 2**). Compared to white individuals, on average, black respondents reported higher frequencies of experiencing barriers (M=1.07, SD=0.60, p= .0008). Furthermore, black females (*BF*) reported the highest frequency of experiencing barriers to healthy eating compared to white males (*WM*), who reported the lowest frequency among cross-classified gender and racial strata (*BF*: M=1.13, SD=0.61; *WM*: M=0.79, SD=0.63; p= .002) (**Table 3**). The association between barriers to healthy eating and gender was not statistically significant (**Table 2**).

Neighborhood

Neighborhood type was categorized into three groupings: in town; in the country or rural area with neighbors close by; in the country or rural area with very few neighbors close by. In the overall sample, there were relatively equal proportions of those residing in town areas (40.9%) and in country/rural areas with neighbors nearby (41.6%), while the remaining 17.4% of respondents reported living in the country or rural area with very few neighbors close by (**Table 2**). Chi-square test results reflected all associations between neighborhood type and gender, race, and gender and race subgroups as not statistically significant (**Tables 2 & 3**).

Associations Between Well-Being and Variables of Interest

Comparisons between variables of interest and well-being, including their statistical significance, were assessed, as shown in **Table 4**. County-level cluster adjusted simple linear regressions showed that compared to food secure individuals (*FS*), those reporting food insecurity (*FI*) scored on average 1.89 and 1.63 points lower on general well-being and the eight-

item composite scales, respectively (*FI vs. FS* general/single-item: 95% CI: (-2.87, -0.90), p= .0002; 8-item composite: 95% CI: (-2.44, -0.83), p< .0001). This indicated that being food insecure was a risk factor for lower well-being for this particular sample. When examining the bivariate relationship between well-being and moderators, compared to white males (*WM*), white females (*WF*) reported on average 1.40 and 1.52 points lower on general well-being and the eight-item composite scales, respectively (*WF vs. WM* general/single-item: 95% CI: (-2.52, -0.28), p= .02; 8-item composite: 95% CI: (-2.44, -0.59), p= .001). This finding highlighted implications of mechanisms like racism and sexism, especially on an intersectional lens. Age, a demographic covariate, demonstrated a statistically significant effect with only the eight-item well-being composite, in that for every one-year increase in age, we would expect the eight-item composite score to increase by 0.02 units (95% CI: (0.001, 0.03), p= .03). Thus, increased age had a protective effect on reported eight-item composite scores. Regarding associations between well-being and food environment covariates, for every one unit increase in food accessibility, general well-being and the eight-item composite score increased by 1.10 and 1.25 units, respectively (general/single-item: 95% CI: (0.70, 1.50), p< .0001; 8-item composite: 95% CI: (0.94, 1.56), p<.0001). Additionally, compared to respondents residing in town areas, those living in the country or rural area with neighbors close by reported 0.76 points higher for general well-being (*Country with neighbors vs. Town* 95% CI: (0.04, 1.49), p= .04). Both of these food environment covariates had protective effects on at least one well-being measure. Estimates for other variables of interest did not demonstrate statistical significance.

Table 4: Effect Sizes of Bivariate Associations Between Well-Being Scores and Variables of Interest‡

Variables of Interest		Well-Being Score			
		General Well-Being		8-Item Composite	
		Estimate (95% CI)	P-value	Estimate (95% CI)	P-value
Food Security Status	Food Insecure	-1.89 (-2.87, -0.90)	.0002	-1.63 (-2.44, -0.83)	<.0001
	Food Secure (ref.)	0		0	
Community Food Access		1.10 (0.70, 1.50)	<.0001	1.25 (0.94, 1.56)	<.0001
Barriers to Healthy Eating		-0.49 (-1.1, 0.13)	.12	-0.36 (-0.90, 0.18)	.19
Gender & Race	White Female	-1.40 (-2.52, -0.28)	.015	-1.52 (-2.44, -0.59)	.001
	Black Female	0.16 (-1.00, 1.32)	.79	-0.15 (-1.10, 0.80)	.75
	Black Male	-0.27 (-1.72, 1.18)	.72	0.34 (-0.86, 1.54)	.58
	White Male (ref.)	0		0	
Age		0.01 (-0.01, 0.03)	.32	0.02 (0.001, 0.03)	.03
Marital Status	Not living together	0.05 (-0.72, 0.81)	.90	-0.06 (-0.69, 0.57)	.85
	Living together (ref.)	0		0	
Employment Status	Not working	-0.91 (-1.83, 0.01)	.052	-0.43 (-1.19, 0.32)	.26
	Working (ref.)	0		0	
Highest Educational Attainment	Some high school or less	-0.62 (-1.94, 0.71)	.36	-0.05 (-1.17, 1.06)	.92
	High school or GED certificate	-0.41 (-1.67, 0.84)	.52	0.12 (-0.93, 1.17)	.83
	Some college or technical school	-0.93 (-2.23, 0.38)	.16	-0.71 (-1.79, 0.37)	.20
	College and above (ref.)	0		0	
Total Yearly Household/Family Income	$20,000 or less	-1.55 (-4.58, 1.48)	.32	-1.96 (-4.42, 0.50)	.12
	$20,001 - $50,000	-0.83 (-4.01, 2.34)	.61	-1.43 (-4.02, 1.16)	.28
	>$50,000 (ref.)	0		0	
Neighborhood	In the country or rural area with neighbors close by	0.76 (0.04, 1.49)	.04	0.38 (-0.24, 0.99)	.23
	In the country or rural area with very few neighbors close by	0.76 (-0.22, 1.74)	.13	0.25 (-0.56, 1.07)	.54

In town (ref.)	0		0	
Household Size	0.10 (-0.14, 0.33)	.41	-0.01 (-0.20, 0.19)	.95

‡ County-level cluster adjustments

Associations Between Food Insecurity and Variables of Interest

Odds ratios were estimated to predict the odds of food insecurity using county-level cluster adjusted binary logistic regressions (**Table 5**). Firstly, for every one unit increase in general well-being, the odds of food insecurity were 27.0% lower (95% CI: (0.61, 0.87); p= .0006); similarly, the odds of food insecurity were 35.7% lower (95% CI: (0.51, 0.81); p= .0003) for every one unit increase in the eight-item well-being composite score. This indicates that increased well-being was a protective factor against food insecurity. Regarding demographic covariates, for every additional person contributing to household size, the odds of food insecurity were multiplied by 1.426 (95% CI: (1.002, 2.030); p= .049). This meant that there were greater odds of food insecurity with increased household size. For one unit increases in community food access (*CFA*) and barriers to healthy eating (*BHE*), we would expect the odds of food insecurity to be multiplied by 0.45 and 3.60, respectively (*CFA* 95% CI: (0.27, 0.77); p= .004); (*BHE* 95% CI: (1.54, 8.40); p= .003). This demonstrated the complementary nature of these food environment covariates, in which increases in community food access lowered the odds of food insecurity, while those in the sample who experience more barriers to healthy eating had greater odds of being food insecure. As evidenced, the ranges of values in the 95% confidence intervals for both well-being scores, household size, community food access, and barriers to healthy eating were all compatible with a practically meaningful effect and are also statistically significant. All other variables of interest did not have meaningful effects, nor were statistically significant, as demonstrated by their ranges of values in the 95% confidence intervals and p-values above the alpha level for odds ratios.

Table 5: Odds Ratio (OR) Estimates of Bivariate Associations Between Food Insecurity and Variables of Interest‡

Variables of Interest		OR (95% CI)	P-value
General Well-Being		0.73 (0.61, 0.87)	.0006
8-Item Composite		0.64 (0.51, 0.82)	.0003
Community Food Access		0.45 (0.27, 0.77)	.004
Barriers to Healthy Eating		3.60 (1.54, 8.40)	.003
Gender & Race	White Female vs. White Male	1.03 (0.26, 4.01)	.56
	Black Female vs. White Male	0.72 (0.18, 2.95)	.67
	Black Male vs. White Male	0.66 (0.13, 3.34)	.58
	Ref.	1	
Age		0.98 (0.96, 1.00)	.07
Marital Status	Not living together vs. Living together	0.7 (0.29, 1.78)	.47
	Ref.	1	
Employment Status	Not working vs. Working	0.30 (0.07, 1.3)	.11
	Ref.	1	
Highest Educational Attainment	Some high school or less vs. College and above	0.31 (0.04, 2.68)	.59
	High school or GED certificate vs. College and above	0.33 (0.04, 2.75)	.68
	Some college or technical school vs. College and above	0.21 (0.03, 1.80)	.11
	Ref.	1	
Total Yearly Household/Family Income	$20,000 or less vs. $20,001 or more	0.46 (0.10, 2.11)	.32
	Ref.	1	
Neighborhood	In the country or rural area with neighbors close by vs. In town	1.48 (0.65, 3.35)	.40
	In the country or rural area with very few neighbors close by vs. In town	1.11 (0.41, 3.02)	.85
	Ref.	1	
Household Size		1.43 (1.002, 2.03)	.049

‡ County-level cluster adjustments

Assessment of Interaction

Interaction assessments were conducted for gender, race, and the intersectional gender and race variable. Given the presence of two well-being measures, there were a total of six crude cluster adjusted models that were analyzed. A significant interaction (p= .02) was found between race and food security status in the model with the eight-item composite as the well-being outcome.

Final Model

In the crude model (**Table 6**), among white respondents, those who reported experiencing food insecurity scored 2.56 points lower on the eight-item well-being composite compared to white food secure individuals (95% CI: (-3.75, -1.37)). As evidenced by the ranges of values in the 95% confidence intervals, as well as the p-values, for the crude estimates, only the effect size for white food insecure respondents was compatible with a practically meaningful effect and statistically significant. A non-statistically significant crude association for black food secure and insecure individuals may have been a result of small sample size.

Table 6: Crude and Adjusted Estimates of Final Model

		White		**Black**	
		Estimate (95% CI)	P-value	Estimate (95% CI)	P-value
Food Insecure (Crude)	Yes	-2.56 (-3.75, -1.37)	<.0001	-0.68 (-1.75, 0.39)	0.21
	No (Ref.)	0		0	
Food Insecure (Adjusted)	Yes	-1.96 (-3.18, -0.74)	0.002	0.07 (-1.66, 1.80)	0.94
	No (Ref.)	0		0	

The adjusted model with the eight-item well-being composite as the outcome, food security status as the exposure, and race as a component of the product term was the final model used for analyses. Confounders included: community food access; barriers to healthy eating;

annual household income; marital status; highest educational attainment; household size; age; employment status; race; gender. Analytic decisions were informed by the DAG (**Figure 6**).

In the adjusted model, white food insecure individuals scored 1.96 points lower on the eight-item well-being composite, while accounting for confounders, compared to their food secure counterpart (95% CI: (-3.18, -0.74)). Similar to the crude model, only the effect size for white food insecure respondents was compatible with a practically meaningful effect and was statistically significant, which was indicated by the range of values in the 95% confidence interval and a p-value above the alpha level, respectively.

As shown in **Table 7** of adjusted associations, there were two statistically significant findings, specifically for total yearly household income and food accessibility. First, compared to individuals earning more than $50,000, those who earn $20,000 or less reported -2.67 points lower on the well-being score (95% CI: (-5.14, -0.2); p= .03). This indicated that those in the sample with lower incomes were at risk of lower well-being on average. Next, food accessibility had a protective effect on well-being; for every one unit increase in food accessibility, the eight-item composite score increased by 1.15 units (95% CI: (0.74, 1.56); p<.0001).

Regardless of statistical significance, other variables of interest also demonstrated important findings. Discussion of these was organized into sections consistent with the categories found in the conceptual model: potential moderators, demographic covariates, and food environment covariates.

Compared to both black and white food secure individuals, as well as white individuals experiencing food insecurity, black food insecure participants scored on average 1.37 points higher on the eight-item well-being composite (95% CI: (-0.42, 3.16). On the other hand, compared to white individuals, black respondents scored on average 0.03 points lower on the

eight-item well-being composite (95% CI: (-1.69, 1.62)). Additionally, compared to males, females reported on average 0.69 units lower on the well-being scale (95% CI: (-1.45, 0.08)). These findings highlighted mechanisms like racism and sexism that add complex layers to consider.

Individuals with educational experiences of some high school or less (*LHS*), as well as a high school degree or GED certificate (*HS/GED*), reported 0.87 and 0.81 points higher, respectively, on the well-being composite compared to respondents with a college degree or higher (*LHS* 95% CI: (-0.56, 2.30); *HS/GED* 95% CI: (-0.54, 2.16)). In contrast, living without a partner (*NP*) or being unemployed (*UE*) resulted in lower well-being scores on average compared to co-habitancy or employment status, respectively (*NP* -0.09, 95% CI: (-0.88, 0.70); *UE* -0.19, 95% CI: (-1.08, 0.71)).

Lastly, adjusted associations between food environment covariates and well-being yielded interesting findings. Compared to respondents living in town areas, those who reside in the country or rural area with very few neighbors nearby reported 0.39 points higher on well-being (95% CI: (-0.58, 1.36)). On the other hand, for every one unit increase in the barrier composite score, we would expect the well-being score to decrease by 0.11 (95% CI: (-0.69, 0.47)).

Table 7: Effect Sizes of Associations Between 8-Item Well-Being Composite Score and Food Insecurity in Final Adjusted Model

Variables of Interest		Estimate (95% CI)	P-Value
Food Access		1.15 (0.74, 1.56)	<.0001
Healthy Eating Barriers		-0.11 (-0.69, 0.47)	.71
Food Insecurity * Race	Food Insecure*Black	1.37 (-0.42, 3.16)	.13
	Food Insecure*White (ref.)	0	
	Food Secure*Black (ref.)	0	
	Food Secure*White (ref.)	0	
Race	Black	-0.03 (-1.69, 1.62)	.97
	White (ref.)	0	
Gender	Female	-0.69 (-1.45, 0.08)	.08
	Male (ref.)	0	
Age		0.012 (-0.01, 0.04)	.29
Marital Status	Not living together	-0.09 (-0.88, 0.70)	.83
	Living together (ref.)	0	
Employment Status	Not working	-0.19 (-1.08, 0.71)	.68
	Working (ref.)	0	
Highest Educational Attainment	Some high school or less	0.87 (-0.56, 2.30)	.23
	High school or GED certificate	0.81 (-0.54, 2.16)	.24
	Some college or technical school	0.67 (-0.68, 2.01)	.33
	College and above (ref.)	0	
Total Yearly Household/Yearly Income	$20,000 or less	-2.67 (-5.14, -0.20)	.03
	$20,001 - $50,000	-2.33 (-4.78, 0.13)	.06
	>$50,000 (ref.)	0	
Neighborhood	In the county or rural area with neighbors close by	0.11 (-0.55, 0.76)	.75
	In the country or rural area with very few neighbors close by	0.39 (-0.58, 1.36)	.43
	In town (ref.)	0	
Household Size		0.04 (-0.20, 0.28)	.75

DISCUSSION

Comparison of Study Findings to the Literature

Overall, these study findings demonstrate alignment with and contribute new insights to the existing food systems literature. They reflect the importance of incorporating theories to capture the intricacies of food insecurity challenges in socially unjust food environments. As mentioned, some theories to consider are the social-ecological model continuum, theories of social disorganization, health promotion models (e.g., Social Cognitive Theory and Theory of Planned Behavior) and the "Double or Triple Jeopardy" framework (Beatty et al., 2014; Bethea et al., 2012; Byker Shanks et al., 2020; Gee & Payne-Sturges, 2004; Holston et al., 2020; Institute of Medicine, 1999; Monnat & Beeler Pickett, 2011; Morello-Frosch & Shenassa, 2006; Morello-Frosch et al., 2011; O'Neill et al., 2003; Rivera et al., 2018; Rivera et al., 2019; Smarr, 2020). These are visually synthesized in **Figure 1**. Altogether, theoretical constructs from some of these models informed creation of the conceptual framework (**Figure 2**), which not only contributes greater understanding of the present study, but also contextualizes study findings in familiar realms of food security work. To facilitate clear discussion of comparing study findings to existing literature, the following sections are organized by key steps of the analysis process: 1) Relevance of study's descriptive characteristics; 2) Supported bivariate associations; and 3) Contributions to food insecurity dialogue with the final model.

Relevance of study's descriptive characteristics

In a general sense, the SNAP-enrolled rural southern sample reflects similar socio-demographic characteristics exhibited in the existing literature regarding food insecurity and SNAP participation. While having mostly female study participants is not necessarily indicative of causal findings, but rather pertains to the tendency for women to participate in studies at a

higher frequency than their gender counterpart, this disproportion is common (Haynes-Maslow et al., 2020). Additionally, both positive and negative implications faced by enrolled individuals, areas highlighted in prior research studies about food insecurity, SNAP participation, and mental well-being, resonated when restricting the present study's sample to a SNAP-enrolled cohort (DeWitt et al., 2020; Haynes-Maslow et al., 2020; Kihlström et al., 2019; Leung et al., 2015; Pak & Kim, 2020; Rigby et al., 2012; Sharkey et al., 2011). With the overall sample reporting a high food insecurity rate (87.4%) within the past 12 months, this is significant, as there is evidence of greater rates of food insecurity among rural communities compared to urban areas (Coleman-Jensen et al., 2017; Haynes-Maslow et al., 2020). While also alarming, the high prevalence of food insecurity among SNAP-enrolled individuals is supported by the literature highlighting the linkages of nutrition assistance programs like SNAP to food insecurity rates (DeWitt et al., 2020; Kihlström et al., 2019; Rigby et al., 2012; Sharkey et al., 2011). Although the participants, on average, occasionally experienced barriers to healthy options, multi-level structural mechanisms continue to impact the accessibility, affordability, availability, choice, and social acceptability of healthy food options (Bickel et al., 2000; Rigby et al., 2012). Evidence of accessibility issues faced by older food insecure adults who also battle poor health status contextualizes potential hardships of the aging study sample. Moreover, representation of an older SNAP-enrolled cohort highlights the significance of serving this priority population, especially given the lower proportion of enrolled older adults in southern rural U.S. states compared to other geographic regions (Lloyd, 2019). Other socio-demographic characteristics of large proportions of the study sample, such as living without a partner, not working, earning less than $20,000/year, and reporting high school/GED certificate as their highest educational attainment, all resemble evidence-based risk factors of food insecurity status and SNAP participation (Kelly et al., 2020;

Leung et al., 2015; Radcliff et al., 2018; Rigby et al., 2012; Sharkey et al., 2011). Additionally, although households without children were mainly represented in the sample, research suggests single-parent households are associated with food insecurity (Sharkey et al., 2011).

While prior literature highlights gender and racial patterns regarding food insecurity, the present study did not yield statistically significant associations between food security status and gender, race, or the intersectional gender and race variable (Brady et al., 2021; DeWitt et al., 2020; Leung et al., 2015; Lloyd, 2019; Pak & Kim, 2020; Zhang et al., 2021). However, the critical roles of gender, race, as well as the intersectionality of gender and race are demonstrated and supported in other study comparisons regarding the sample of rural SNAP recipients. For example, not only did females report a higher average household size compared to males, but they also had lower eight-item composite well-being scores on average than their gender counterparts. These findings are explained by traditional gender roles that suggests females, particularly in rural areas, take on caretaking responsibilities (Reiheld, 2014). Additionally, compared to black individuals, white individuals had higher average agreement of community food accessibility, reported lower frequencies of experiencing barriers to healthy food options, and were proportionally more likely to reside with a partner. However, their greater likelihood of being unemployed and report of lower average well-being scores than black individuals reflect the complexities and implications of race in the food environment, particularly for this SNAP-enrolled sample. Furthermore, identification of protective and risk factors becomes muddled in the context of the "food apartheid" which describes the racial, class, and gender discrimination widening social, economic, and health gaps among food insecure communities (Kitch et al., 2021; Lu, 2020). Intentional examination of intersectional identities requires understanding that the combination of individual characteristics is not equivalent to the sum of these characteristics.

For example, white females, most of whom were unemployed and reported the largest average household size among intersectional subgroups, had the lowest average well-being scores for both general well-being and the eight-item well-being composite. In contrast, despite white males exhibiting protective factors (e.g., high proportions employed, married/living with a partner, low barriers to healthy food options, and highest agreement of accessibility and quality of foods), black females and black males had the highest average general well-being score and eight-item composite well-being score, respectively. This finding offers perspectives on resiliency among rural SNAP recipients, although it is not conclusory in nature.

Supported bivariate associations

As demonstrated in this study, increases in community food accessibility and well-being are protective factors of food security status, while increases in household size and barriers to healthy eating are risk factors of food security status. These patterns from statistically significant regressions, especially regarding accessibility, barriers, and well-being, are extensively covered in food security research and offer confirmatory findings (Bruening et al., 2017; Byker Shanks et al., 2020; HUD Exchange, n.d.; Leung et al., 2015; Lloyd, 2019; Pak & Kim, 2020; Sharkey et al., 2011; Sharkey et al., 2013; Zhang et al., 2021).

Other regression analyses also yielded results supported by the literature. For example, food insecurity status is a harmful factor of both well-being scores, which is extensively evidenced (Bruening et al., 2017; Hanmer et al., 2021; Kihlström et al., 2019; Leung et al., 2015; Lloyd, 2019; Pak & Kim, 2020). For the present study, the relationship between food insecurity and physical and emotional well-being can be contextualized with SNAP participation, as research has shed light on negative self-attitudes, stigma, and perceived stress commonly experienced by SNAP recipients (Davy et al., 2015; Jilcott et al., 2011; Pak & Kim, 2020).

Additionally, community food access, living in the country or rural area with neighbors nearby, and older age all have protective effects on at least one well-being score. These findings correspond with food systems literature underlying the importance of food variety and quality, social capital, and accessibility of healthy food options (Byker Shanks et al., 2020; Holston et al., 2020; Lloyd, 2019; Sharkey et al., 2011). Furthermore, with white females reporting lower average well-being scores compared to white males, this demonstrates how the combination of certain gender and racial identities can be a risk factor related to well-being, and thus exacerbates health disparities.

Contributions to food insecurity dialogue with the final model

Consistent with some of the findings yielded in this study, the final model, which focuses on a rural southern sample, contributes to the dialogue of food insecurity and risk factors for morbidity and mortality experienced by rural communities. Specifically, food insecurity status and low income (i.e., <$20,000) have harmful effects on the eight-item composite well-being score, both of which are associations well supported by research (Befort et al., 2012; Bruening et al., 2017; Gholami et al., 2017; Hanmer et al., 2021; Harnack et al., 2019; Kihlström et al., 2019; Leung et al., 2015; Lloyd, 2019; Pak & Kim, 2020; Sharkey et al., 2011; Trivedi et al., 2015). It is important to note, however, that food insecurity observations were made among white individuals given that a significant interaction was found between race and food insecurity, and thus reporting the main effect was not meaningful. As already demonstrated, community food accessibility is a protective factor of well-being, such that individual and community health inequities arise in food environments lacking healthy and culturally appropriate foods (Byker Shanks et al., 2020; Lloyd, 2019; Sharkey et al., 2011). Other findings, despite not being statistically significant, offer confirmatory insights regarding risk factors of experiencing barriers

to healthy eating options, living without a partner, and being unemployed on well-being. Black individuals or females are also at-risk groups; these findings contribute to discussions of exploiting marginalized racial, class, and gender groups (Cooper, 2017; Kitch et al., 2021; Lu, 2020). However, the protective effects of lower educational attainment and living with very few neighbors nearby in rural areas contrast the existing literature about well-being risk factors (Byker Shanks et al., 2020; Holston et al., 2020; Sharkey et al., 2011).

Significance of Study Findings to the Literature

In addition to comparisons to existing literature, the present study contributes to the ongoing dialogue regarding food systems and food insecurity by addressing research gaps. The current examination of well-being spans nine dimensions, ranging from general well-being to life achievements, and focuses on satisfaction rather than traditional measures like HRQOL. Additionally, a significant interaction was found between race and food security status, thus determining the adjusted final model's inclusion of the eight-item well-being composite, food insecurity, race, and other variables of interest. Furthermore, intersectionality of gender and race was examined as a core study aim, but this investigation was exploratory given the small sample sizes of the subgroups. Yet, as discussed, analysis of these multiple identities yielded interesting study comparisons that supplemented the existing literature.

Another key research contribution of the present study is the demonstration of potential resiliency among the sample. There were higher well-being scores for some groups, particularly for racial minorities, despite experiencing unfavorable circumstances. It is likely that racial minorities have developed increased resiliency and coping mechanisms. Lazarus and Folkman's Transactional Theory of Stress and Coping examines how an individual's appraisal process impacts their coping response (Lazarus, 1966; Lazarus & Folkman, 1984). The influence of

personal and contextual factors (e.g., capacities, skills and abilities, and resources) during stress appraisal is relevant in this study, as it is consistent with the multi-level conceptual model informing and guiding the work (Mechanic, 1978). Thus, it is possible that black individuals experiencing food insecurity process the myriad of stressors in a way that exhibits resiliency in their coping response. Moreover, the impact of multiple risk factors on well-being may not as prominent among racial minorities, given the ongoing discrimination and exploitation of these groups. Racial discrimination, especially in the U.S., has widespread impacts on the social determinants of health. While the term "food apartheid" has been used to describe the harmful mechanisms experienced by food insecure communities, these are risk factors that also fuel other structural inequities for black communities in general (Cooper, 2017; Kitch et al., 2021; Lu, 2020).

Societal Significance

In addition to its contribution to the literature, this study has significant impacts on food-related public health work and in turn, the communities they support. Study findings confirm and expand on the health and social disparities experienced by priority populations, especially racial and gender minorities, as well as intersectional racial/gender identities. Identification of vulnerable populations, the types of challenges they experience, and their well-being statuses may inform future priority areas among the 11 coalitions participating in *The Two Georgias Initiative*. It is also likely that the present study may serve as an example for other rural U.S. areas that intend to investigate food injustices in their communities. Therefore, the scope of societal significance may be broadened, in that study protocol and findings may inform the work of programs and future research of other rural areas within the U.S.

Strengths

There are several strengths of the present study. Three notable strengths are discussed in this section: 1) the presence of two well-being outcomes; 2) the examination of race and gender as intersectional elements; and 3) the quality of the data source.

First, the inclusion of two well-being outcomes, the general/single item and eight-item composite well-being scores, provided a thorough assessment of satisfaction levels among the SNAP-enrolled sample. Ranging from life achievement to future security, a total of nine items measured aspects of well-being.

Second, exploring the intersectionality of gender and race in the food environment is a distinct strength of the study, given significant research and societal implications of holding multiple identities. Specifically, as evidenced by existing multi-level frameworks, such as the Social Ecological Model and the Triple Jeopardy framework, studying intersectional identities is pertinent in understanding health disparities and addressing public health challenges. By incorporating an intersectional lens, the present study fills a gap in the literature, thus raising awareness of why multiple identities are necessary to investigate and representing what is commonly experienced in society in the academia realm.

Another strength of this study is the quality of the data source. Survey data were gathered from individuals living among the 11 coalitions participating in *The Two Georgias Initiative*, an evaluation offering unique insights about the public health landscape of rural Georgia. There is strong internal validity of the baseline population-based mail survey, as it accurately and adequately examined behaviors and environments related to common coalition priority areas in rural areas. Thus, this sampling and data collection method may serve as an example for programs in other rural locations across the U.S.

Limitations

Reflection of the present study is not complete without a discussion of its limitations. These do not lessen the integrity of the findings nor its impact on food systems literature, but rather, it sheds light on the study bounds. There are three main limitations which this section focuses on: 1) selection bias; 2) small sample sizes of intersectional subgroups; and 3) type of study design.

A limitation that emerged early in the data analysis phase is the potential for selection bias. Specifically, data from eight out of the 11 coalitions were analyzed, given the others did not complete modules regarding food security/access and healthy eating. Therefore, not including all coalitions in the present study may have led to inaccuracies in study findings, as coalitions who answered all modules may have specific characteristics that differ from coalitions who did not. Additionally, the inability to fully represent the data in an accurate manner may have influenced the study's generalizability when examining its findings.

Despite having a relatively large final sample size (N=286 SNAP-enrolled individuals) to facilitate thorough data analysis processes, the examination of the intersectionality of gender and race was exploratory, given small sample sizes of the subgroups. Specifically, the interaction assessments for the intersectional gender and race variable were not statistically significant. The inability to model pertains to issues related to large standard error and power, yet the implications of racial and gender intersectionality exist in a social context.

A final limitation is that the present study utilized data from a cross-sectional data source. While a breadth of data was collected, measuring information from one point in time limited the ability to ascertain key patterns of interest. For example, although the prevalence of food insecure individuals was assessed, it is unknown whether the food insecurity status was an

underlying characteristic of SNAP-enrolled individuals, exacerbated by their SNAP benefits, or both.

Future Directions

The present study offers both research and societal opportunities to expand on its findings. Future studies with greater accessibility to racial and gender subgroups can further investigations of the intersectionality of race and gender regarding food insecurity status and well-being measures. Additionally, more action should be taken to explore the mechanisms of stress and coping among minority groups, like black individuals, to better understand how external stressors like food insecurity result in higher well-being. Qualitative methods should also be considered not only to better capture the voices of marginalized groups, but also to gather comprehensive insights of contextual factors that correspond to well-being.

Furthermore, this study presents a call to action for food security and nutrition access work to continue the prioritization of vulnerable populations, as well as focus attention on intersectional identities. However, doing so should not disregard or ignore the experiences of those with historically privileged identities. In other words, future public health programs and grants should focus on the mechanisms that influence how food insecure individuals cope, and guide program activities to foster greater resiliency and health outcomes.

Conclusion

The multi-level conceptual framework used to inform the present study captures the complexities facing SNAP-enrolled individuals in rural Georgia. Additionally, based on key theories, from individual level components social relationships that are at play with individual constructs, those experiencing food insecurity are perpetually confined to structural mechanisms of the built environment. Poverty, residential instability, and racism are examples of mechanisms

that foster a non-sustainable healthy food environment, which contributes to worsened food insecurity status and increased risk of health outcomes. Yet, marginalized communities are often blamed for making harmful choices for their health. Through its research goals, the present study aimed to raise awareness of the intricacies of the food systems environment. It shed light on novel ways well-being can be assessed among SNAP-enrolled participants, examined race as an effect measure modifier, and brought to the forefront the implications of intersectional identities. In addition to yielding some consistent findings to existing research, a noteworthy finding is that some groups, particularly racial minorities, reported higher well-being scores despite experiencing adverse situations. Future investigations should explore processes of coping mechanisms, focus on intersectionality studies, and consider qualitative study designs to better understand the stories of food insecure SNAP recipients. Additionally, other rural communities can utilize this work from *The Two Georgias Initiative* to inform policy and research decisions.

References

Adams, E. J., Grummer-Strawn, L., & Chavez, G. (2003). Food Insecurity Is Associated with Increased Risk of Obesity in California Women. *The Journal of Nutrition*, *133*(4), 1070-1074. https://doi.org/10.1093/jn/133.4.1070

Beatty, T. K., Nanney, M. S., & Tuttle, C. (2014). Time to eat? The relationship between food security and food-related time use. *Public Health Nutr*, *17*(1), 66-72. https://doi.org/10.1017/s1368980012005599

Befort, C. A., Nazir, N., & Perri, M. G. (2012). Prevalence of obesity among adults from rural and urban areas of the United States: findings from NHANES (2005-2008). *J Rural Health*, *28*(4), 392-397. https://doi.org/10.1111/j.1748-0361.2012.00411.x

Berkowitz, S. A., Seligman, H. K., Rigdon, J., Meigs, J. B., & Basu, S. (2017). Supplemental Nutrition Assistance Program (SNAP) Participation and Health Care Expenditures Among Low-Income Adults. *JAMA Intern Med*, *177*(11), 1642-1649. https://doi.org/10.1001/jamainternmed.2017.4841

Bethea, T. N., Lopez, R. P., Cozier, Y. C., White, L. F., & McClean, M. D. (2012). The relationship between rural status, individual characteristics, and self-rated health in the Behavioral Risk Factor Surveillance System. *J Rural Health*, *28*(4), 327-338. https://doi.org/10.1111/j.1748-0361.2012.00414.x

Bickel, G., Nord, M., Price, C., Hamilton, W., & Cook, J. (2000). *Measuring Food Security in the United States: Guide to Measuring Household Food Security*. Alexandria, VA, USA Retrieved from https://naldc.nal.usda.gov/download/38369/PDF

Brady, P. J., Askelson, N. M., Wright, B., Daly, E., Momany, E., McInroy, B., & Damiano, P. (2021). Food Insecurity Is Prevalent in Iowa's Medicaid Expansion Population. *J Acad Nutr Diet*. https://doi.org/10.1016/j.jand.2021.04.011

Bruening, M., Dinour, L. M., & Chavez, J. B. R. (2017). Food insecurity and emotional health in the USA: a systematic narrative review of longitudinal research. *Public Health Nutr*, *20*(17), 3200-3208. https://doi.org/10.1017/s1368980017002221

Bullinger, L. R., Fleckman, J. M., & Fong, K. (2021). Proximity to SNAP-authorized retailers and child maltreatment reports. *Econ Hum Biol*, *42*, 101015. https://doi.org/10.1016/j.ehb.2021.101015

Burke, M., Cabili, C., Berman, D., Forrestal, S., & Gleason, P. (2021). A Randomized Controlled Trial of Three School Meals and Weekend Food Backpacks on Food Security in Virginia. *J Acad Nutr Diet*, *121*(1s), S34-s45. https://doi.org/10.1016/j.jand.2020.10.026

Byker Shanks, C., Ahmed, S., Dupuis, V., Houghtaling, B., Running Crane, M. A., Tryon, M., & Pierre, M. (2020). Perceptions of food environments and nutrition among residents of the Flathead Indian Reservation. *BMC Public Health*, *20*(1), 1536. https://doi.org/10.1186/s12889-020-09584-7

Centers for Disease Control and Prevention (CDC). (2017). *Behavioral Risk Factor Surveillance System Survey Questionnaire*. Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention

Centers for Disease Control and Prevention (CDC). (2021, 6/16/2021). *Health-Related Quality of Life (HRQOL)*. Retrieved 11/14/2021 from https://www.cdc.gov/hrqol/index.htm

Chojnacki, G. J., Gothro, A. G., Gleason, P. M., & Forrestal, S. G. (2021). A Randomized Controlled Trial Measuring Effects of Extra Supplemental Nutrition Assistance Program (SNAP) Benefits on Child Food Security in Low-Income Families in Rural Kentucky. *J Acad Nutr Diet*, *121*(1s), S9-s21. https://doi.org/10.1016/j.jand.2020.05.017

Coleman-Jensen, A., Rabbitt, M., Gregory, C., & Singh, A. (2017). *Household Food Security in the United States in 2016*.

Coleman-Jensen, A., Rabbitt, M. P., Gregory, C. A., & Singh, A. (2021). *Household Food Security in the United States in 2020*. https://www.ers.usda.gov/publications/pub-details/?pubid=102075

Cooper, D. (2017). *What is Food Justice?* Retrieved 10/20/2021 from http://www.daracooper.com/food-justice-blog--more/what-is-food-justice

Core indicators of nutritional state for difficult-to-sample populations. (1990). *J Nutr*, *120 Suppl 11*, 1559-1600. https://doi.org/10.1093/jn/120.suppl_11.1555

Davy, B. M., Zoellner, J. M., Waters, C. N., Bailey, A. N., & Hill, J. L. (2015). Associations among chronic disease status, participation in federal nutrition programs, food insecurity, and sugar-sweetened beverage and water intake among residents of a health-disparate region. *J Nutr Educ Behav*, *47*(3), 196-205. https://doi.org/10.1016/j.jneb.2015.01.001

De Marco, M., Thorburn, S., & Kue, J. (2009). In a country as affluent as America, people should be eating: experiences with and perceptions of food insecurity among rural and urban Oregonians. *Qual Health Res*, *19*(7), 1010-1024. https://doi.org/10.1177/1049732309338868

DeWitt, E., Gillespie, R., Norman-Burgdolf, H., Cardarelli, K. M., Slone, S., & Gustafson, A. (2020). Rural SNAP Participants and Food Insecurity: How Can Communities Leverage Resources to Meet the Growing Food Insecurity Status of Rural and Low-Income Residents? *Int J Environ Res Public Health*, *17*(17). https://doi.org/10.3390/ijerph17176037

Ettinger de Cuba, S., Chilton, M., Bovell-Ammon, A., Knowles, M., Coleman, S. M., Black, M. M., Cook, J. T., Cutts, D. B., Casey, P. H., Heeren, T. C., & Frank, D. A. (2019). Loss Of SNAP Is Associated With Food Insecurity And Poor Health In Working Families With Young Children. *Health Aff (Millwood)*, *38*(5), 765-773. https://doi.org/10.1377/hlthaff.2018.05265

Food and Nutrition Service. (2019). *Trends in Supplemental Nutrition Assistance Program Participation Rates: FiscalYear 2010 to Fiscal Year 2017*. Retrieved 10/21/2021 from https://www.fns.usda.gov/snap/trends-supplemental-nutrition-assistance-program-participation-rates-fiscal-year-2010

Food Research & Action Center. (2018). *Rural Hunger in America: Supplemental Nutrition Assistance Program*. Retrieved 10/21/2021 from https://frac.org/wp-content/uploads/rural-hunger-in-america-snap-get-the-facts.pdf

Freedman, D. A., Ngendahimana, D., Shon, E. J., Merritt, K., & Pon, J. (2019). Predictors of Supplemental Nutrition Assistance Program Use at Farmers' Markets With Monetary Incentive Programming. *Am J Health Promot*, *33*(7), 1039-1048. https://doi.org/10.1177/0890117119854708

Gee, G. C., & Payne-Sturges, D. C. (2004). Environmental health disparities: a framework integrating psychosocial and environmental concepts. *Environmental health perspectives*, *112*(17), 1645-1653.

Gholami, A., Khazaee-Pool, M., Rezaee, N., Amirkalali, B., A, A. B. G., Moradpour, F., Rajabi, A., Sohrabi, M. R., Yarmohammadi, R., & Mousavi Jahromi, Z. (2017). Household Food Insecurity is Associated with Health-Related Quality of Life in Rural Type 2 Diabetic Patients. *Arch Iran Med*, *20*(6), 350-355.

Green, S. H., & Glanz, K. (2015). Development of the Perceived Nutrition Environment Measures Survey. *Am J Prev Med*, *49*(1), 50-61. https://doi.org/10.1016/j.amepre.2015.02.004

Gregory, C. A., & Todd, J. E. (2021). SNAP timing and food insecurity. *PLoS One*, *16*(2), e0246946. https://doi.org/10.1371/journal.pone.0246946

Gundersen, C., Engelhard, E. E., Crumbaugh, A. S., & Seligman, H. K. (2017). Brief assessment of food insecurity accurately identifies high-risk US adults. *Public Health Nutr*, *20*(8), 1367-1371. https://doi.org/10.1017/s1368980017000180

Hager, E. R., Cockerham, A., O'Reilly, N., Harrington, D., Harding, J., Hurley, K. M., & Black, M. M. (2017). Food swamps and food deserts in Baltimore City, MD, USA: associations with dietary behaviours among urban adolescent girls. *Public Health Nutr*, *20*(14), 2598-2607. https://doi.org/10.1017/s1368980016002123

Hanmer, J., DeWalt, D. A., & Berkowitz, S. A. (2021). Association between Food Insecurity and Health-Related Quality of Life: a Nationally Representative Survey. *J Gen Intern Med*, *36*(6), 1638-1647. https://doi.org/10.1007/s11606-020-06492-9

Harnack, L., Valluri, S., & French, S. A. (2019). Importance of the Supplemental Nutrition Assistance Program in Rural America. *Am J Public Health*, *109*(12), 1641-1645. https://doi.org/10.2105/ajph.2019.305359

Haynes-Maslow, L., Hardison-Moody, A., Patton-Lopez, M., Prewitt, T. E., Byker Shanks, C., Andress, L., Osborne, I., & Jilcott Pitts, S. (2020). Examining Rural Food-Insecure Families' Perceptions of the Supplemental Nutrition Assistance Program: A Qualitative Study. *Int J Environ Res Public Health*, *17*(17). https://doi.org/10.3390/ijerph17176390

Hingle, M. D., Shanks, C. B., Parks, C., Prickitt, J., Rhee, K. E., Wright, J., Hiller-Venegas, S., & Yaroch, A. L. (2020). Examining Equitable Online Federal Food Assistance during the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2): A Case Study in 2 Regions. *Curr Dev Nutr*, *4*(10), nzaa154. https://doi.org/10.1093/cdn/nzaa154

Holston, D., Stroope, J., Greene, M., & Houghtaling, B. (2020). Perceptions of the Food Environment and Access among Predominantly Black Low-Income Residents of Rural Louisiana Communities. *Int J Environ Res Public Health*, *17*(15). https://doi.org/10.3390/ijerph17155340

HUD Exchange. (n.d.). *Colonias History*. Retrieved 10/20/2021 from https://www.hudexchange.info/programs/cdbg-colonias/colonias-history/#:~:text=Generally%2C%20HUD%20and%20USDA%20Rural,a%20combination%20of%20all%20three.

Institute of Medicine. (1999). *Toward Environmental Justice: Research, Education, and Health Policy Needs*. The National Academies Press. https://doi.org/doi:10.17226/6034

Jackson, J. E., Doescher, M. P., Jerant, A. F., & Hart, L. G. (2005). A national study of obesity prevalence and trends by type of rural county. *J Rural Health*, *21*(2), 140-148. https://doi.org/10.1111/j.1748-0361.2005.tb00074.x

Jilcott, S. B., Wall-Bassett, E. D., Burke, S. C., & Moore, J. B. (2011). Associations between food insecurity, supplemental nutrition assistance program (SNAP) benefits, and body mass index among adult females. *J Am Diet Assoc*, *111*(11), 1741-1745. https://doi.org/10.1016/j.jada.2011.08.004

Jones, S. J., & Frongillo, E. A. (2006). The Modifying Effects of Food Stamp Program Participation on the Relation between Food Insecurity and Weight Change in Women. *The Journal of Nutrition*, *136*(4), 1091-1094. https://doi.org/10.1093/jn/136.4.1091

Kelly, C., Maytag, A., Allen, M., & Ross, C. (2020). Results of an Initiative Supporting Community-Based Organizations and Health Care Clinics to Assist Individuals With Enrolling in SNAP. *J Public Health Manag Pract*. https://doi.org/10.1097/phh.0000000000001208

Kihlström, L., Burris, M., Dobbins, J., McGrath, E., Renda, A., Cordier, T., Song, Y., Prendergast, K., Serrano Arce, K., Shannon, E., & Himmelgreen, D. (2019). Food Insecurity and Health-Related Quality of Life: A Cross-Sectional Analysis of Older Adults in Florida, U.S. *Ecol Food Nutr*, *58*(1), 45-65. https://doi.org/10.1080/03670244.2018.1559160

Kitch, S., McGregor, J., Mauricio MejÍa, G., El-Sayed, S., Spackman, C., & Vitullo, J. (2021). Gendered and Racial Injustices in American Food Systems and Cultures. *Humanities*, *10*(66). https://doi.org/https://doi.org/10.3390/h10020066

Lazarus, R. S. (1966). *Psychological stress and the coping process*. Springer.

Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. Springer.

Leung, C. W., Epel, E. S., Willett, W. C., Rimm, E. B., & Laraia, B. A. (2015). Household food insecurity is positively associated with depression among low-income supplemental nutrition assistance program participants and income-eligible nonparticipants. *J Nutr*, *145*(3), 622-627. https://doi.org/10.3945/jn.114.199414

Lloyd, J. L. (2019). From Farms to Food Deserts

Food Insecurity and Older Rural Americans. *Generations: Journal of the American Society on Aging*, *43*(2), 24-32. https://www.jstor.org/stable/26760111

Lu, I. (2020, 9/3/2021). *Food Apartheid: What Does Food Access Mean in America?* Retrieved 10/19/2021 from https://nutritionstudies.org/food-apartheid-what-does-food-access-mean-in-america/

Mechanic, D. (1978). *Students under stress: A study in the social psychology of adaptation*. University of Wisconsin Press.

Meyers, M. K., Gornick, J. C., & Peck, L. R. (2001). Packaging support for low-income families: Policy variation across the United States. *Journal of Policy Analysis and Management: The Journal of the Association for Public Policy Analysis and Management*, *20*(3), 457-483.

Monnat, S. M., & Beeler Pickett, C. (2011). Rural/urban differences in self-rated health: examining the roles of county size and metropolitan adjacency. *Health Place*, *17*(1), 311-319. https://doi.org/10.1016/j.healthplace.2010.11.008

Morello-Frosch, R., & Shenassa, E. D. (2006). The environmental "riskscape" and social inequality: implications for explaining maternal and child health disparities. *Environmental health perspectives*, *114*(8), 1150-1153.

Morello-Frosch, R., Zuk, M., Jerrett, M., Shamasunder, B., & Kyle, A. D. (2011). Understanding the cumulative impacts of inequalities in environmental health: implications for policy. *Health affairs*, *30*(5), 879-887.

Morton, L. W. (2004). Spatial Patterns of Rural Mortality. In N. Glasgow, N. E. Johnson, & L. W. Morton (Eds.), *Critical Issues in Rural America*. Blackwell Publishing.

O'Neill, M. S., Jerrett, M., Kawachi, I., Levy, J. I., Cohen, A. J., Gouveia, N., Wilkinson, P., Fletcher, T., Cifuentes, L., & Schwartz, J. (2003). Health, wealth, and air pollution: advancing theory and methods. *Environmental health perspectives*, *111*(16), 1861-1870.

Pak, T. Y., & Kim, G. (2020). Food stamps, food insecurity, and health outcomes among elderly Americans. *Prev Med*, *130*, 105871. https://doi.org/10.1016/j.ypmed.2019.105871

Perdue, S., & Hamer, H. (2019). *2017 Census of Agriculture United States Summary and State Data* (Geographic Area Series, Issue. https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1,_Chapter_1_US/usv1.pdf

Radcliff, E., Gustafson, E., Crouch, E., & Bennett, K. J. (2018). Uptake of Supplemental Nutrition Assistance Program Benefits by Participants in a Home Visiting Program. *Soc Work*, *63*(3), 244-251. https://doi.org/10.1093/sw/swy022

Rank, M. R., & Hirschl, T. A. (1993). The link between population density and welfare participation. *Demography*, *30*(4), 607-622.

Reiheld, A. (2014). Gender Norms and Food Behaviors. In P. Thompson & D. Kaplan (Eds.), *Encyclopedia of Food and Agricultural Ethics*. https://philpapers.org/rec/REIGNA

Rigby, S., Leone, A. F., Kim, H., Betterley, C., Johnson, M. A., Kurtz, H., & Lee, J. S. (2012). Food deserts in Leon County, FL: disparate distribution of Supplemental Nutrition Assistance Program-accepting stores by neighborhood characteristics. *J Nutr Educ Behav*, *44*(6), 539-547. https://doi.org/10.1016/j.jneb.2011.06.007

Rivera, R. L., Dunne, J., Maulding, M. K., Wang, Q., Savaiano, D. A., Nickols-Richardson, S. M., & Eicher-Miller, H. A. (2018). Exploring the association of urban or rural county status and environmental, nutrition- and lifestyle-related resources with the efficacy of SNAP-Ed (Supplemental Nutrition Assistance Program-Education) to improve food security. *Public Health Nutr*, *21*(5), 957-966. https://doi.org/10.1017/s1368980017003391

Rivera, R. L., Maulding, M. K., & Eicher-Miller, H. A. (2019). Effect of Supplemental Nutrition Assistance Program-Education (SNAP-Ed) on food security and dietary outcomes. *Nutr Rev*, *77*(12), 903-921. https://doi.org/10.1093/nutrit/nuz013

Scott, J., Dardas, L., Sloane, R., Wigington, T., Noonan, D., & Simmons, L. A. (2020). Understanding Social Determinants of Cardiometabolic Disease Risk in Rural Women. *J Community Health*, *45*(1), 1-9. https://doi.org/10.1007/s10900-019-00710-0

Seligman, H. K., & Schillinger, D. (2010). Hunger and socioeconomic disparities in chronic disease. *N Engl J Med*, *363*(1), 6-9. https://doi.org/10.1056/NEJMp1000072

Sharkey, J. R., Dean, W. R., & Johnson, C. M. (2011). Association of household and community characteristics with adult and child food insecurity among Mexican-origin households in colonias along the Texas-Mexico border. *Int J Equity Health*, *10*, 19. https://doi.org/10.1186/1475-9276-10-19

Sharkey, J. R., Dean, W. R., Nalty, C. C., & Xu, J. (2013). Convenience stores are the key food environment influence on nutrients available from household food supplies in Texas Border Colonias. *BMC Public Health*, *13*, 45. https://doi.org/10.1186/1471-2458-13-45

Smarr, M. (2020). *Principles of Environmental Justice Advocacy Relevant to Public Health Research [PowerPoint Slides]*. Retrieved 10/21/2021 from http://canvas.emory.edu

Smith, T. M., Bertmann, F. M. W., Pinard, C. A., Schober, D. J., Shuval, K., Nguyen, B. T., Fricke, H. E., & Yaroch, A. L. (2017). Factors Associated With Supplemental Nutrition Assistance Program Participation Among the Working Poor: Findings From 2012 American Community Survey. *Journal of Hunger & Environmental Nutrition*, *12*(2), 169-180. https://doi.org/10.1080/19320248.2016.1146196

SNAP To Health! (n.d.). *The History of SNAP*. Retrieved 11/14/2021 from https://www.snaptohealth.org/snap/the-history-of-snap/

State Office of Rural Health (SORH). (2017). Georgia Rural Counties: Rural Hospital Organization Assistance Act of 2017. In.

Townsend, M. S., Peerson, J., Love, B., Achterberg, C., & Murphy, S. P. (2001). Food Insecurity Is Positively Related to Overweight in Women. *The Journal of Nutrition*, *131*(6), 1738-1745. https://doi.org/10.1093/jn/131.6.1738

Trivedi, T., Liu, J., Probst, J., Merchant, A., Jhones, S., & Martin, A. B. (2015). Obesity and obesity-related behaviors among rural and urban adults in the USA. *Rural Remote Health*, *15*(4), 3267.

U. S. Census Bureau. (2015). *The American Community Survey*. Retrieved 1/9/2022 from https://www2.census.gov/programs-surveys/acs/methodology/questionnaires/2015/quest15.pdf

United States Department of Agriculture. (2021, 08 September 2021). *Definitions of Food Insecurity*. Retrieved 19 October from https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/definitions-of-food-security.aspx

US Census. (2019, 11/4/2021). *State Population Totals and Components of Change: 2010-2019*. US Census Bureau. Retrieved 1/9/2022 from https://www.census.gov/data/tables/time-series/demo/popest/2010s-state-total.html

Waltham, H. (2015). *Waltham Healthy Food Access Survey*. http://www.healthy-waltham.org/wp-content/uploads/2015/06/Waltham-Healthy-Food-Access-Survey.pdf

Wright, A. (2021). *Interactive Web Tool Maps Food Deserts, Provides Key Data*. Retrieved 10/20/2021 from https://www.usda.gov/media/blog/2011/05/03/interactive-web-tool-maps-food-deserts-provides-key-data#:~:text=In%20the%20Food%20Desert%20Locator,supermarket%20or%20large%20grocery%20store

Yakini, M. (2020). *Malik Yakini on Food Apartheid* Youtube, Center for Nutrition Studies. https://www.youtube.com/watch?v=IUeFtaujl7E

Zhang, J., Wang, Y., & Yen, S. T. (2021). Does Supplemental Nutrition Assistance Program Reduce Food Insecurity among Households with Children? Evidence from the Current Population Survey. *Int J Environ Res Public Health*, *18*(6). https://doi.org/10.3390/ijerph18063178