Journal of Agriculture, Food Systems, and Community Development
ISSN: 2152-0801 online
https://foodsystemsjournal.org

"I don't say food desert, I say food apartheid": Community-engaged research to understand food insecurity

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Submitted January 4, 2026 / Revised March 10, May 4, and June 2, 2026 / Accepted June 2, 2026 / Published online August 25, 2026

Citation: Asanzi, A. A., Martin, M. C., Papanek, A., Ajayi, D., Allen-Mitchell, A., Burton, T. C. J., Dixon, B. N., & Monaghan, P. F. (2026). "I don't say food desert, I say food apartheid": Community-engaged research to understand food insecurity. *Journal of Agriculture, Food Systems, and Community Development*, *15*(4), 95–117. https://doi.org/10.5304/jafscd.2026.154.021

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Abstract

Physical access to healthy food in the U.S. has been shaped by social and economic structures that include historical segregation and inequities in neighborhood development and investment. African Americans are most likely to reside in these historically segregated and economically challenged neighborhoods that have fewer healthy food options. Consequently, residents face significantly greater barriers to accessing healthy foods. To better understand the food insecurity experiences and food access needs of residents living in predominantly African American neighborhoods, we used a community-based participatory research (CBPR) approach and partnered with a community advisory board (CAB) in an urban Florida community. The CAB sought to capture the experience of living in a food desert by designing data collection tools, and recruiting and interviewing participants who lived or had family ties in Southeast Gaines-

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ville. Between February and December 2021, the team hosted three online focus groups with a total of 17 adult participants and administered a 35-item survey (N = 103). The survey response showing that 48% could not consistently afford to prepare a healthy meal was used as a measure of food insecurity. Significant predictors of this response were whether the participant also worried about running out of food (OR = 0.181, 95% CI [0.058, 0.561]), used Supplemental Nutrition Assistance Program (SNAP) assistance (OR = 0.515, 95% CI [0.266, 0.997]), and occasionally had to avoid their preferred grocery store for some reason (OR = 0.177, 95% CI [0.049, 0.641]). Over one third (37%) of households reported special dietary needs due to health issues, and many of those (39%) said they had trouble meeting those needs. Two major themes emerged from the qualitative data: navigating the structures of food apartheid and community food solutions. Underscoring the need for CBPR approaches to food systems planning and intervention, these results suggest that local knowledge of the food environment is critical for understanding how households in food deserts experience food insecurity and view potential solutions.

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Financial Support
This research received no specific grant from any funding agency, commercial or not-for-profit sectors.

Conflict of Interest
No potential conflict of interest was reported by the authors.

Keywords
food insecurity, food apartheid, African American, community-engaged research, community-based participatory research, community advisory board, food and health disparities, food environment, healthy food affordability, urban

Introduction

Food and nutrition security (FNS) exists when healthy foods are available, affordable, and consistently accessible in ways that promote wellbeing and prevent diseases (Mozaffarian et al., 2021; Simelane & Worth, 2020). The food environment, that is, where residents access their food, shapes FNS and diet-related health outcomes (Bevel et al., 2023; Caspi et al., 2012; Cooksey-Stowers et al., 2017; Gripper et al., 2022; Karpyn et al., 2020; Kraft et al., 2020; Radulescu, 2021; Reese, 2019; Yamaguchi et al., 2022). Food environments, defined as the availability, accessibility, affordability, acceptability, and accommodation of food (Caspi et al., 2012), are situated in the socioecological model of food systems, where they play a critical role in supporting diets because they represent the daily spaces

Ethical Standards Disclosure
This study was conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving research study participants were approved by the University of Florida Institutional Review Board (IRB 202002389). Verbal informed consent was witnessed and formally recorded from all participants.

Authorship
A. Asanzi drafted the manuscript and incorporated revisions from all authors. She was also involved in formulating the research questions, data collection, and data analysis.
M. C. Martin conducted quantitative and qualitative data analysis, was also involved in formulating the research questions and drafting the initial manuscript.
A. Papanek led the literature review process and conducted qualitative data analysis.
D. Ajayi assisted with reviewing and revisiting the manuscript.
A. Allen-Mitchell assisted with literature review and the design of the study.
T. Burton assisted in developing the manuscript outline and contributed to revising and editing the final draft.
B. N. Dixon supervised research provided guidance on study design and supported data interpretation.
P. Monaghan supervised the research, provided guidance on study design, and supported data collection and data analysis.

and structures in which individuals navigate food systems and access the food options that are available to them (Downs et al., 2020). In this model, food environments do not operate in isolation; rather, they interact with other layers of the food systems socioecological model, such as sociocultural and political environments, sectors of influence, and individual factors (Downs et al., 2020). These various scales of systems are drivers of the food environment, influencing individual food purchases, consumption, and FNS (Downs et al., 2020; Nisbett et al., 2022).

The impact of the food environment on FNS is especially pronounced in lower-income and minority neighborhoods where access to healthy food is often limited (Gripper et al., 2022; Kraft et al., 2020; Reese, 2019). African Americans make up a larger population of those living in food deserts and food swamps, as defined by limited access to supermarkets and nutritious foods and by a high density of fast-food outlets, convenience stores, and highly processed foods (Cooksey-Stowers et al., 2020; Goh et al., 2024). According to Cooksey-Stowers et al. (2020), non-Hispanic Blacks in the U.S. are 38% more likely than non-Hispanic whites to be situated in food swamps. These environments are associated with increased risks of diabetes (Baxter & Park, 2024), metabolic dysfunction (Paik et al., 2025), and obesity rates (Bevel et al., 2023), and higher hospitalization rates (Phillips & Rodriguez, 2019), placing Black communities at higher risks of adverse health outcomes.

While most food systems and public health research consistently show that behavioral choices and socioeconomic disadvantages are linked to food health disparities (Alcott et al., 2019), an expanding body of literature highlights the role of food apartheid, a term describing food systems shaped by racist structures, policies, and institutions that produce inequitable food environments and diet outcomes (Burrell, 2022; Gripper et al., 2022; Odoms-Young & Bruce, 2018). In the U.S., historic and contemporary policies and practices—such as redlining, zoning ordinances, transportation routes, and racial discrimination—have created food apartheid (de Souza, 2024; Gripper et al., 2022; Williams & Collins, 2001). These policies and practices place Black individuals at a disadvantage in accessing quality education, employment opportunities, and healthcare (Gripper et al., 2022; Williams & Collins, 2001). These compounding disadvantages perpetuate socio-economic inequalities, producing disinvested neighborhoods (e.g., food swamps and food deserts) where access to healthy food is severely limited (Gripper et al., 2022; Howerton & Trauger, 2017). While the burden of food apartheid falls disproportionately on low-resourced communities (de Souza, 2024), Black individuals with higher income and education levels are not exempt from its effects, as research shows they too experience a high risk of poor diet quality (Hilmers et al., 2012; McCullough et al., 2022).

The complexity of healthy food access and its interconnectedness with socio-economic disadvantages, racist structures, systems, and institutions requires a collaborative approach and the involvement of various stakeholders (Burrell, 2022). Community-based participatory research (CBPR), one of the most used community engagement approaches to engage disadvantaged communities (De Las Nueces et al., 2012; Fleming et al., 2023; Riccardi et al., 2023), enables this type of collaboration. CBPR uses a partnership approach to research and involves community members, practitioners, and academic researchers in the inception, development, implementation, evaluation, and dissemination of knowledge (Doustmohammadian et al., 2022; Israel et al., 2010, 2013; Rollins et al., 2021).

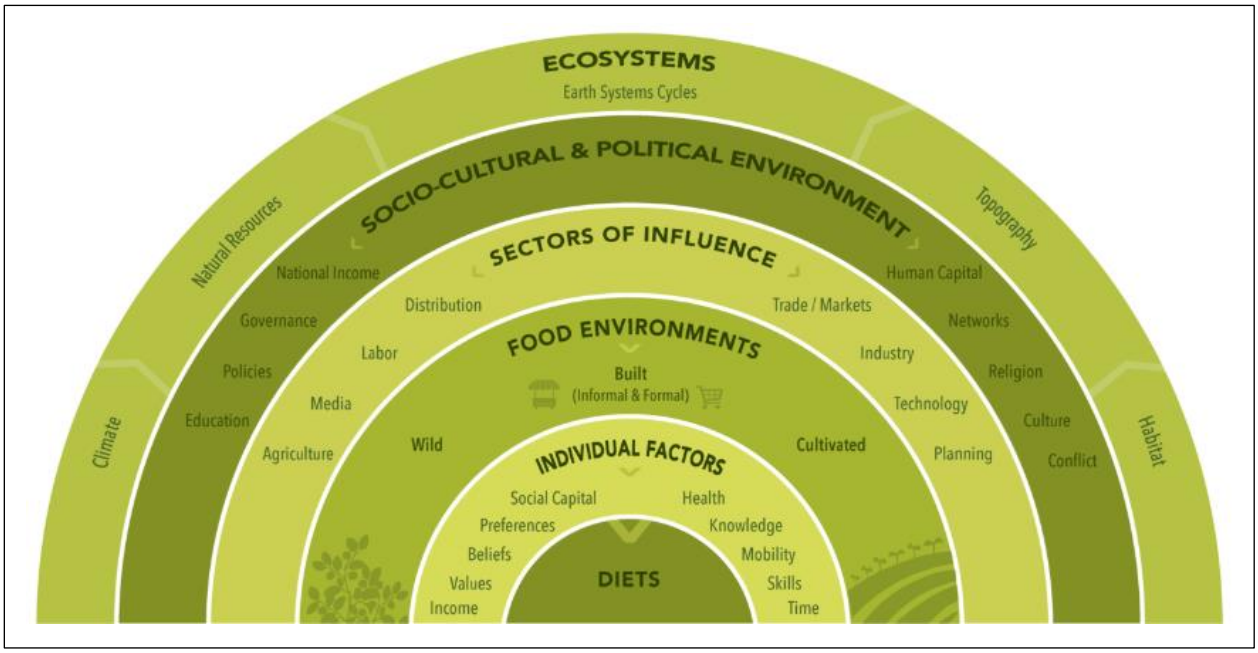
There are different levels of engagement in CBPR, and community members must be involved in at least one of the following stages: identifying the problem, recruitment, intervention development, data collection, and/or dissemination of results (Riccardi et al., 2023). The engagement framework of CBPR makes it a powerful tool to empower communities by building capacity within the community through the research process and involving residents in decision-making (Breland-Noble et al., 2024). Prior research has identified positive outcomes when CBPR was used in health promotion projects. These outcomes included equal partnerships with researchers, increased capacity of community members to create projects that address community needs, improved cultural

sensitivity, and a better dissemination of results (Ortega et al., 2018; Riccardi et al., 2023). While CBPR offers tools and guiding principles to address social and health inequities by engaging with historically disadvantaged communities (e.g., ethnic minorities, Black and Brown communities [Breland-Noble et al., 2024; Fleming et al., 2023]), its implementation is not without challenges. Specifically, the fluid and often ambiguous roles and responsibilities of community members, the devaluation of their knowledge and lived experience, their limited decision-making power, and the inconsistent communication between researchers and community members challenge CBPR's ability to erase inequities and achieve positive outcomes (Ortega et al., 2018; Riccardi et al., 2023).

Decades of community advocacy, public health research, and scholarship on structural racism (Antrum et al., 2024; Black et al., 2014; Cooksey-Stowers et al., 2017; Gripper et al., 2022; Hilmers et al., 2012; Odoms-Young & Bruce 2018) have documented the relationships between race, food access, and poor health outcomes in the U.S. Federal policy responses include the U.S. Department of Agriculture (USDA) Healthy Food Financing Initiative (HFFI) created in 2010 by the Obama Administration to build healthy food stores in historic urban and rural food desert areas (Morland et al., 2022). HFFI is a critical funding mechanism to bring healthy food access to underserved communities (Morland et al., 2022). However, despite the promises of HFFI, low-income and minoritized (or disinvested) communities continue to be impacted by the complex, multilevel ramifications of unequal geographic access, structural racism, and systemic lack of investments to build healthy food systems (Joyner et al., 2022). Because of these factors, policy initiatives and even increasing the physical access to healthy food have demonstrated limited impacts (Allcott et al., 2019; Campbell et al., 2020; Cummins et al., 2014; Dubowitz et al., 2015; Elbel et al., 2015; Packer, 2017; Wright et al., 2016).

A more complete understanding of the multiple factors that shape food and nutrition factors, such as the food systems socioecological model (see Figure 1), also highlight the individual factors that are involved, such as income level, lower education attainment, and insufficient nutrition knowledge (Alcott et al., 2019; McCullough et al., 2022). Beyond individual factors, socio-cultural influences further complicate the relationship between food access and food and nutrition out-

Figure 1. The Socioecological Model of Food Systems



Source: Downs et al., 2020, p. 5.

comes. These outcomes are shaped by social norms, cultural practices (Nisbett et al., 2022), and long-standing purchasing habits rooted in what has historically been available and affordable in local food environments (McCullough et al., 2022; Reese, 2019). Together, these barriers highlight a critical gap in current interventions in food environments, underscoring the need for multilevel approaches that target all layers of the socio-ecological model of food systems.

Often used interchangeably with food sovereignty, food justice has emerged as a response to food system inequities (or food apartheid) that particularly affect disadvantaged communities (Clapp, 2024; Murray et al., 2023). The concept of food justice aligns with social justice goals by advocating for the recognition of human rights, equal opportunity, fair treatment, community participation, and community-specific solutions to food inequities (Murray et al., 2023). It encompasses a transformative approach that goes beyond addressing food affordability, availability, and access.

Study Context

The current study was conducted by a partnership organized by the Grace Grows Community Food Project (GGCFP), a CBPR initiative led by Grace Grows, a local nonprofit organization dedicated to improving local food sovereignty in north-central Florida. The GGCFP team included local leaders, nonprofit staff, volunteers from the Southeast Gainesville community, and graduate students and faculty from the University of Florida (UF) in the Department of Agricultural Education and Communication (AEC), the Department of Family, Youth, and Community Sciences (FYCS), and the College of Public Health and Health Professions (PHHP). The GGCFP was launched in 2021 with the primary goal of conducting a needs assessment to understand the healthy food challenges faced by households in Southeast Gainesville. By incorporating community perspectives through CBPR, the study aims to understand how households navigate structural food environments and the types of barriers to healthy foods.

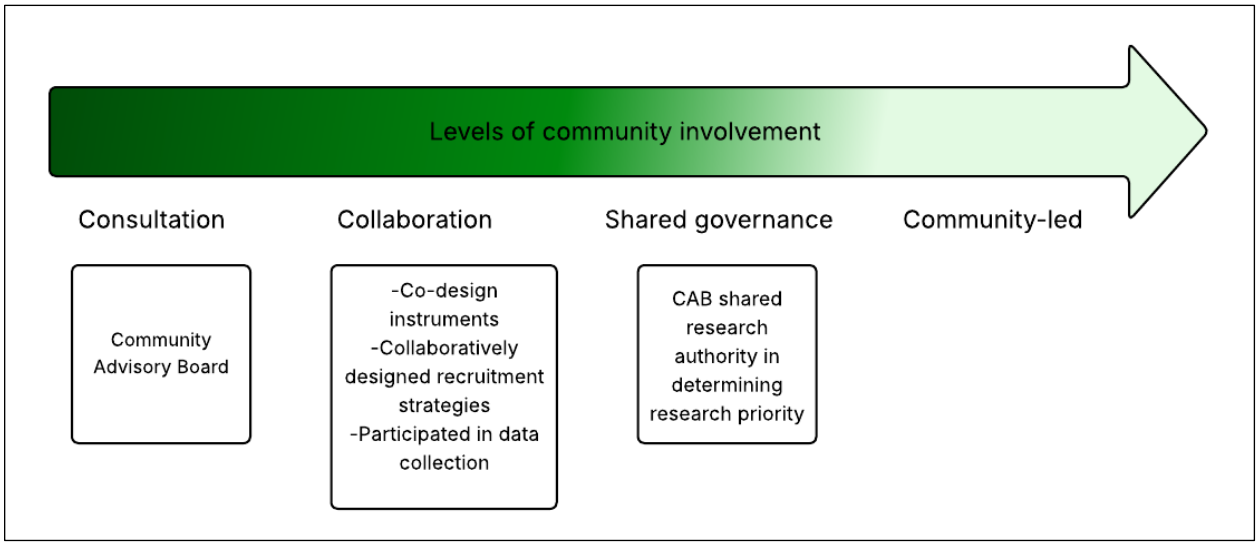
Research Methods

This research was co-designed and administered through both qualitative focus group discussions (three groups) and a quantitative survey (Israel et al., 2010), following a sequential mixed-methods approach comprising a three-phase process (Creswell & Clark, 2017). The first phase entailed two focus groups with residents of Southeast Gainesville, many of whom were parents of school-age children. The second phase was the design and implementation of a survey instrument with the CAB. The third phase involved the final focus group to review and synthesize findings. Institutional review board approval was obtained from the University of Florida (IRB 202002389).

Selection and Engagement with the Community Advisory Board

The community was engaged in nearly all early stages of the study, from the initial development of the research project through data collection (Riccardi et al., 2023). A panel of Project Advisors consisting of leaders in local food justice activities nominated 40 community members who lived or worked in Southeast Gainesville to be considered for the CAB. Fifteen community members (11 females and 4 males), all of whom identified as African American, agreed to participate and were ultimately included in the final CAB. Their eligibility to participate was based on criteria such as community leadership, lack of traditional recognition in position of power, past involvement in food systems, lived experience with food insecurity, and leadership in faith, arts, or social safety networks in the Southeast Gainesville community. The CAB members convened for six monthly meetings and were compensated US$200 per meeting. The members were trained in IRB principles and how to conduct interviews. Additionally, CAB members supported recruitment efforts by identifying potential participants for the study and recommending locations for data collection. Following data collection and analysis, the Project team shared preliminary results of the focus groups and the survey with the CAB to gather insights and develop steps forward. Considering the level of engagement in CBPR as a continuum (see Figure 2), this project was characterized by consultation, collaboration, and shared governance (Carlson et al., 2006; Israel et al., 2010; Pine & de Souza, 2013).

Figure 2. Continuum of Community Engagement Demonstrating This Project's Levels of Collaboration and Participation in the CBPR Framework



Instruments

Data collection tools included focus group questionnaires and a 35-item survey co-designed with the CAB.

Focus Group Development

The Project team created the first focus group discussion (FGD) questions, and two were conducted prior to the survey. This instrument included 10 semi-structured questions on the lived experiences of food insecurity, barriers to food access, dietary needs, community food and health knowledge, use of food assistance, and community-driven solutions (see Appendix A). Using the FGD findings, the Project team and the CAB, collectively referred to as the Research team, developed a preliminary survey. The survey results were then validated in the third focus group with revised questions that captured new emerging themes and topics from the survey (Collins et al., 2006). As a result, the third focus group included additional questions focused on community assets that facilitate food access, solutions to food access challenges, nutrition and culinary education needs, gardening educational needs, barriers to gardening, definitions of healthy eating, existing food resources, and visions for a food-secure future.

Survey Development

The first two focus group results and feedback from the CAB shaped the survey questionnaire so that it would highlight the barriers and facilitators of access to healthy food. The first draft of the questionnaire was presented to the CAB, who then revised the survey questions. The CAB added questions on the definitions of healthy food, perception of dietary health, and frequency of how often they could not afford to prepare a healthy meal (Questions 6, 7, 8; see Appendix A). They also revised questions related to food access, special household dietary needs, and barriers to access (Questions 12 and 14, see Appendix A). Notably, the CAB introduced questions about shopping behaviors, such as "where do you shop?", "have you ever avoided shopping there because it was too difficult?", and "what made it difficult?" Finally, the CAB added questions about food assistance programs, including the Supplemental Nutrition Assistance Program (SNAP) and the Special Supplemental Nutrition for Women, Infants, and Children (WIC), and whether these programs helped meet the food needs of the household. The CAB recommended retaining only one item from the USDA Food Security Module: the question assessing how often households worried about running out of food. The result was a 35-question survey including mostly closed-ended Likert-style, yes/no

responses, and seven open-ended questions. It was pilot tested with members of the CAB. The CAB reviewed the pilot test results in a consensus-driven discussion to determine the importance and relevance of each question and then modified the language and content of questions based on priorities, perceived needs, and interests of the community. Table 1 presents CAB-prioritized topics assessed during the survey.

Sample

All participants in both the FGD and survey were recruited using purposeful and convenience sampling, appropriate methods for studying disadvantaged populations (Golzar et al., 2022; Koch & Emrey, 2001; Palinkas et al., 2015). Across all phases of research, the participants' eligibility criteria were that they were (1) 18 years or older, and (2) living, working, or had family in Southeast Gainesville. Since the study location was in predominantly English-speaking African American neighborhoods, all recruitment and research materials were only available in English. In total, participants were recruited across nine neighborhoods of the city where there is a history of structural inequality despite decades of attempts to address it (University of Florida Bureau of Economic and Business Research [BEBR], 2018). East Gainesville has the highest concentration of people living in poverty and those identifying as racial and ethnic minorities in the city of Gainesville (BEBR, 2018; Renaissance Planning Group, 2003). Almost all of Southeast Gainesville is classified as a food desert (USDA Economic Research Service, n.d.).

During the first phase of the research, FGD participants were recruited with the help of the Project Advisors. In the second phase of the research (the survey), participants were recruited from locations or households suggested by the CAB and through intercept recruitment by going door-to-door and approaching caregivers during school pick-up hours to invite them to participate in the study. During door-to-door recruitment, when more than one individual was present in a

Table 1. Survey Topics Prioritized by the Community Advisory Board (CAB)

Constructs	Survey topics/questions
Food access experiences	● Preferred grocery store and why ● Unable to shop at preferred grocery store and why ● Access to transportation ● Asking others for a ride or to help to pick up food ● Worry about running out of food *(only question from the USDA Food Security Module that was retained)*
Healthy foods	● Definition of healthy food ● How often one cannot afford to prepare a healthy meal ● Perception of healthiness of their own diet
Special dietary needs	● Description of special dietary needs ● Difficulty buying food that fits within special diet needs
Interest and willingness to participate in community garden	● Interest in fruit and vegetable gardening, including receiving training for self and for children ● Gardening resources available in the community
Food assistance program use and experiences	● Frequency of food assistance use such as WIC, SNAP,[a] food pantries ● How often food assistance fits household diet needs ● Satisfaction with the quality of food ● Food assistance covers the full month
Community assets	● What residents value about the neighborhood ● List of organizations that you are involved in ● How you stay involved in the community

[a] WIC is the Special Supplemental Nutrition for Women, Infants, and Children; SNAP is the Supplemental Nutrition Program (formerly known as food stamps).

household, the available caregiver was asked to complete the survey. When no adults were present in the household, a copy of the survey along with the Qualtrics survey link was left behind. Information on household characteristics is presented in the results. In the third phase of the research (third focus group), participants who had participated in the survey were recruited using the contact information they had provided.

Data Collection

Two focus groups were conducted in February 2021 with 10 participants total (five participants in each one). Between June and November 2021, the survey was administered in person and self-administered online to a total of 103 respondents. In-person survey administration lasted approximately 30 minutes and was conducted in participants' homes and public spaces, with two members of the research team present for each session. All survey data were recorded as typed responses, whether entered by participants directly or transcribed by interviewers. The third focus group, which included seven participants recruited directly from the survey sample, was held in November 2021 to review survey findings and validate emerging themes. All focus group discussions lasted approximately 60 to 90 minutes and were conducted using Zoom video conferencing (Boland et al., 2022). They were facilitated by a community leader from the research team. Two additional members of the research team were also present as observers. The focus group discussions were audio recorded, deidentified, and transcribed verbatim by a member of the research team using Zoom-generated transcripts as a starting point, followed by cleaning and editing. Consent was obtained verbally for all data collection activities. For participants who self-administered the survey, consent was recorded when the participant agreed to participate using the Qualtrics link to begin the survey.

Data Analysis

Each dataset was analyzed separately. Data analysis was completed by three members of the Project team (two graduate students and one independent researcher), hereafter referred to as analysts. Preliminary results were presented to the CAB.

Qualitative Data Analysis

Qualitative analysis was conducted in MAXQDA 2022 (VERBI Software, 2021) using a structured codebook and an iterative process using both a priori and inductive codes. The analysts met weekly with senior research staff to discuss, review, and define the codes. A second round of coding was conducted to refine and merge codes and to identify prominent themes (Saldaña & Omasta, 2016).

Quantitative Data Analysis

Findings from the focus group data indicated that the ability to afford healthy meals was a significant barrier to food access. Therefore, the primary outcome variable was households' ability to afford healthy meals. This outcome was derived from responses to the survey question, "In a typical year, how often was there a time that you could not afford to prepare a healthy meal?" Healthy foods were defined by participants in the survey through an open-ended survey question. Responses to this question, along with other open-ended questions, were analyzed using content analysis.

Descriptive statistics and binary logistic regression analysis were conducted in SPSS. Descriptive statistics included frequency, means, standard deviation, correlations and chi-square analysis. For analytic clarity and to enhance statistical robustness, the four- and five-point Likert scale items were simplified into binary indicators of 'never' versus all other responses (e.g., often, sometimes, occasionally) to simplify interpretation, reduce sparsity in response categories, and support the assumptions of chi-square and logistic regression (Boone & Boone, 2012; Dolnicar & Grün, 2013). A binary logistic regression was selected because the outcome variable was dichotomous (LaValley, 2008). All predictors were entered simultaneously into the logistic model and their odds ratios were estimated. The ability to afford healthy meals was recoded from a four-point Likert scale to a binary variable, where ability was coded as 0 and inability as 1. Model fit was assessed using the omnibus test of model coefficients. Independence of observations was assumed as each participant contributed one survey response and no repeated measures were included in the analysis. The independent variables were also not highly correlated with each other.

Therefore, we tested the relationship between the dependent variable (the ability to afford healthy meals) and predictors such as worrying about running out of food, use of public transportation, receiving SNAP benefits, and avoiding a preferred grocery store for any reason. Age was included as a covariate.

Results

Table 2 provides the descriptive statistics of the survey sample (N = 103). Demographic data was not collected for focus group participants. More than three-quarters of survey respondents (86%) completed the survey with an interviewer and 14% of respondents self-administered the survey using a Qualtrics link. Forty-two percent of respondents used SNAP and 11% used WIC benefits at least once in the past year. Forty percent of respondents reported worrying about running out of food, 37% indicated that food assistance was sufficient to meet their household food needs for the entire month, and the majority (84%) reported that when food assistance was received, it often or always aligned with their household's dietary needs.

Table 2. Survey Respondent Demographics

	Full Sample	
Characteristic (N = 103)	***n***	**%**
Gender (n = 94)		
Man	19	20.2
Woman	75	79.8
Race/Ethnicity (n = 95)		
American Indian or Native American	4	4.2
Asian	1	1.1
Native Hawaiian or Other Pacific Islander	1	1.1
Black of African American	81	85.3
White	8	8.4
Hispanic/Latinx	4	4.3
Other	8	8.4
Education Level (n = 96)		
Some high school	8	8.3
High school diploma or GED	19	19.8
Some college (no degree)	29	30.2
Trade/technical/vocational training	4	4.2
Higher Education (bachelor, master, doctorate)	36	37.6
ZIP Code (n = 95)		
32641	79	77
32601	5	5
32608	3	3
Other	8	8
Characteristics (N = 103)	**Mean**	**SD**	**Range**
Participant Age (n = 91)	54.6	16.4	67
Household Size (# of adults) (n = 94)	1.84	0.83	3
Household Size (# of children) (n = 92)	0.90	1.32	5
SNAP assistance (n = 97)	2.12	0.98	4
WIC (n = 98)	1.63	1.42	4

Quantitative Results

The section presents the quantitative results. Associations between the ability to afford healthy meals with special dietary needs, food access experiences, worry about running out of food, and avoiding a preferred store were assessed using chi-square analysis. This was followed by a logistic regression analysis to examine the barriers to affordability.

Dietary Restrictions

As a result of pre-existing health conditions, over one third (37%) of the survey respondents reported having special dietary needs in their households, and 38 of them identified such special dietary needs. Those with special dietary needs in their households reported having trouble meeting such needs within the past month (39%). Respondents with affordability challenges were more likely to report trouble meeting special dietary needs, although this

association was not statistically significant (χ^2 = 2.51; p = .11). While 22 respondents reported health conditions experienced either personally or by a family member, including diabetes (n = 7), food allergies (n = 5), food intolerances such as lactose intolerance (n = 5), elevated cholesterol (n = 2), Crohn's disease (n = 2), and dementia (n = 1), 25 identified foods they avoided due to these conditions. Although hypertension was not specifically mentioned as a health concern, six respondents indicated that they had reduced sodium in their diets.

Food Access Experiences: Navigating Food Access Through Social Networks and Transit

Assistance from social networks to obtain food was an important variable for understanding how residents navigate the food environment. Survey data indicates that 34% of participants had asked their neighbors for help getting groceries at least once a month. This help specifically involved either receiving a ride to the store or having groceries picked up for them. Among these participants, a high percentage (64%) reported sometimes not able to afford a healthy meal. Spearman's correlation analysis found a significant association between these two variables (ϱ = -.238). Using public transportation to get groceries was also associated with whether the respondent could consistently afford a healthy meal in both Spearman correlation (ϱ = .314) and chi-square analyses (χ2 = 9.570; p = .002). Household composition, specifically the number of children in the household, was significantly associated with whether the participant could consistently afford a healthy meal using Spearman correlation analysis (ϱ = -.372).

Barriers to Affordability

Participants defined healthy foods across six themes: food categories (n = 53), food to avoid or eat moderately (n = 34), production practices (n = 32), consumption practices (n = 29), and nutrients (n = 19). Food categories were the most frequently cited theme with participants most commonly referring to fruits and vegetables (n = 52), meat (n = 14), and grains (n = 8). The most cited foods to avoid or eat moderately were sugar (n = 10), additives (n = 7), and meats (n = 7). Examples of production practices included fresh (n = 20), unprocessed (n = 8), and organic foods (n = 7). Almost half of respondents (48%) reported that they could not consistently afford to prepare a healthy meal. Variables that were associated with the ability to afford healthy meals were examined for inclusion in the logistic regression. Whether an individual was ever unable to afford a healthy meal was significantly associated with worry about running out of food in both Spearman correlation (ϱ = .448) and chi-square analyses (χ^2 = 19.079; p = .001). Having to avoid a preferred store for any reason was also associated with whether an individual was ever unable to afford a healthy meal in both Spearman correlation (ϱ = .284) and chi-square analyses (χ^2 = 7.723; p = .005). Spearman correlation analyses found significant associations between the use of both SNAP (ϱ = .280) and WIC (ϱ = -.354) and those who were unable to afford a healthy meal. Chi-square analyses were conducted using binarized variables for SNAP (0 = no, 1 = yes in the past year) and WIC (0 = no, 1 = yes in the past year). Both analyses were statistically significant (SNAP: χ^2 = 11.739, p = .003; WIC: χ^2 = 11.309, p = .004).

Predictors for the logistic regression model were selected based on a bivariate analysis, whereby variables demonstrating a statistically significance ($p < .05$) were considered for inclusion in the logistic model. Variables were then iteratively added and removed based on changes in overall model fit. The final binary logistic regression model is presented in Table 3. The strongest predictors of the ability to afford a healthy meal were worry about running out of food (OR = 0.181, 95% CI [0.058, 0.561]), ever avoiding a preferred store for any reason (OR = 0.177, 95% CI [0.049, 0.641]). The model indicated that worry about running out of food, ever having to avoid their preferred store, and using SNAP assistance, are significant predictors of the ability to consistently afford a healthy meal (alpha value of .05).

Survey data also provided additional information on what made it difficult to afford healthy meals. Specifically, in the open-ended questions, respondents described several barriers to the preparation of healthy meals, including the cost of healthy food and available income (n = 34), food

Table 3. Binary Logistic Regression Results

Predictors	Coefficient	Standard Error	Wald	df	*p*-value	Odds Ratio	95% CI Lower	95% CI Upper
Worry about running out of food	–1.709	0.577	8.772	1	0.003	0.181*	0.058	0.561
Having to avoid a preferred store	–1.730	0.656	6.954	1	0.008	0.177*	0.049	0.641
SNAP assistance	-0.664	0.337	3.882	1	0.049	0.515*	0.266	0.997
Public transportation use	0.255	0.860	0.088	1	0.767	1.291	0.239	6.964
Age	0.021	0.019	1.282	1	0.258	1.022	0.984	1.060
Constant	1.593	1.450	1.206	1	0.272	4.918		

* Indicates statistically significant results at .05 level.

access and availability (n = 30), lack of interest or motivation (n = 21), and lack of time (n = 19).

While survey results highlight individual barriers to healthy diets, the focus group data presented below offer a community perspective on the food environment and how it shapes food insecurity and healthy food access, while also providing additional context on affordability challenges.

Insights from Focus Group Data

Two major themes related to participants' lived experience with food access emerged from the qualitative data. The themes included "navigating the food apartheid environment" and "community food solutions."

Theme 1: Navigating the Food Apartheid Environment

Under this theme, participants described interconnected structural and individual challenges that characterize the food environment. These include the cost of transportation and other household financial obligations. They also identified institutional disinvestment in their community and limited physical access to grocery stores as additional barriers to the access and affordability of healthy foods.

Participants described making trade-offs between purchasing food and meeting other necessities, including medication, transportation, and household expenses: "What makes it worse is having to choose between food and blood pressure medicine, food and medication, food and transportation. So, it's always, what's more important?" (Focus Group 1 participant). One participant explained that having to choose between food and transportation often led individuals to make less healthy food choices: "You gotta get on two buses to get over there [to a popular grocery store], are you going to go? No. You're going to go to McDonald's and get that two-for-three and call it a day" (Focus Group 2 participant).

Participants felt that their community was overlooked or neglected by the local government and private sectors. They suggested increasing access to healthy foods by building more grocery stores could improve healthy food access; however there was little to no incentive for the city or retailers to invest in their communities:

> I know, a lot of times we hear the City and the County: "Don't nobody want to put a grocery store over there. They don't want to do it. They don't want to invest. … Look. The City and the County do a lot of things with private funds, okay? So, they do what they gotta do to get what needs to be done to be beneficial for them. (Focus Group 1 participant)

Focus group participants discussed two defining features of their food environment: limited accessibility and persistent food insecurity. Limited access to grocery stores due to distance or lack of reliable transportation created additional concerns for families and vulnerable individuals in their community who would have relied on these families to access food. This situation as illustrated below weakens community solidarity:

> Because of accessibility, families are more worried about how they're going to get to the store than how they're going to get Ms. Ethel her groceries also. So, it creates a whole host of problems. It's like a domino effect. Things that you could be doing, but because of accessibility, everyone has to think about themselves and their families. And Ms. Ethel sure can't get to the store. You understand? So, it creates a whole host of problems. (Focus Group 1 participant)

These discussions revealed that participants understood food insecurity as fundamentally tied to a structural problem of the food environment, particularly the type of foods that were available:

> Oh sure, so when I think of food insecurity, I think of the accessibility of healthy affordable food, and so I believe. I don't want to call this area a food desert; I think that might be inaccurate, because there are farms over here, but this is definitely a food insecure area, because after a certain hour, you're not going to be able to get anything except deep fried junk that you're going to eat, tastes good, and then your stomach is going to be hurting within the next hour after eating it. (Focus Group 2 participant)

Additionally, they also commented on the disparity in access to different food choices between the east and west sides of Gainesville. The disparity in access to healthy food is described as food apartheid, as illustrated in the following quote:

> I don't say food desert, I say food apartheid. Because that's exactly what it is. So, then, that creates food insecurity. … If I don't live close to a grocery store where I can get three for $10, and the only thing that's around me are dollar stores and convenience stores and I have to go buy that one item for $5, then that's creating food insecurity for me because I live somewhere where there's food apartheid going on. (Focus Group 1 participant)

Theme 2: Community Food Solutions

The focus groups actively engaged participants to explore solutions they have used successfully, as well as additional strategies that could help build a community free of food insecurity. Participants in the earlier focus groups focused their suggestions more on local grocery stores, healthier options in convenience stores, or smaller produce markets in the neighborhood. For example, one participant said:

> I went to Tallahassee one weekend, and I ran into one of those co-op stores that was built right in the middle of a marginalized community. He had food, he had drinks, he had candy, they had cooking on site for the community to come in and get the things that they need. (Focus Group 1 participant)

Other key recommendations, particularly from the third focus group, included educational programs for children (e.g., gardening), offering cooking classes for adults and children, and developing educational programs (e.g., nutrition, gardening) that emphasized experiential learning through real life examples, community testimonials, and opportunities to experience the benefits, as illustrated in the following example:

> If I see someone who is heavier and I know that person right here in Gainesville. … And in three months to whatever, they're talking about, "We started in December, and six months later in June, we're living a healthier life, I'm happier, I'm stronger, I can do this with my child. We're in this program." If I can see it and I know that person … even if I don't know that person, they're still right here in my community, it kinda hits home. And maybe that person cannot just be a person who does it, but they can be an ambassador, and they can help in that garden, and because being that they're in my area, they know my lingo, they know how hard I work, they know I'm a single parent, they know what it's like because they were that person. And they did it, and I literally can see, "Okay, you did it; I can do it too." (Focus Group 3 participant)

However, a few participants observed that food-related programs in their communities were unsustainable. They believed that certain resources, such as community gardens, were underutilized:

> What's the library down the street's name? [trying out possible names] They have a community garden, but I never really see anyone using it, so maybe there's just not enough people knowing about it. [another participant suggests the Cone Branch] Yes. With the track in the back. That's it. Yeah, there's a community garden there. I've never seen anyone actually out there. So maybe it's just people just not knowing about it. (Focus Group 3 participant)

These qualitative results reveal the difficulties of navigating a food apartheid environment that forces households to overcome multiple barriers in order to access healthy foods. Individual factors such as lack of transportation, special diets, or the cost of medication further increased the barriers to healthy foods. Participants saw a lack of institutional support for healthy food access. In response to these structural barriers, participants emphasized the need for programs that were practical, sustainable, and tailored to their needs.

Discussion

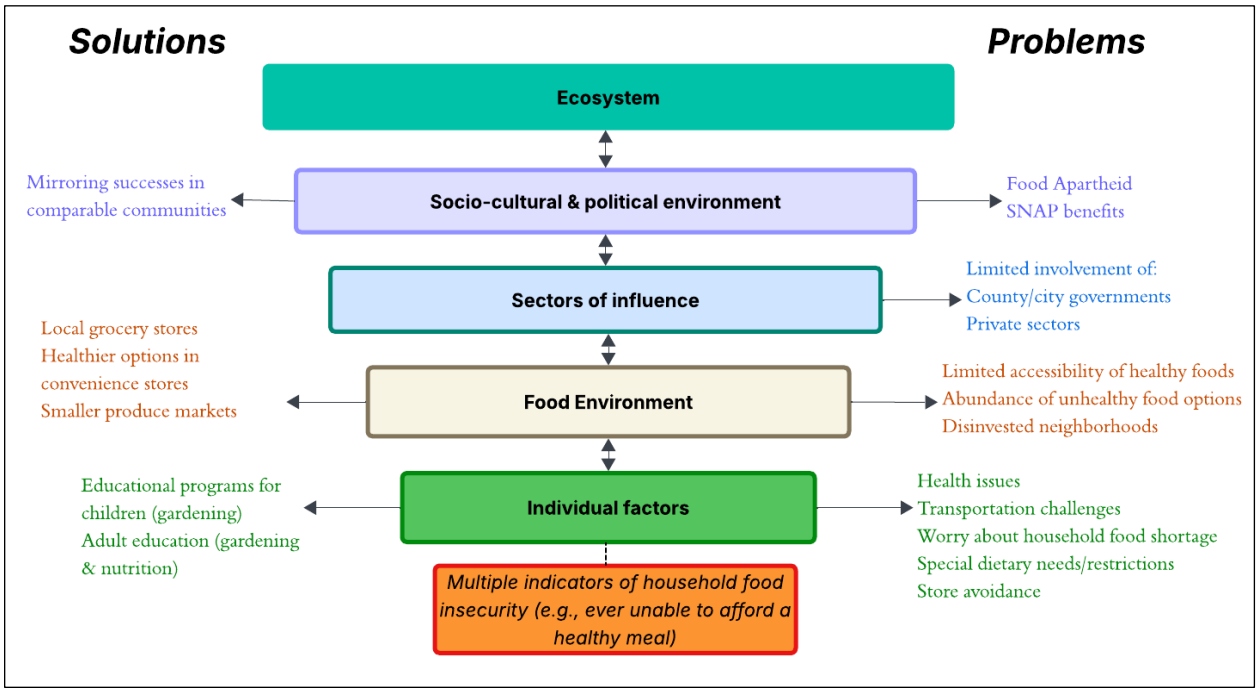
While there is extensive literature describing the food environment of low-income communities (Black et al., 2014; Caspi et al., 2012; Cooksey-Stowers et al., 2017; Gittelsohn et al., 2008; Karpyn et al., 2020), there are fewer studies that have used CBPR to understand the perceptions of those who navigate this environment (Rollins et al., 2021; Shisler et al., 2023). In this study, we engaged members of a CAB to explore residents' perceptions of their food environment and the challenges they face in securing a healthy diet.

Our results demonstrate that community engagement is critical for understanding food systems disparities. The forward-looking, empowerment-focused, and community needs-centered nature of CBPR (Ortega et al., 2018; Riccardi et al., 2023) helped us to better understand the lived realities of communities affected by food insecurity. One key insight was suggested by the CAB and it captured the consistency of affording a healthy meal. This was a key indicator through which food insecurity was understood and felt by community members. Our results are grounded in the practical and daily struggles of accessing nutritious foods in a food apartheid environment. These results have yielded insights that both align and extend the existing literature that use other measures of food insecurity.

A key finding of this study is the relationships between the ability to consistently purchase healthy meals, individual factors, the food environment, and sectors of influence (Figure 3). Prior research has largely examined these constructs and found significant associations between healthy eating and household challenges, neighborhood food availability (Karpyn et al., 2020; Zorbas et al., 2018), and access to a private vehicle (Wright et al., 2016). Our results strengthen this body of work by suggesting that these same factors also operate upstream, shaping whether individuals can afford healthy meals. Also notable is the inverse relationship found between SNAP benefits and the ability to afford a healthy meal, corroborating evidence from Alawode et al. (2023), Rivera et al. (2019), and Verghese et al. (2019), that SNAP may be falling short in reducing food and nutrition insecurity.

Beyond affordability, participants saw deeper structural issues rooted in policy decisions, disinvestment, and structural racism, which are common in Black and Brown communities (Gripper et al., 2022). Researchers commonly refer to these experiences as food apartheid (de Souza, 2024; Gripper et al., 2022). The intersection of racially patterned food environments and individual factors, such as health and transportation challenges, makes accessing healthy diets even more challenging. This was evident among focus group participants who discussed the tradeoffs some individuals must make between food, medicine, and transportation. Additionally, adhering to dietary restrictions in food swamps may be especially challenging for individuals with chronic illnesses, as evidenced in the survey data. The challenges of maintaining medically recommended diets in food swamp environments create a double burden for Black communities, who are 38% more likely to live in such environments (Cooksey-Stowers et al., 2017), 73%

Figure 3. Summary of Participants Lived Experience with Food Insecurity in the Socioecological Model of Food Systems



more likely to have diabetes (Cheng et al., 2019), and 44% more likely to have hypertension than white people (Aggarwal et al., 2021).

While studies have shown that food and nutrition indicators together are far more effective than food security markers alone (Mozaffarian et al., 2021; Simelane & Worth, 2020), this study demonstrates that centering community knowledge can uncover lived experiences with food and nutrition insecurity. Finally, the solutions proposed by participants (such as community gardening) align with those Gripper et al. (2022) found common in communities affected by food apartheid. Solutions such as increasing the availability of grocery stores and healthier options in convenience stores already have existing implementation mechanisms, such as the Healthy Food Financing Initiative. Therefore, leveraging existing policies, while addressing their limitations, represents a critical opportunity to translate community knowledge into equitable food systems change.

This study has several limitations. Validated measurements of healthy eating and FNS outcomes (e.g., Healthy Eating Index, FNS Index), were not included in the instrument design. As a result, this limits the extent to which our results are comparable to previous findings and constructs of FNS and healthy eating. Our sampling design was also another limitation. Data collection was limited to nine purposively and conveniently selected neighborhoods in Southeast Gainesville; therefore, the results presented here may have been different if a probability sampling design had been used. The modest survey sample size (N = 103) also represents a limitation; however, the study's focus on a population that is relatively homogenous in key characteristics helped to capture meaningful associations and patterns within this sample. Although this study achieved a substantial level of community involvement, CBPR requires significant time and resources. As a result, conducting a CBPR project within an academic setting can make it difficult to fully realize community-led engagement. In addition, CAB involvement in data analysis and dissemination was limited, even though the findings were later shared with community stakeholders through a lay report (see Grace Grows, n.d.). Despite these limitations, a key strength of the study remains the CBPR approach as it revealed details that are important to those experiencing

food insecurity in their neighborhoods and households. Additionally, this study took place during the COVID-19 pandemic, thus participants' experiences provide valuable insights of food access during a time of widespread disruption.

Conclusion

The involvement of a CAB represents a substantive contribution to this study and a valuable learning experience for researchers seeking to implement a CBPR. Their involvement in the design and implementation of the project deepened our understanding of residents' barriers to healthy diets and their lived experiences with food apartheid. Thus, the implications of food apartheid are concerning because they often reflect multiple layers of structural issues that a single intervention cannot resolve. While participants suggested that disparities in their food systems could be reduced through interventions that are viable, sustainable, and directly address community needs, we also identify a lack of local institutional support. This gap suggests that community-driven solutions, while useful, may be difficult to sustain without relevant and supportive policies that prioritize equitable food access from city and county governments.



Acknowledgments

The authors would like to thank all participants and community organizations for their contribution to the study. We would also like to thank the data collection team specifically, Latashia Mayze-Brimm, Abigail Perret-Gentil; and Dr. Glenn Israel for his support with data analysis.

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Appendices

Appendix A. Survey

Food Access

1. **This question is going to ask you about where you went food shopping in the last month.**
   a. In the last month, where did you shop for food MOST OFTEN? This could be a farmer's market, grocery store, dollar store, etc.)
      a. How many times did you shop there in the last month?
      b. What do you like about shopping there?
      c. Have you ever avoided shopping there because it was too difficult?
      d. If so, what made it too difficult?
   b. In the last month, where did you shop for food SECOND MOST OFTEN? This could be a farmer's market, grocery store, dollar store, etc.)
      a. How many times did you shop there in the last month?
      b. What do you like about shopping there?
      c. Have you ever avoided shopping there because it was too difficult?
      d. If so, what made it too difficult?
   c. In the last month, where did you shop for food THIRD MOST OFTEN? This could be a farmer's market, grocery store, dollar store, etc.)
      a. How many times did you shop there in the last month?
      b. What do you like about shopping there?
      c. Have you ever avoided shopping there because it was too difficult?
      d. If so, what made it too difficult?

2. **How often do you use public transportation to get groceries?**
   - Always
   - Often
   - Sometimes
   - Occasionally
   - Never

3. **How often do your neighbors ask you for help getting to the store or picking up groceries for THEIR households?**
   - Never
   - Once a month
   - A few times a month
   - Once a week
   - More than once a week

4. **How often do you need to ask friends, family or neighbors for help getting to the store or picking up groceries for YOUR household?**
   - Never
   - Once a month
   - A few times a month
   - Once a week
   - More than once a week

5. **In a typical year (prior to COVID-19), how often did you worry that your household would run out of food?**
   - Often
   - Sometimes
   - Occasionally

- Never
- Don't know/don't want to respond

Healthy Meals

6. In a few words, please describe what "healthy food" means to you.

7. Based on your description of "healthy food," how healthy is your diet?
   a. I only eat healthy food
   b. I mostly eat healthy food
   c. I sometimes eat healthy food
   d. I occasionally eat healthy food
   e. I never eat healthy food
   f. Don't know / don't want to respond

8. In a typical year (prior to COVID-19), how often was there a time that you could not afford to prepare a healthy meal?
   - Often
   - Sometimes
   - Occasionally
   - Never
   - Don't know/don't want to respond

9. What are some of the reasons / challenges that prevent you from preparing meals that you would consider "healthy"?

10. In what ways do you see a person's diet impacting their overall health?

Food Waste

11. How often do you have issues with refrigeration or with storing food?
   - Never
   - Occasionally
   - Sometimes
   - Frequently
   - Don't know/don't want to respond

Special Diets

12. Does anyone in your household have any special dietary needs?
   - Yes
   - No
   - Don't know/don't want to respond

13. (If yes to #12) Can you please describe the special dietary needs of your household?

14. (If yes to #13) In the past month, how often did you have difficulties with buying or preparing foods that fit within your household's special dietary needs?
   - Often
   - Sometimes
   - Occasionally
   - Never
   - Don't know/don't want to respond

Community Gardens

15. **How interested or not interested are you in fruit and vegetable gardening at home or at a community garden?**
    - Very interested
    - Somewhat interested
    - Neither interested nor uninterested
    - Not at all interested
    - I'm not sure

16. **Would you be interested in receiving training in fruit and vegetable gardening?**
    - Yes
    - No
    - I'm not sure

17. **How likely or unlikely are you to put your children into a gardening program?**
    - Very likely
    - Somewhat likely
    - Neither likely nor unlikely
    - Somewhat unlikely
    - Very unlikely
    - I'm not sure
    - This question does not apply to me

18. **Please tell us where there are gardens in the SE Gainesville area that offer food to community members, such as Community Gardens, Church Gardens, etc.?**

Food Assistance Programs

19. **In the past year, how often has your household used each of these programs?**

	Never	1-2 times	3-4 times	5 or more times	Don't know or don't want to respond
Food pantries	○	○	○	○	○
Food distribution from a church	○	○	○	○	○
Food distribution from another organization	○	○	○	○	○
Student free meals	○	○	○	○	○
Weekend Food Backpacks or other food backpack program	○	○	○	○	○
WIC	○	○	○	○	○
SNAP	○	○	○	○	○
Fresh Access Bucks	○	○	○	○	○

20. **If you have received food from a food assistance program or pantry, how often does the food fit your household's dietary needs?**
    - Almost always
    - Often
    - Sometimes
    - Occasionally
    - Never
    - Don't know/don't want to respond
    - Not applicable

21. **If you have received food from a food assistance program or pantry, how satisfied are you with the quality of the food you received?**
    - Completely satisfied
    - Somewhat satisfied
    - Neither satisfied nor dissatisfied
    - Somewhat dissatisfied
    - Completely dissatisfied
    - Don't know/don't want to respond
    - Not applicable

22. **If you receive food assistance (such as food stamps), how often does the food you get cover you for the month?**
    - Almost always
    - Often
    - Sometimes
    - Occasionally
    - Never
    - Don't know/don't want to respond
    - Not applicable

Community Assets

23. **What are three ideas you have for improving access to healthy food in your community?**

24. **Of the three ideas you listed previously, what skills, knowledge, or other resources could you provide to make sure one of these ideas is successful?**

25. **What do the residents value about your neighborhood?**

26. **Please list any groups or organizations in which you participate (for example, churches, non-profit organizations, hobby and special interest groups, etc.).**

27. **In what ways do you stay involved with your community?**

Demographics

28. **What is your age?**

29. **How do you identify your gender?**
    - Man
    - Non-binary
    - Woman
    - Prefer to self-describe:
    - Prefer not to respond

30. **What category(ies) best describes you? Feel free to select more than one if applicable.**
    - American Indian or Native American
    - Asian
    - Native Hawaiian or other Pacific Islander
    - Black or African American
    - White
    - Other:

31. **Are you Hispanic or Latinx?**
    - Yes
    - No

32. **What is your highest level of education?**
    - No formal education
    - Some high school
    - High school diploma or the equivalent (GED)
    - Some college (no degree)
    - Trade/technical/vocational training
    - Associate degree
    - Bachelor's degree
    - Master's degree
    - Doctorate degree
    - Professional degree
    - Other:
    - Prefer not to respond

33. **What is your zip code?**

34. **How many adults live in your household (including yourself)?**

35. **How many children (17 years old or younger) live in your household?**

Appendix B. Focus Group Discussions

Questionnaire of focus groups held in February

1. Please describe any challenges you encounter with using public transportation for food.
2. What is the one most important thing that people need to know about households that worry about food running out?
3. What is the single most important thing we can do to help those households facing food insecurity?
4. In what ways do you see your or your neighbor's diets leading to health issues?
5. What do you think is the one most important thing your community needs to know about food and health?
6. How do you solve any challenges you face with buying or preparing foods that fit within your household's special dietary needs?
7. What could be done to make it easier to meet your household's special dietary needs?
8. If you have used food pantries, food distributions, student free meals, weekend food backpacks, WIC, SNAP, Fresh Access Bucks, or any other food assistance program, how useful or not useful do you find them?
9. If you have used food pantries, food distributions, student free meals, weekend food backpacks, WIC, SNAP, Fresh Access Bucks, or any other food assistance program, please provide any suggestions you have for improving the program(s).
10. What effect has the COVID-19 pandemic had on your diet and access to food?
11. As a result of the pandemic, what solutions have you found to help your family or your community to eat?

Questionnaire of focus group held in November

1. What do you see that's special about your community?
2. Think back to the survey you took and the ideas you provided for solutions to address food access. Considering the solutions you gave, how do we make those ideas a reality?
    a. PROBE: Some of the most common things mentioned were a grocery store in the Southeast, community gardening, and educational programs.
3. IF NOT COVERED: In the survey, participants indicated that education is another important priority to help improve healthy food eating in the community. In your opinion, what kind of educational programs can actually be useful and keep people engaged?
    a. IF NEEDED: For example, cooking demonstrations at grocery stores, providing recipes, etc.
    b. PROBE: What topics could the community benefit from learning about?
    c. PROBE: How should the information be shared? For example, online, in person, etc.?
4. What barriers do you see to having gardens as one solution to food access issues in Southeast Gainesville?
5. In the survey we asked you to describe what healthy eating means to you. Can you talk more about what you shared?
6. What can be done to ensure healthy eating is easy for people with any life circumstance or personal interest?
7. What are some of the things that already exist in your community that help give people access to foods they want?
    a. IF NEEDED: For example, this could be something like a neighbor who is great at cooking or fishing, people who share or trade foods, community gardens, food distribution from a church, etc.
    b. What type of support do these programs or services need to continue operating or expand?
    c. How can you and your neighbors use these resources to improve food access in your community?
8. Imagine that five years from now, no one in the Southeast Gainesville community has to worry about running out of food and everyone has access to the foods they want. Is there anything else that we haven't discussed that could make this a reality?