8-1-2023

Association Between Food Insecurity and Type of Food Pantry Visited Among Individuals in Atlanta, Georgia

Kendall Dennis

ACCEPTANCE PAGE

ACCEPTANCE

This thesis, Association Between Food Insecurity and Type of Food Pantry Visited Among Individuals in Atlanta, GA

by Kendall Dennis

was prepared under the direction of the Master's Thesis Advisory Committee. It is accepted by the committee members in partial fulfillment of the requirements for the degree Master of Science in the Byrdine F. Lewis College of Nursing and Health Professions, Georgia State University. The Master's Thesis Advisory Committee, as representatives of the faculty, certify that this thesis has met all standards of excellence and scholarship as determined by the faculty.

_____
Committee Chair

_____
Committee Member

_____
Committee Member

_____
Date

AUTHOR'S STATEMENT

In presenting this thesis as a partial fulfillment of the requirements for the advanced degree from Georgia State University, I agree that the library of Georgia State University shall make it available for inspection and circulation in accordance with its regulations governing materials of this type. I agree that permission to quote, to copy from, or to publish this thesis may be granted by the professor under whose direction this was written, by the Byrdine F. Lewis College of Nursing and Health Professions director of graduate studies and research, or by me. Such quoting, copying, or publishing must be solely for scholarly purposes and will not involve potential financial gain. It is understood that any copying from or publication of this thesis which involves potential financial gain will not be allowed without my written permission.

_____

Signature of Author

NOTICE TO BORROWERS

All theses deposited in the Georgia University library must be used in accordance with the stipulations prescribed by the author in the preceding statement. The author of this thesis is:

Kendall A. Dennis

2222 Clairmont Terrace NE

Atlanta, Ga 30345

The director of this thesis is:

Nida Shaikh, Ph.D., RD

Assistant Professor

Department of Nutrition

Byrdine F. Lewis College of Nursing and Health Professions Georgia State University

Atlanta, GA 30302

VITA

Kendall Dennis
Kdennis16@student.gsu.edu
2222 Clairmont Terrace NE
Atlanta, Ga 30345
404-697-0035

Education:

M.S. Health Sciences, Nutrition
Georgia State University
Atlanta, GA
August 2023 (In progress)

Dietetic Internship
Georgia State University
Atlanta, Ga
August 2023 (In progress)

B.S. Biology
University of North Georgia
Dahlonega, Ga
December 2016

Experience:

Graduate Teaching Assistant – Georgia State University, Atlanta, GA
January 2023 – April 2023

- Prepared quizzes on various micronutrients including calcium, vitamin D, and vitamin E
- Graded student assignments for a class of ~65 students, for both graduate and undergraduate students
- Uploaded grades to Georgia State's online Learning Management platform, known as iCollege
- Maintained open communication with students and answered concerns and questions in a timely manner

Graduate Research Assistant – Georgia State University, Atlanta, GA
January 2022 – December 2022

- Aided in the writing and editing of various grant proposals, including a multidisciplinary grant with a budget of $500,000
- Contributed to manuscripts on topics including feeding in children with cerebral palsy and the nutrition transition in India
- Developed poster for poster presentation at Annual meeting of the American Society for Nutrition
- Conducted literature reviews on various topics including culturally tailored Diabetes Prevention Programs and food insecurity among low-income smokers

- Created study recruitment materials and distributed around Atlanta to recruit study participants with pre-diabetes for a qualitative study
- Managed online shared folders with study documents

Project Coordinator – Acella Pharmaceuticals, Alpharetta, GA
July 2019 – August 2021

- Acquired and maintained FDA Regulatory Guidance and CGMP knowledge
- Responsible for capturing meeting minutes, providing weekly status updates to internal team members, and tracking action items for multiple projects
- Generated project timelines to encompass major milestones, risks, resource allocation, and overall project completion
- Generated and maintained a master calendar to include multiple projects in a consolidated view for team members
- Responsible for tracking overall budgets to scope
- Responsible for maintaining general product knowledge
- Enhanced team collaboration and interdepartmental communication

Associate Product Manager – Avion Pharmaceuticals, Alpharetta, GA
January 2017 – June 2019

- Involved in strategic planning and marketing positioning for dietary supplements and FDA approved drugs
- Worked alongside other departments such as Legal, Regulatory, and Quality to submit, review, and approve materials as a member of a Promotional Review Committee
- Worked alongside marketing agencies to develop and create marketing field tools, as well as construct digital marketing campaigns utilizing paid search, paid social, and programmatic display ads
- Responsible for monitoring emerging clinical data and relevant competitor marketing strategy
- Responsible for planning and coordinating yearly trade show/convention schedule

Published Abstract:
Shaikh NI, Dennis K, Brown J, Airhihenbuwa C, Okosun I. (2022). Protocol for the development of culturally-tailored mHealth messages for a Diabetes Prevention Program (DPP) in new immigrants in the U.S.: a pilot study. *Current Developments in Nutrition* 6(Supplement_1): 1158-1158.

Poster Presentations:
Dennis K, Brooks F, Gundersen C, Wiley K, Shaikh NI. Food insecurity rates and characteristics of adults visiting choice vs. non-choice food pantries. Poster presentation. *American Public Health Association (APHA) 2023 Meeting, Atlanta, GA. November 12-15, 2023.*

Dennis K, Brooks F, Gundersen C, Wiley K, Shaikh NI. Association between food insecurity and pantry type among individuals in Atlanta, Georgia. Poster Presentation. *Lewis College Research Day, Atlanta, GA. April 13, 2023.*

Dennis K, Brooks F, Gundersen C, Wiley K, Shaikh NI. Association between food insecurity and pantry type among individuals in Atlanta, Georgia. Poster Presentation. *Georgia Academy of Nutrition and Dietetics (GAND) Annual Conference and Exhibit, Atlanta, GA. March 3-4, 2023.*

Shaikh NI, Dennis K, Brown J, Airhihenbuwa C, Okosun I. Protocol for the development of culturally-tailored mHealth messages for a Diabetes Prevention Program (DPP) in new immigrants in the U.S.: a pilot study. Poster Presentation. *Annual meeting of the American Society for Nutrition, Nutrition 2022 Live Online. June 14-16, 2022.*

Manuscript under preparation:
Dennis K, Brooks F, Gundersen C, Wiley K, Shaikh NI. Association between food insecurity and pantry type among individuals in Atlanta, Georgia. To be submitted to Journal of Nutrition Education and Behavior in June 2023.

Honors and Awards:
Lewis College Research Day (2023); 3rd place poster presentation titled *Association between food insecurity and pantry type among individuals in Atlanta, Georgia*
Alpha Eta Honor Society (2023)
Magna Cum Laude (2016)

Professional Associations:
- Academy of Nutrition and Dietetics (AND) Member, 2021-present
- Pediatric Nutrition Practice Group (PNPG), 2023-present
- Georgia Academy of Nutrition and Dietetics (GAND) Member, 2021-present
- Greater Atlanta Dietetic Association (GADA) Member, 2021-present

Leadership Roles:
- Chair, Georgia State University Journal Club, August 2021 – July 2022
- Student Liaison, Grady Fresh Food Cart, May 2022 – August 2022

ABSTRACT

Objective: To assess the association between food insecurity and type of food pantry visited.

Design: Secondary analysis of cross-sectional study.

Participants: N=685 adults visiting a choice (n=347) or non-choice pantry (n=338) in Atlanta, GA.

Main Outcome Measure: Type of pantry was the dependent variable. Food security status was the independent variable, assessed using the 18-item Household Food Security Survey Module.

Analysis: Chi-square and Mann-Whitney U tests used to compare variables. Adjusted multivariable logistic regression models developed based on results from bivariate analysis.

Results: Overall, participants were 60 years (IQR: 51-68), majority were female (75.3%), Black (68.3%), and 53.6% were experiencing food insecurity. Participants visiting choice pantries were younger [58 years (IQR: 48-66) vs. 63 years (IQR: 55-69)], had lower participation in the Supplemental Nutrition Assistance Program (35.5% vs 42.9%), and higher rates of food insecurity (59.7% vs 47.3%) ($p<0.05$). The association between food insecurity and pantry type was not significant after adjusting for all covariates (OR = 1.44 [95% CI = 0.97 – 2.13], p=0.07).

Conclusion and Implications: Food insecurity was not a factor that influenced type of pantry visited, however, age, income, and proximity to home address were. Studies in other geographic regions are needed to further explore these factors.

Key words: Food insecurity, food pantries, choice pantry, non-choice pantry

ASSOCIATION BETWEEN FOOD INSECURITY AND TYPE OF FOOD PANTRY VISITED AMONG INDIVIDUALS IN ATLANTA, GEORGIA

Kendall Dennis

Master's Thesis

Presented in Partial Fulfillment of Requirements for the Degree of Master of Science in Health Sciences

The Byrdine F. Lewis College of Nursing and Health Professions

Department of Nutrition

Georgia State University

Atlanta, GA

June 2023

ACKNOWLEDGEMENTS

I would like to express my deepest gratitude to my thesis committee, Dr. Nida Shaikh, Katherine Wiley, and Dr. Fred Brooks, who guided me and encouraged me every step of the way. I could not have undertaken this journey without the help of my thesis chair, Dr, Nida Shaikh, who has pushed me to be a better student and researcher. I would also like to extend my appreciation to Dr. Craig Gundersen, who has championed this work and granted access to the data used in this thesis. I'd also like to recognize Dr. Halley Riley for her assistance with data analysis and interpretation. Lastly, this endeavor would not have been possible without the work of Dr. Brooks, research assistants, study participants, and food pantry staff, without whom data collection would not have been possible. My sincerest thank you to all the participants who trusted us with their personal information.

I am also grateful for my cohort members, who graciously lent an ear to listen and grounded me throughout this process. I would be remiss to not mention my husband, Taylor, and my family. Their continued support and love gave me the confidence to continue throughout this process. Lastly, I would like to thank my canine companion, Millie, who never fails to provide comic relief and keeps me living in the moment.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS

Abbreviation	Term
U.S.	United States
SNAP	Supplemental Nutrition Assistance Program
WIC	Supplemental Nutrition Program for Women, Infants, and Children
NSLP	National School Lunch Program
USDA	United States Department of Agriculture
IRB	Institutional Review Board
HFSSM	Household Food Security Survey Module
VLFS	Very low food security
FACS	Feeding America Client Survey
CDC HRQOL-4	Centers for Disease and Control Healthy Days Core Module

CHAPTER I

Introduction

Problem

Food insecurity, the limited or uncertain availability of nutritionally adequate food or ability to acquire food in socially acceptable ways to meet dietary needs and food preferences for an active and healthy life, is a long-withstanding public health problem.[1,2] In the United States (U.S.), in 2021, 10.2% or 13.5 million households experienced food insecurity, with 3.8% considered to be experiencing very low food security (Figure 1).[3] Low-income households, households with racial and ethnic minorities, and households with children disproportionately experience food insecurity.[3,4] Vital resources for individuals experiencing food insecurity and hunger include national efforts such as the Supplemental Nutrition Assistance Program (SNAP), Supplemental Nutrition Program for Women, Infants, and Children (WIC), and the National School Lunch Program (NSLP) and community level food programs such as food banks, food pantries, and emergency kitchens.[5]

The utilization of food pantries is on the rise. It's estimated that 6.7% of all households in the U.S. used a food pantry in 2020, up from 4.4% in 2019, which coincides with the onset of the COVID-19 pandemic (Figure 2).[6] However, not all food pantries operate the same way. Choice pantries are food pantries where individuals select their food options to meet their needs. Non-choice pantries, also referred to as traditional food pantries, are pantries where the individual is given a predetermined food selection. Choice pantries foster client autonomy and serve as a more dignified pantry experience compared to non-choice pantries.[7-10] Additionally, choice pantries are positively associated with a greater

number of healthy food options and enhanced diet quality;[11-15] and are preferred by individuals over non-choice pantries.[9,11,16] However, limited research exists examining the sociodemographic characteristics of individuals who visit choice pantries versus non-choice pantries and little is known about the relationship between food insecurity and the type of pantry visited by individuals.

Significance

The benefits of using choice versus non-choice pantries have been established; choice pantries increase the number of food options and the nutritional quality of food, while decreasing food waste.[12,14,15,17] Choice pantries may decrease food insecurity, however, the relationship between pantry type and food security status is not well established.[18-20] Therefore, the present study aims to provide first insights into the sociodemographic characteristics and food insecurity rates among pantry users in Atlanta, GA. Given the added benefits of using choice pantries compared to non-choice-pantries, it is hypothesized that individuals who visit choice pantries may experience lower rates of food insecurity than those who visit non-choice pantries. It also hypothesized that food insecurity influences the type of pantry visited.

Research Question

This study aims to assess the association between food insecurity and pantry type usage among individuals visiting choice and non-choice food pantries in Atlanta, Georgia.

CHAPTER II

Review of Literature

Classification of Food Security

In the U.S., food security is classified by the U.S. Department of Agriculture (USDA) as high, marginal, low, or very low food security.[21] High food security represents no problems accessing food, while marginal security represents trouble accessing food at times but no significant change in the quality or quantity of food intake.[22] Low food security occurs when there are changes to the quality of diet, but the quantity of food intake remains the same, and very low food security represents significant reductions in food intake due to limited money or resources for food.[22] Low and very low food security are deemed food insecure. Food insecurity is associated with various poor mental and physical health outcomes. Adults who experience food insecurity are at increased risk for decreased nutrient intakes,[23-25] depression,[23-27] type 2 diabetes,[28-30] hypertension,[29,30] hyperlipidemia,[29] and dysregulated eating patterns.[31-33]

Disparities in Food Insecurity

The burden of food insecurity varies across the U.S. and among racial and ethnic groups. The prevalence of food insecurity among households with children was 14.8% in 2020, significantly higher than the national average of 10.5%.[34] The prevalence of food insecurity is even higher for single parent households: 27.7% and 16.3% for single women and men, respectively.[34] In 2020, 21.7% of Black households and 17.2% of Hispanic households were food insecure, compared to only 7.1% of White households.[34] It is also reported that Native Americans are two times more likely to experience food

insecurity than White counterparts, and people of Asian descent are also at significantly higher risk for experiencing food insecurity.[35-39] The cause of these racial inequities is complex and intersects with other determinants of food insecurity including poverty, unemployment, incarceration, and disability.[38,40] Racial discrimination and systemic racism are also factors that result in socioeconomic disadvantages contributing to food insecurity.[40,41]

Food Insecurity and the COVID-19 Pandemic

The prevalence of food insecurity in the U.S. remained fairly consistent during the COVID-19 pandemic, although this is likely attributed to expansions and flexibilities of federal nutrition assistance programs during the pandemic which helped to alleviate the burden of food insecurity during this time.[34,42] The prevalence of food insecurity among households in the U.S. leading up to the pandemic, which began in 2020, was 10.5%.[34] As the pandemic continued into 2021, the prevalence of food insecurity decreased slightly from 10.5% to 10.2% of households.[3] In response to the COVID-19 pandemic, the federal government issued emergency expansions and increases in benefits for the Supplemental Nutrition Assistance Program (SNAP) and the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). Additionally, waivers were passed to increase the availability of food for children during the COVID-19 pandemic including flexibilities to the National School Lunch Program and Seamless Summer Option, and initiation of the Pandemic Electronic Benefit Transfer (P-EBT), and the Farmers to Families Food Box Program. These programs, in addition to the use food

pantries and food banks, may have helped to prevent a rise in food insecurity during the pandemic.

Food Pantries

Role of Food Pantries

Food pantries directly distribute food to individuals, serving as the direct access point for people seeking food. In addition to the food received from food banks, food pantries rely heavily on food received from personal donations and local organizations.[43] Food pantries often operate out of churches, schools, and community centers. Mobile pantries are also common. Because food pantries provide food to anyone in need, individuals of diverse backgrounds and circumstances utilize food pantries to meet their food needs. Within the U.S., Feeding America is the largest network of food banks and pantries, supporting approximately 200 food banks and 60,000 food pantries across the country.[44] In Atlanta, Georgia, the Atlanta Community Food Bank, a member of Feeding America, partners with more than 700 nonprofit food distribution partners, including food pantries, community kitchens, and childcare centers to deliver food to those in need.[45]

For households experiencing food insecurity, the use of food pantries is significantly higher than those who are food secure.[6] In 2020, a food pantry was used by 36.5% of households experiencing food insecurity and 45.5% of households with very low food security used a food pantry.[6] Comparatively, only 3.2% of households who were food secure in 2020 utilized a food pantry.[6] It's been shown that food pantry clients rely on

pantries to meet their food needs on a long-term basis, with the average duration of use being 5.5 years.[11,46]

Choice and Non-Choice Food Pantries

Food distributed from non-choice food pantries is often wasted by clients for numerous reasons such as being spoiled, unable to be prepared at home, inconsistent with special dietary restrictions or needs, or not matching client food preferences.[47] Choice pantries help ameliorate the food waste associated with non-choice food pantries by allowing clients to choose foods that fit their individual needs and circumstances.[17,18,47,48] There are multiple methods used to implement a choice pantry system, among them are the supermarket method, the item list method, the table method, and the window method.[9,47,49,50] The supermarket method mimics a grocery store and allows clients to shop as if they were at a store. For the item list system, clients are given a list of available food inventory and denote which items they would like, then, a pantry staff member or volunteer makes the food bag for the client. The table method uses tables to group foods by food group, allowing clients to walk by the tables and choose their food. Lastly, the window model organizes food on shelves by food group and allows clients to point to foods they want while a staff member packs the bag for the client. Although there are a variety of options for implementing a choice pantry model, the commonality in all the distribution methods is that the client is allowed to dictate their desired food options.

Nutritional Content of Food at Choice and Non-Choice Pantries

As food pantries rely on food provided by food banks and donations, the nutritional content of the food received is not always a factor of consideration. As a result, the food offered at pantries has been shown to be inadequate in micronutrient content.[51-54] The nutritional content of food pantries has been shown to vary based on location and availability, where rural pantries have less nutritionally dense foods compared to urban pantries.[51] Choice pantries, however, provide clients with a more well-rounded nutritional repository of food choices than non-choice pantries.[12,14]

In a study in the Bronx, New York, foods and drinks from 21 pantries were analyzed for nutritional content.[14] Of the 21 pantries, 12 used a traditional, non-choice distribution method and 9 pantries used client choice.[14] The average number of food items available at choice pantries was almost three times higher than the non-choice pantries (35.1 compared to 11.8). In addition, the nutritional quality of the items was over 20% higher, measured by NuVal® score, at choice pantries than at non-choice pantries.[14] Choice pantries were shown to have more fresh fruits and vegetables available to clients and offered items such as herbs and whole wheat bread that were typically unavailable at non-choice food pantries.[14]

Although the majority of studies demonstrate choice pantries offer a larger variety of healthy foods than non-choice pantries, [12,14,18] a 2018 study in Baltimore, Maryland with 75 participants across seven food pantries, found no significant differences in the nutritional quality of food offered at choice pantries compared to non-choice pantries.[9] However, the size of the pantry was shown to impact the nutritional content of foods

given to clients.[9] Small choice pantries (65 - 10,000 pounds/year) received more fruits, vegetables, and whole grains than medium (10,001 - 24,600 pounds/year) and large (24,601 or more pounds/year) choice pantries.[9] As such, pantry size, along with a choice model, helps to determine the types and nutrition quality of foods available.

For pantry clients living with nutrition-related chronic conditions such as diabetes or heart disease, choice pantries may be especially useful. A mixed methods study with 612 clients using limited and non-choice pantries in rural areas of Indiana, Michigan, Ohio, Nebraska, South Dakota, and Missouri sought to determine whether the presence of chronic health conditions in the household changes perceptions about food pantries and their ability to meet needs.[11] Participants were classified into three groups: households with no chronic health condition, households with a chronic health condition that includes diabetes, and households with a chronic health condition other than diabetes.[11] All participants in the study preferred having more variety of food, including more fruits, vegetables, dairy, and protein.[11] Participants with chronic conditions, such as hypertension and diabetes, expressed more frustration over the inability to choose foods and the limited variety of healthy food options.[11] In households where a family member had diabetes, a greater concern was expressed regarding the compatibility of offered food with their special dietary needs.[11] In those households, a desire for low-carbohydrate and low-sodium food from pantries was noted.[11] Given that food insecurity is associated with an increased risk of type 2 diabetes,[28-30] hypertension,[29,30] and hyperlipidemia,[29] food pantries are vital resources in helping individuals experiencing food insecurity meet their

dietary needs. Choice pantries may make specific foods for managing nutrition-related conditions more readily available and accessible to pantry clients

Choice Pantries and Food Security

Choice pantries may have a direct impact on food security outcomes. A randomized controlled trial conducted in Hartford, Connecticut from 2010-2012 with 228 adult participants studied the effect of a client-choice food pantry intervention called *Freshplace*, on food security, self-sufficiency, and fruit and vegetable consumption. Community organizations in Hartford designed Freshplace to address the underlying causes of poverty and, in 2009 partnered with the University of Connecticut to assess its effectiveness.[18] There were three main components to the Freshplace pantry; 1) it was a choice pantry serving fresh food, 2) clients meet with a project manager trained in motivational interviewing once per month to set and follow-up on goals, 3) resources and services, such as cooking classes and housing referrals, were provided to help clients reach their individual goals.[18] Study participants were randomized to Freshplace or the control group (non-choice pantry) with follow-up every three months for the 12-month study duration. Most participants were Black, female, in their early fifties (M = 51.4 (SD 11.9)), with very low food security. At baseline, 57% of participants received SNAP and, 63% went to a food pantry at least once per week. Additionally, 26% of participants had diabetes, 65% had high blood pressure, and 38.8% consumed less than three servings of fruits and vegetables per day. Following the 12-month study duration, the scores for fruit and vegetable consumption significantly increased among the Freshplace group compared to the control group (control = 12.6 (SD 5.6), intervention = 14.4 (SD 5.6);

p=0.005).[18] After controlling for gender, age, household size, household income, and presence of children in the household, participants in the Freshplace group were significantly less likely to experience very low food security compared to the control group (OR=0.42 [95% CI=0.24, 0.72]).[18] Further, the Freshplace group improved in self-sufficiency by an average of 4.1 points out of 100 using the Missouri Community Action Family Self-Sufficiency Scale, with low-income households benefiting the most [control =66.7 (SD 12), intervention 70.2 (SD 11.4); p=0.03)].[18]

In a follow-up study using the Freshplace intervention, self-efficacy and food insecurity were measured again, but this time across an 18-month duration, with the same study participants minus one participant (N=227).[19] Self-efficacy was defined as an individual's confidence in their ability to plan and follow through with a series of actions to create desired outcomes.[55] Self-efficacy was measured with a food security self-efficacy scale developed by the researchers that asks six questions related to shopping for healthy food, preparing food, and affordability of food. Household food security was measured using the USDA 18-item Household Food Security Survey Module (HFSSM).[56] After 18 months, the Freshplace group had increased self-efficacy and decreased risk for very low food insecurity, compared to the control group.[19] Very low food security was independently associated with both the Freshplace intervention (p=0.01) and higher self-efficacy (p=0.04).[19]

Another randomized controlled trial in El Paso, Texas with a similar model to Freshplace, called the Fresh Start Program, resulted in the same outcomes as Freshplace: improved

food security, self-sufficiency, and diet quality.[57] The *Fresh Start Program* in Texas was designed in 2016 by the same researchers that created Freshplace, using the More Than Food framework, which is built on the tenets of choice, connection, and culture, with a goal to help other pantries address the causes of hunger and build food security.[57] Similarly, the *Voices for Food* longitudinal intervention from 2014-2017, designed to improve food insecurity among rural communities in South Dakota, Indiana, Missouri, Michigan, Nebraska, and Ohio using community coaching, food policy councils, and a transition to a client choice model (*MyChoice*), found decreased rates of food insecurity among the intervention group compared to the control pantries (57% vs. 64%).[58]

MANUSCRIPT

Introduction

Food insecurity, the limited or uncertain availability of nutritionally adequate food or the ability to acquire food in socially acceptable ways to meet dietary needs and food preferences for an active and healthy life, has emerged as a leading, if not the leading, indicator of well-being for vulnerable households in the United States (U.S.).[1,2] In 2021, the estimated prevalence of food insecurity among households in the U.S. was 10.2% or 13.5 million households.[3] Of those, 3.8% were estimated to be experiencing very low food security (VLFS), which is defined as having severe reductions in food intake due to limited money or resources for food.[3,22] In the areas served by the Atlanta Community Food Bank, rates were slightly lower than U.S. average, 8.4%. Low-income households, households with racial and ethnic minorities, and households with children disproportionately experience food insecurity.[3,4]

For individuals and families experiencing food insecurity, food pantries serve as vital resources to meet dietary needs and alleviate hunger.[59] In 2021, 53 million people in the U.S. received food assistance from food pantries and food banks, which reflected a 33% increase in usage from 2019.[60] Food pantries are more heavily used by households experiencing food insecurity. In 2020, 36.5% of households experiencing food insecurity used food pantries and 45.5% of households with very low food security used food pantries.[6] Comparatively, only 3.2% of households who were food secure in 2020 utilized a food pantry.[6]

While all food pantries aim to expand food access and ameliorate hunger, not all food pantries operate in the same way. Food pantries are classified as choice pantries and non-choice pantries. Choice pantries are food pantries where individuals can select specific foods and beverages, whereas non-choice pantries, also known as traditional food pantries, provide individuals with a predetermined selection of food. Limited research has demonstrated that the receipt of charitable food assistance decreases food insecurity.[18-20,57]

What hasn't been examined, however, is the association between pantry type and food security status. In other words, our interest in this study is about whether food insecurity status has an influence on what types of pantries are visited, not with respect to the impact of pantry type on food insecurity. We consider this issue using data from choice and non-choice food pantries in Atlanta, Georgia.

Methods

Study design:

This secondary analysis used baseline data from the Atlanta site of a multi-city study aimed at understanding food pantry behavior usage of individuals visiting choice and non-choice pantries over six months. Ten pantries in the Atlanta Community Food Bank service area were selected that met the inclusion criteria. The inclusion criteria required pantries to have a sufficient volume of unduplicated visitors per month to create a sample of 75 participants per pantry. Pantries were also required to track pantry usage of participants. The pantries in our study were all in metro Atlanta, within an hour drive of

downtown Atlanta. Of the ten pantries, five pantries selected were choice pantries that offered visitors a degree of food choice, and the other five pantries were non-choice. At each pantry, random sampling methods were used to recruit participants. Baseline interviews were completed between March 12 and July 1, 2022. The survey was comprised of seven sections and included 46 questions on pantry satisfaction, household information, and health status. Participants received a $25 gift card for participating in the baseline survey. From the baseline data, we analyzed the sociodemographic, health, and food insecurity variables in relation to the type of pantry visited. Approval for the study was obtained by the Institutional Review Board (IRB) at Georgia State University.

Participants:

The dataset includes 685 participants from 10 pantries across metro Atlanta. Participants were eligible to participate if they were users of the selected pantries.

Measures:

The outcome of interest is the type of pantry visited (choice or non-choice pantry). Each food pantry participating in the study was given a unique agency identification number which was recorded at every interview with each participant. The agency identification number was used to track the name of the pantry that the individual was visiting and the type of pantry.

The main exposure variable of interest was food security status. Food insecurity was measured using the validated USDA 18-item Household Food Security Survey Module

(HFSSM), which asks questions related to the food status of adults and children living within the household over the last 12 months.[56] Responses were coded following the USDA report, *Household Food Security in the United States in 2020.*[34] If three or more questions from 18-item HFSSM were answered in the affirmative, the participant was classified as food insecure and screened out and all subsequent questions were coded as negative responses. If the affirmative was answered less than three times, the participant was classified as food secure. For this analysis, we created a food insecurity variable and a very low food security (VLFS) variable. A household was deemed very low food secure when eight affirmative responses were recorded for households with children and six affirmative responses were recorded for households without children.[61]

Covariates used in the analysis included age, race and ethnicity, income, gender identity, education level, and relationship status. Health status was measured using four survey questions that assessed physical and mental health over the last 30 days. These questions come from the Feeding America Client Survey (FACS) which was adapted from the CDC Healthy Days Core Module (CDC HRQOL-4).[62,63] We also included variables such as time spent traveling to the pantry, transportation used to get to a pantry, and the distance traveled to the pantry. The survey also included questions for agency zip code and respondent zip code, which were used to evaluate the distance participants traveled to get to a pantry. Using the zip code responses, we analyzed the percentage of participants that visited pantries inside versus outside their zip code of residence and looked at the differences based on pantry type.

Data Analysis:

Frequency and descriptive bivariate analyses were used to analyze sociodemographic characteristics, health characteristics, and rates of food insecurity. Results are presented for the full sample and across the type of pantry visited (choice vs. non-choice). The median and interquartile range are presented for continuous variables (age and health characteristics), as the variables were not distributed normally when the Kolmogorov–Smirnov test and the Shapiro–Wilk test were run. Mann-Whitney U tests were used to compare continuous variables between choice and non-choice participants. Counts and percentages are presented for categorical variables. Chi-square tests were used to compare categorical variables between groups (participants visiting choice vs. non-choice pantry). Data were checked for outliers and missing cases. Multivariable logistic regression models were developed based on the results of the bivariate analysis to evaluate the association between pantry type visited and food security. The models were adjusted for variables that had statistical significance in the bivariate analysis ($p<.05$) or were factors known to influence food security status. We first ran an unadjusted logistic regression model with food insecurity as the independent variable (model 1) and then adjusted for age, race, and gender (model 2). Extending model 2 to account for other relevant sociodemographic variables, we further adjusted for education, relationship status, income, and SNAP (model 3). We then added geographic variables into the model that were significant in the bivariate analysis (model 4). Additionally, as a sensitivity analysis, backward stepwise regression models were performed to analyze the association with food insecurity and pantry type. Data were analyzed using IBM SPSS Statistics, Version 28.0.1.1.

Results

Demographic Characteristics and Prevalence of Food Insecurity

In total, 685 participants completed the baseline survey. The majority of participants were Black (68.3%), female (75.3%), and with at least a high school education (84.5%) (Table 1). The median age for all participants was 60 years (IQR=51-68). Food insecurity was statistically significantly higher in individuals visiting choice pantries compared to non-choice pantries (59.7% vs. 47.3%, p=0.002) (Table 2). VLFS also was statistically significantly higher; 21.0% versus 15.7% (p=0.012). Compared to individuals visiting non-choice pantries, individuals visiting choice pantries were younger [58 years (IQR: 48-66) vs. 63 years (IQR: 55-69)], had lower participation in SNAP (35.5% vs. 42.9%), and had a higher proportion who were married or living with a partner (34.4% vs. 28.7%) ($p<0.05$). Only 3.1% of the total sample had an annual income above $50,000 per year . There were no statistically significant differences among the health survey measures between the two groups, including the number of days of poor physical and mental health experienced in one month.

Distance and Travel Time

More than half of the total participants spent less than 15 minutes traveling to their pantry (51.5%) (Table 3). A higher proportion of participants visiting non-choice pantries traveled outside of their zip code of residence to get to their pantry (79.6%) than participants visiting choice pantries (65.6%) ($p<0.001$) (Figure 1). There were also significant differences found between individuals visiting choice and non-choice pantry

according to the type of transportation used to get to the pantry ($p<0.001$). Driving was the most common method of transportation for individuals visiting both choice (60.8%) and non-choice pantries (62.7%). However, more individuals visiting choice pantries took public transport or walked/biked than individuals visiting non-choice pantries (13.6% vs. 3.9%). Less than one quarter of participants took multiple methods of transportation to get to their pantry, but more individuals visiting non-choice pantries used multiple methods compared to individuals visiting choice pantries (17.2% vs. 13.5%).

Association Between Food Insecurity and Type of Food Pantry Visited

The adjusted multivariable logistic regression models to analyze the association between food insecurity and pantry type visited by participants are given in Tables 4 and 5. In the initial crude model and model adjusted only for relevant sociodemographic covariates, there was an association between food insecurity and type of pantry visited; food insecure participants were more likely to visit choice pantries than food secure participants (OR=1.65 [95% CI =1.22 – 2.23] and OR=1.50 [95% CI =1.03 – 2.19], $p < 0.05$), respectively (Table 4). However, after further adjusting for geographic variables, the model was statistically insignificant (OR=1.44 [95% CI =0.97– 2.13]; $p >0.05$). A backward stepwise regression was performed to confirm no significant associated existed between food insecurity and type of pantry visited (OR = 1.38 [95% CI = 0.95 – 2.01], $p>0.05$). The factors associated with the type of pantry visited include age, income, and location of pantry in relation to the participant's home zip code. Individuals with an income below the poverty line were less likely to visit a choice pantry than those with an

income above the poverty line (OR = 0.40 [95% CI = 0.21 – 0.76], p< 0.01). Similarly, visiting a pantry outside of someone's home zip code decreased the likelihood that a participant visited a choice pantry (OR = 0.35 [95% CI=0.22 – 0.53], p<0.001). As an additional analysis, the association between VLFS and type of pantry visited was assessed (Table 5). Here too, after adjusting for all covariates, there was no association between VLFS and type of pantry visited (OR = 1.48 [95% CI = 0.90 – 2.43]; p > 0.05) and age, income, and proximity to someone's home address were significant factors associated with type of pantry visited.

Discussion

In the current secondary analysis, we assessed the association between food insecurity and the type of food pantry visited by individuals. While the rate of food insecurity was statistically significantly higher among individuals visiting choice pantries compared to non-choice pantries, there was no association between food insecurity and the type of food pantry after controlling for a full set of covariates. We found that participants traveled farther and used more forms of transportation to visit non-choice pantries than choice pantries, indicating a potential preference for visiting non-choice pantries. This finding could be attributed to volume of food provided, efficiency of food delivery, or the physical location of the pantries themselves. While the volume of food distributed at choice and non-choice pantries was not measured in our study, there are known variations in the volume of food allotted between pantries and frequency in which individuals can visit the pantry.[9] Both quality and quantity of food are important to pantry users and often cited as insufficient to meet dietary needs.[64,65] It is plausible that the non-choice pantries

in our study could have provided larger quantities of food per household than choice pantries. Secondly, non-choice pantries may have more time efficient food delivery systems than choice pantries. Because non-choice pantries provide individuals with a predetermined selection of food, the time it takes to provide pantry users with food could be less than a choice model where the individual selects certain foods. This ease and convenience of food delivery may be a factor for why someone visits a specific pantry. Thirdly, the actual location of non-choice pantries could have impacted how far participants traveled and the types of transport used. Two of the five non-choice pantries enrolled in the study were outside of the Atlanta perimeter, and while there were more choice pantries outside of the Atlanta perimeter than non-choice pantries, the two non-choice pantries outside of the perimeter were the farthest distance away from downtown Atlanta. Additionally, some pantries have geographical requirements that limit service to specific zip codes closest to the pantry. The presence or absence of a geographical requirement could be a factor for how far someone can travel to a visit a pantry. The presence or lack of a geographical requirement, and the distance of the two non-choice pantries outside of the perimeter could be contributing factors for why participants traveled farther from their homes to visit non-choice pantries.

Strengths of this study include a large sample size of participants visiting choice and non-choice pantries in Atlanta, GA that allowed for the first comparisons of the characteristics and pantry usage behaviors of individuals visiting choice and non-choice pantries in Atlanta, GA. These results provide insights into the food security status and factors that influence which type of food pantry individuals visit. Another strength of our study was

the diverse study population. In Atlanta, 48.2% of people are Black, 41.0% are White, and 5.0% are Hispanic.[66] Our study population was 68.3% Black, 11.4% White, and 9.8% Hispanic. Because food insecurity disproportionately affects Black and Hispanic individuals, and Black and Hispanic individuals are more likely to use food pantries,[6] the proportion of our study population from Black and Hispanic communities is in line with expectations that food pantry users are largely people of color. Therefore, our study offers greater insights of the demographics of choice and non-choice pantry users in Atlanta, GA.

Our study is not without limitations. First, survey bias could have been introduced due to the use of interviewers to administer the survey. Second, although our sample was racially diverse, it still may not be representative of all food pantry users in Georgia or the U.S. and is therefore specific to the region of metro Atlanta. Finally, food insecurity was assessed using the USDA 18-item Household Food Security Survey Module (HFSSM), which although considered the gold standard for measuring food insecurity, uses a reference period of 12 months. Therefore, participants could have experienced changes in food security status throughout the 12 months preceding the data collection that were not reflective of their status when the survey was administered.

Implications for Research and Practice

Food pantries play a pivotal role in expanding food availability and accessibility. This study provides an understanding of the sociodemographic characteristics and rates of food insecurity among individuals who utilize different types of food pantries in Atlanta,

GA. While choice food pantries are thought to be preferred by pantry users, there appears to be no association between food insecurity and type of pantry visited by adults in Atlanta, GA. Instead, proximity of pantry to a participant's home, income, and age were factors significantly associated with the type of pantry visited by adults. It appears participants specifically sought out non-choice over choice pantries by traveling farther and using multiple methods of transportation to visit non-choice pantries. Future research should investigate the factors associated with type of pantry visited in other regions across the U.S. and seek to further understand if a specific pantry model, if any, is preferred by pantry users. Variability between pantries of the same distribution model and the impact on pantry satisfaction among pantry users should also be investigated.

REFERENCES

1. Core indicators of nutritional state for difficult-to-sample populations. *J Nutr*. Nov 1990;120 Suppl 11:1559-600. doi:10.1093/jn/120.suppl_11.1555
2. U.S. Department of Agriculture. Food Security in the U.S. Accessed July 21, 2022. https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-u-s/measurement/#security
3. Coleman-Jensen A, Rabbitt MP, Gregory CA, Singh A. *Household Food Security in the United States in 2021*. Vol. ERR-309. Service ER; 2022. September 2022. https://www.ers.usda.gov/webdocs/publications/104656/err-309.pdf?v=8819.9
4. Denney JT, Brewer M, Kimbro RT. Food insecurity in households with young children: A test of contextual congruence. *Soc Sci Med*. Oct 2020;263:113275. doi:10.1016/j.socscimed.2020.113275
5. An R, Wang J, Liu J, Shen J, Loehmer E, McCaffrey J. A systematic review of food pantry-based interventions in the USA. *Public Health Nutr*. Jun 2019;22(9):1704-1716. doi:10.1017/s1368980019000144
6. Coleman-Jensen A, Rabbitt MP, Gregory CA, Singh A. *Statistical Supplement to Household Food Security in the United States in 2020*. Vol. AP-091. 2021.
7. Rowland B, Mayes K, Faitak B, Stephens RM, Long CR, McElfish PA. Improving health while alleviating hunger: Best practices of a successful hunger relief organization. *Current developments in nutrition*. 2018;2(9):nzy057.
8. Remley DT, Gallagher T, McDowell J, Kershaw M, Lambea MC, Melgar-Quinonez H. Extension's role in developing" Choice" food pantries in Southwest Ohio. *J Extension*. 2006;44(6):6IAW5.
9. Gu Y, Ali SH, Yan S, et al. Associations between Food Pantry Size and Distribution Method and Healthfulness of Foods Received by Clients in Baltimore City Food Pantries. *Int J Environ Res Public Health*. Jun 29 2021;18(13)doi:10.3390/ijerph18136979
10. Carson F. *Promoting Client Choice*. 2008. Accessed September 1, 2022. https://www.hungercenter.org/wp-content/uploads/2011/07/Promoting-Client-Choice-Carson.pdf
11. Remley D, Franzen-Castle L, McCormack L, Eicher-Miller HA. Chronic Health Condition Influences on Client Perceptions of Limited or Non-choice Food Pantries in Low-income, Rural Communities. *Am J Health Behav*. Jan 1 2019;43(1):105-118. doi:10.5993/ajhb.43.1.9
12. Caspi CE, Davey C, Barsness CB, Wolfson J, Peterson H, Pratt RJ. Applying the Healthy Eating Index-2015 in a Sample of Choice-Based Minnesota Food Pantries to Test Associations Between Food Pantry Inventory, Client Food Selection, and Client Diet. *J Acad Nutr Diet*. Nov 2021;121(11):2242-2250. doi:10.1016/j.jand.2021.05.007
13. Long CR, Narcisse MR, Rowland B, et al. Written Nutrition Guidelines, Client Choice Distribution, and Adequate Refrigerator Storage Are Positively Associated with Increased Offerings of Feeding America's Detailed Foods to Encourage (F2E) in a Large Sample of Arkansas Food Pantries. *J Acad Nutr Diet*. May 2020;120(5):792-803.e5. doi:10.1016/j.jand.2019.08.017

14. Bryan AD, Ginsburg ZA, Rubinstein EB, et al. Foods and Drinks Available from Urban Food Pantries: Nutritional Quality by Item Type, Sourcing, and Distribution Method. *J Community Health*. Apr 2019;44(2):339-364. doi:10.1007/s10900-018-0592-z
15. Caspi CE, Canterbury M, Carlson S, et al. A behavioural economics approach to improving healthy food selection among food pantry clients. *Public Health Nutr*. Aug 2019;22(12):2303-2313. doi:10.1017/s1368980019000405
16. Verpy H, Smith C, Reicks M. Attitudes and behaviors of food donors and perceived needs and wants of food shelf clients. *J Nutr Educ Behav*. Jan-Feb 2003;35(1):6-15. doi:10.1016/s1499-4046(06)60321-7
17. Pruden B, Poirier L, Gunen B, et al. Client Choice Distribution Model Is Associated with Less Leftover Food in Urban Food Pantries. *Current Developments in Nutrition*. 2020;4(Supplement_2):266-266. doi:10.1093/cdn/nzaa043_117
18. Martin KS, Wu R, Wolff M, Colantonio AG, Grady J. A novel food pantry program: food security, self-sufficiency, and diet-quality outcomes. *American journal of preventive medicine*. 2013;45(5):569-575.
19. Martin KS, Colantonio AG, Picho K, Boyle KE. Self-efficacy is associated with increased food security in novel food pantry program. *SSM Popul Health*. Dec 2016;2:62-67. doi:10.1016/j.ssmph.2016.01.005
20. Stluka S, Moore L, Eicher-Miller HA, et al. Voices for food: methodologies for implementing a multi-state community-based intervention in rural, high poverty communities. *BMC Public Health*. Aug 23 2018;18(1):1055. doi:10.1186/s12889-018-5957-9
21. Bickel G NM, Price C, Hamilton W, Cook J,. *Guide to Measuring Household Food Security*. Service FaN; 2000. *Measuring Food Security in the United States: Reports of the Federal Interagency Food Security Measurement Project*. 2000.
22. USDA. Definitions of Food Insecurity Updated September 8, 2021. Accessed February 26, 2022 2022. https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-u-s/definitions-of-food-security/.
23. Tarasuk VS. Household food insecurity with hunger is associated with women's food intakes, health and household circumstances. *J Nutr*. Oct 2001;131(10):2670-6. doi:10.1093/jn/131.10.2670
24. Heflin CM, Siefert K, Williams DR. Food insufficiency and women's mental health: findings from a 3-year panel of welfare recipients. *Soc Sci Med*. Nov 2005;61(9):1971-82. doi:10.1016/j.socscimed.2005.04.014
25. Heflin CM, Ziliak JP. Food insufficiency, food stamp participation, and mental health. *Social Science Quarterly*. 2008;89(3):706-727.
26. Hromi-Fiedler A, Bermudez-Millan A, Segura-Perez S, Perez-Escamilla R. Household food insecurity is associated with depressive symptoms among low-income pregnant Latinas. *Matern Child Nutr*. Oct 2011;7(4):421-30. doi:10.1111/j.1740-8709.2010.00266.x
27. Reeder N, Tolar-Peterson T, Bailey RH, Cheng W-H, Evans MW. Food Insecurity and Depression among US Adults: NHANES 2005–2016. *Nutrients*. 2022;14(15):3081.
28. Seligman HK, Bindman AB, Vittinghoff E, Kanaya AM, Kushel MB. Food insecurity is associated with diabetes mellitus: results from the National Health Examination and Nutrition Examination Survey (NHANES) 1999-2002. *J Gen Intern Med*. Jul 2007;22(7):1018-23. doi:10.1007/s11606-007-0192-6

29. Seligman HK, Laraia BA, Kushel MB. Food insecurity is associated with chronic disease among low-income NHANES participants. *J Nutr*. Feb 2010;140(2):304-10. doi:10.3945/jn.109.112573
30. Stuff JE, Casey PH, Szeto KL, et al. Household food insecurity is associated with adult health status. *J Nutr*. Sep 2004;134(9):2330-5. doi:10.1093/jn/134.9.2330
31. Weaver LJ, Fasel CB. A systematic review of the literature on the relationships between chronic diseases and food insecurity. *Food and Nutrition Sciences*. 2018;9(05):519.
32. Zickgraf HF, Hazzard VM, O'Connor SM. Food insecurity is associated with eating disorders independent of depression and anxiety: Findings from the 2020–2021 healthy minds study. *International Journal of Eating Disorders*. 2022;55(3):354-361.
33. Laraia B, Vinikoor-Imler LC, Siega-Riz AM. Food insecurity during pregnancy leads to stress, disordered eating, and greater postpartum weight among overweight women. *Obesity*. 2015;23(6):1303-1311.
34. Coleman-Jensen A. *Household Food Security in the United States in 2020*. Service ER; 2021. 298. September 2021.
35. Blue Bird Jernigan V, Wetherill MS, Hearod J, et al. Food insecurity and chronic diseases among American Indians in rural Oklahoma: The THRIVE study. *American Journal of Public Health*. 2017;107(3):441-446.
36. Blue Bird Jernigan V, Garroutte E, Krantz EM, Buchwald D. Food insecurity and obesity among American Indians and Alaska Natives and Whites in California. *Journal of hunger & environmental nutrition*. 2013;8(4):458-471.
37. Jernigan VBB, Huyser KR, Valdes J, Simonds VW. Food insecurity among American Indians and Alaska Natives: A national profile using the current population survey–food security supplement. *Journal of hunger & environmental nutrition*. 2017;12(1):1-10.
38. Morales DX, Morales SA, Beltran TF. Racial/Ethnic Disparities in Household Food Insecurity During the COVID-19 Pandemic: a Nationally Representative Study. *Journal of Racial and Ethnic Health Disparities*. 2021/10/01 2021;8(5):1300-1314. doi:10.1007/s40615-020-00892-7
39. Becerra MB, Mshigeni SK, Becerra BJ. The Overlooked Burden of Food Insecurity among Asian Americans: Results from the California Health Interview Survey. *International Journal of Environmental Research and Public Health*. 2018;15(8):1684.
40. Odoms-Young A, Bruce MA. Examining the Impact of Structural Racism on Food Insecurity: Implications for Addressing Racial/Ethnic Disparities. *Fam Community Health*. Apr/Jun 2018;41 Suppl 2 Suppl, Food Insecurity and Obesity(Suppl 2 FOOD INSECURITY AND OBESITY):S3-s6. doi:10.1097/fch.0000000000000183
41. Phojanakong P, Brown Weida E, Grimaldi G, Lê-Scherban F, Chilton M. Experiences of Racial and Ethnic Discrimination Are Associated with Food Insecurity and Poor Health. *International Journal of Environmental Research and Public Health*. 2019;16(22):4369.
42. Jones JW, Hodges L, Toossi S. *The Food and Nutrition Assistance Landscape: Fiscal Year 2021*. Vol. EIB-237. Annual Report. Service ER; 2022.
43. Feeding America. How food banks and food pantries get their food. Accessed October 1, 2022. https://www.feedingamerica.org/hunger-blog/how-food-banks-and-food-pantries-get-their-food
44. Feeding America. The Feeding America Network. Accessed August 24, 2022. https://www.feedingamerica.org/our-work/food-bank-network

45. Atlanta Community Food Bank. We're ending hunger in our community. Accessed May 13, 2022, https://www.acfb.org/
46. Schmitt FF, Topics SP, Philosophy T, Spring G. Characteristics of short and long-term food pantry users. *Michigan Sociol Rev*. 2012;26:58-74.
47. Ohio Association of Second Harvest Foodbanks. *Making the Switch: A Guide to Converting to A Choice Food Pantry*. 2006. Accessed August 28, 2022. https://static1.squarespace.com/static/5626862ce4b0b39e06352d65/t/6238996b995feb189b6df392/1647876460096/Making_the_Switch_to_Client_Choice.pdf
48. John M. Arnold. *Charity Food Programs That Can End Hunger In America*. 2004. Accessed August 28, 2022. https://www.endhungerinamerica.org/wp-content/uploads/2010/03/wnwnelca.pdf
49. Remley DT, Kaiser ML, Osso T. A case study of promoting nutrition and long-term food security through
choice pantry development. *J Hunger Environ Nutr*. 2013;8(3):324-336
50. Akron-Canton Regional Foodbank. *Client Choice Pantry Handbook*. 2012. Accessed October 5, 2022. https://www.akroncantonfoodbank.org/sites/default/files/Choice-Pantry-Handbook_May2012.pdf
51. Akobundu UO, Cohen NL, Laus MJ, Schulte MJ, Soussloff MN. Vitamins A and C, calcium, fruit, and dairy products are limited in food pantries. *J Am Diet Assoc*. May 2004;104(5):811-3. doi:10.1016/j.jada.2004.03.009
52. Nanney MS, Grannon KY, Cureton C, et al. Application of the Healthy Eating Index-2010 to the hunger relief system. *Public health nutrition*. 2016;19(16):2906-2914.
53. Grannon KY, Hoolihan C, Wang Q, Warren C, King RP, Nanney MS. Comparing the application of the Healthy Eating Index–2005 and the Healthy Eating Index–2010 in the food shelf setting. *Journal of Hunger & Environmental Nutrition*. 2017;12(1):112-122.
54. Simmet A, Depa J, Tinnemann P, Stroebele-Benschop N. The dietary quality of food pantry users: a systematic review of existing literature. *Journal of the Academy of Nutrition and Dietetics*. 2017;117(4):563-576.
55. Bandura A. Health promotion from the perspective of social cognitive theory. *Psychology and health*. 1998;13(4):623-649.
56. Bickel G, Nord M, Price C, Hamilton W, Cook J. Measuring food security in the United States. Guide to measuring household food security. Revised 2000. *United States Dep Agric*. 2000;
57. Martin KS, Redelfs A, Wu R, Bogner O, Whigham L. Offering More Than Food: Outcomes and Lessons Learned from a Fresh Start food pantry in Texas. *Journal of Hunger & Environmental Nutrition*. 2019/03/04 2019;14(1-2):70-81. doi:10.1080/19320248.2018.1512925
58. SNAP-Ed Toolkit. *Voices for Food (VFF)*. 2019. Accessed March 10, 2023. https://snapedtoolkit.org/interventions/programs/voices-for-food-vff/#Evidence_Summary
59. Bertmann F, Rogomentich K, Belarmino EH, Niles MT. The Food Bank and Food Pantries Help Food Insecure Participants Maintain Fruit and Vegetable Intake During COVID-19. Brief Research Report. *Frontiers in Nutrition*. 2021-August-06 2021;8doi:10.3389/fnut.2021.673158
60. Feeding America. *Charitable Food Assistance Participation in 2021*. 2022. Accessed May 6, 2023. https://www.feedingamerica.org/sites/default/files/2022-06/Charitable%20Food%20Assistance%20Participation%20in%202021.pdf

61. U.S. Department of Agriculture. *U.S. Household Food Security Survey Module: Three-Stage Design, With Screeners.* September 2012. Accessed October 4, 2022. https://www.ers.usda.gov/media/8271/hh2012.pdf
62. Centers for Disease Control and Prevention (CDC). Health-Related Quality of Life (HRQOL). Updated October 31, 2018. Accessed September 20, 2022. https://www.cdc.gov/hrqol/methods.htm#2
63. Feeding America. *Feeding America Client Survey (FACS)*. 2022. Accessed September 20, 2022.
64. Long CR, Bailey MM, Cascante DC, et al. Food Pantry Clients' Needs, Preferences, and Recommendations for Food Pantries: A Qualitative Study. *Journal of Hunger & Environmental Nutrition*. 2023/03/04 2023;18(2):245-260. doi:10.1080/19320248.2022.2058334
65. Cooksey-Stowers K, Martin KS, Schwartz M. Client Preferences for Nutrition Interventions in Food Pantries. *Journal of Hunger & Environmental Nutrition*. 2019/03/04 2019;14(1-2):18-34. doi:10.1080/19320248.2018.1512929
66. United States Census Bureau. QuickFacts, Atlanta, Ga. United States Census Bureau. Accessed March 1, 2023. https://www.census.gov/quickfacts/fact/table/atlantacitygeorgia/RHI225221#qf-headnote-a
67. United States Department of Agriculture ERS. Interactive Charts and Highlights Updated September 08, 2021. Accessed July 5, 2022. https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-u-s/interactive-charts-and-highlights/#trends

APPENDICES

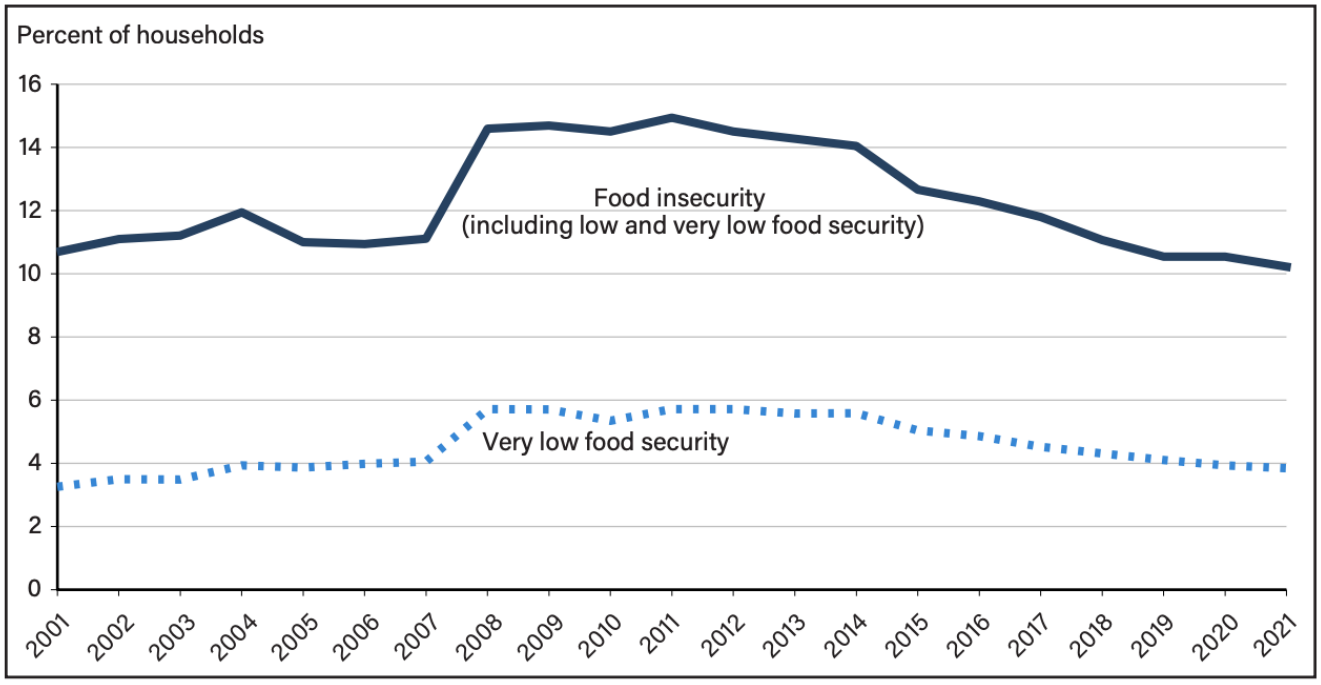

Figure 1. Trends in the prevalence of food insecurity and very low food security in U.S. households, 2001–2021

Source: USDA, Economic Research Service using data from U.S. Department of Commerce, Bureau of the Census, Current Population Survey Food Security Supplements[3,67]

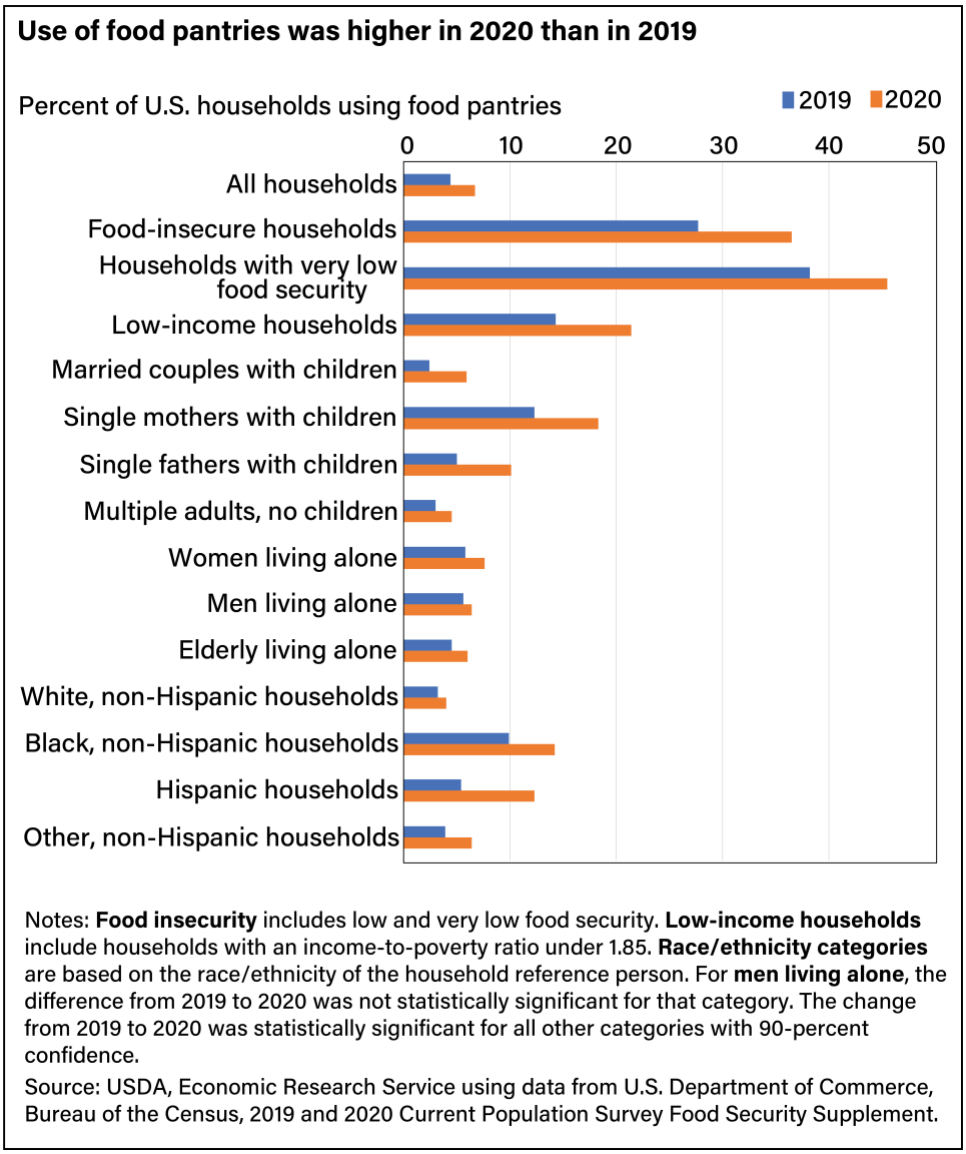

Figure 2. Food pantry use among U.S. households from 2019-2020[6]

Table 1. Comparison of Sociodemographic Characteristics of Pantry Users that Visited Choice vs. Non-Choice Pantries in Atlanta, Georgia

Characteristic	Overall (N=685)	Choice (n=347)	Non-Choice (n=338)
Age[a,b]	60.0 (17)	58.0 (18)	63.0 (14)***
Race/Ethnicity			
White	78 (11.4)	46 (13.3)	32 (9.5)**
Hispanic	67 (9.8)	48 (13.8)	19 (5.6)
Black/AA	468 (68.3)	217 (62.5)	251 (74.3)
Asian	10 (1.5)	5 (1.4)	5 (1.5)
Other[c]	35 (5.1)	15 (4.3)	20 (5.9)
Multiple[d]	27 (3.9)	16 (4.6)	11 (3.3)
Gender			
Male	166 (24.2)	96 (27.7)	70 (20.7)
Female	516 (75.3)	250 (72.0)	266 (78.7)
Non-conforming/ Prefer not to answer	3 (0.4)	1 (0.3)	2 (0.6)
Annual Income			
$0-10,000	126 (18.4)	65 (18.8)	61 (18.0)
$10,001-15,000	119 (17.4)	48 (13.9)	71 (21.0)
$15,001-25,000	157 (22.9)	83 (24.0)	74 (21.9)
$25,001-50,000	135 (19.7)	76 (22.0)	59 (17.5)
>$50,000	21 (3.1)	14 (4.0)	7 (2.1)
Prefer not to answer/don't know	127 (18.5)	61 (17.6)	66 (19.5)
Relationship Status			
Married or living with partner	216 (31.5)	119 (34.4)	97 (28.7)**
Divorced, separated, widowed	289 (42.2)	125 (36.1)	164 (48.5)
Never been married	165 (24.1)	93 (26.9)	72 (21.3)
Prefer not to answer/don't know	15 (2.2)	10 (2.9)	5 (1.5)
Education			
Less than high school	102 (14.9)	56 (16.2)	46 (13.6)
High school graduate	238 (34.7)	123 (35.5)	115 (34.0)
More than high school diploma[e]	341 (49.8)	166 (48.0)	175 (51.8)
Prefer not to answer/don't know	4 (0.6)	2 (0.6)	2 (0.6)
SNAP	268 (39.1)	123 (35.5)	145 (42.9)*

Values are expressed as number (%)

Abbreviations: AA = African American, SNAP = Supplemental Nutrition Assistance Program

*P < 0.05; **P < 0.01; ***P < 0.001

Unless otherwise stated, chi-square test for independence used as statistical test for correlations

[a] Mann-Whitney U test used

[b] Median and interquartile range reported for non-normal distributed continuous variable

[c] Includes American Indian or Alaska Native, Middle Eastern or North African, Native Hawaiian or other Pacific Islander, Don't Know, and Prefer Not to Answer

[d] Refers to more than one race/ethnicity

[e] Includes any amount of college or trade school

Table 2. Comparison of Rates of Food Security and Health-Related Characteristics of Pantry Users that Visited Choice vs. Non-Choice Pantries in Atlanta, Georgia

Characteristic	Overall (N=685)	Choice (n=347)	Non-Choice (n=338)
Food Security			
Food insecure	367 (53.6)	207 (59.7)	160 (47.3)**
Very low food security	126 (18.4)	73 (21.0)	53 (15.7)*
General Health			
Excellent	61 (8.9)	35 (10.1)	26 (7.7)
Very good	119 (17.4)	62 (17.9)	57 (16.9)
Good	236 (34.5)	121 (35.0)	115 (34.0)
Fair	208 (30.4)	92 (26.6)	116 (34.3)
Poor	60 (8.8)	37 (10.7)	23 (6.8)
Don't know	1 (0.1)	0 (0.0)	1 (0.3)
Days of poor physical health in one month[a,b,c]	2 (14)	2 (10)	3 (14)
Days of poor mental health in one month[a,b,c]	1 (10)	2 (10)	0 (8)
Days poor mental or physical health in one month kept participant from usual activities[a,b,c]	0 (6)	0 (7)	0 (6)

Values are expressed as number (%)

*P < 0.05; **P < 0.01; ***P < 0.001

Unless otherwise stated, chi-square test for independence used as statistical test for correlations

[a] Mann-Whitney U test used

[b] N=681

[c] Median and interquartile range reported for non-normal distributed continuous variables

Table 3. Comparison of Distance and Time Spent Traveling Between Choice vs. Non-Choice Pantry Users in Atlanta, Georgia

Characteristic	Overall (N=685)	Choice (n=347)	Non-Choice (n=338)
Proximity to Home Zip Code			
Within same zip code	186 (27.2)	119 (34.4)	67 (19.8)***
Outside same zip code	496 (72.4)	227 (65.6)	269 (79.6)
No home zip code	3 (0.4)	1 (0.3)	2 (0.6)
Time Spent Traveling to Pantry			
Less than 15 min	353 (51.5)	192 (55.5)	161 (47.6)
15-30 min	232 (33.9)	107 (30.9)	125 (37.0)
31 min – 1 hr	81 (11.8)	36 (10.4)	45 (13.3)
1-2 hrs	17 (2.5)	11 (3.2)	6 (1.8)
> 2 hrs	2 (0.3)	1 (0.3)	1 (0.3)
Type of Transportation			
Walk or bike	33 (4.8)	29 (8.4)	4 (1.2)***
Public transport[a]	27 (3.9)	18 (5.2)	9 (2.7)
Drive	423 (61.8)	211 (60.8)	212 (62.7)
Get ride with family/friend	91 (13.3)	39 (11.2)	52 (15.4)
Taxi[b]	6 (0.9)	3 (0.9)	3 (0.9)
Multiple[c]	105 (15.3)	47 (13.5)	58 (17.2)
Location of Pantry[d]			
Inside Atlanta perimeter	304 (44.4)	125 (36.1)	179 (53.0)***
Outside Atlanta perimeter	381 (55.6)	222 (64.2)	159 (47.0)

Abbreviations: Min=minutes, hr=hour
Values are expressed as number (%)
*P < 0.05; **P < 0.01; ***P < 0.001
Unless otherwise stated, chi-square test for independence used as statistical test for correlations
[a] Public transport includes bus, train, and multiple buses or trains
[b] Taxi includes Uber and Lyft
[c] Refers to multiple forms of transportation used to get to pantry
[d] Atlanta perimeter refers to Interstate 285 that encircles metro Atlanta

Table 4. Association Between Food insecurity and Type of Pantry Visited Among Adults in Atlanta, Georgia, US (Multivariable Logistic Regression)

Independent Variables	Model 1 OR, 95% CI N=685	Model 2 OR, 95% CI N=685	Model 3 OR, 95% CI N=540[a]	Model 4 OR, 95% CI N=537[a]
Food Security				
Food insecure	**1.65 [1.22 – 2.23]*** **	**1.46 [1.06 – 2.00]***	**1.50 [1.03 – 2.19]***	1.44 [0.97 – 2.13]
Food secure	Ref	Ref	Ref	Ref
Age	--	0.98 [0.97 – 0.99]**	0.98 [0.97 – 0.997]*	0.98 [0.96 – 0.996]*
Race/Ethnicity				
White	--	Ref	Ref	Ref
Hispanic	--	1.57 [0.76 – 3.25]	1.89 [0.81-4.39]	2.11 [0.89 – 5.04]
Black/AA	--	0.68 [0.41 -1.12]	0.85 [0.48 – 1.48]	0.91 [0.50 – 1.64]
Asian	--	0.81 [0.21 – 3.13]	1.02 [0.22-4.82]	0.92 [0.19 – 4.50]
Other[b]	--	0.56 [0.24 – 1.29]	0.47 [0.15 – 1.44]	0.49 [0.15 – 1.59]
Multiple[c]	--	0.94 [0.38 – 2.32]	0.99 [0.35 – 2.75]	1.09 [0.37 – 3.20]
Gender				
Female	--	0.67 [0.47 – 0.97]*	0.64 [0.43 – 0.97]*	0.66 [0.43 – 1.02]
Male	--	Ref	Ref	Ref
Relationship Status				
Married[d]	--	--	0.77 [0.47 – 1.25]	0.92 [0.55 – 1.52]
Divorced[e]	--	--	0.60 [0.37 – 0.96]*	0.65 [0.40 – 1.06]
Never been married	--	--		Ref
Education				
Less than high school graduate	--	--	0.90 [0.54 – 1.51]	0.90 [0.53 – 1.54]
High school graduate[f]	--	--	Ref	Ref
Income[g]				
Below poverty line	--	--	0.46 [0.25 – 0.85]*	0.40 [0.21 – 0.76]**
100-150% of poverty line	--	--	0.56 [0.28 – 1.11]	0.55 [0.27 – 1.13]
150-200% of poverty line	--	--	0.53 [0.26 – 1.23]	0.47 [0.20 – 1.14]
Above 200% of poverty line	--	--	Ref	Ref
SNAP				
Enrolled	--	--	0.80 [0.54 – 1.19]	0.74 [0.49 – 1.12]
Not enrolled	--	--	Ref	Ref
Proximity of Pantry to Participant Home				
Same zip code	--	--	--	Ref

Outside of home zip code	--	--	--	0.35 [0.22 – 0.53]***
Location of Pantry				
Inside Atl perimeter	--	--	--	Ref
Outside Atl perimeter	--	--	--	1.42 [0.95 – 2.13]

Note: The dependent variable in this analysis is pantry type visited coded so that 0 = non-choice pantry and 1 = choice pantry

Abbreviations: AA = African American, Ref = Reference group, Atl = Atlanta

*P < 0.05; **P < 0.01; ***P < 0.001

[a] Change in N due to missing data for income variable

[b] Includes American Indian or Alaska Native, Middle Eastern or North African, Native Hawaiian or other Pacific Islander, Don't Know, and Prefer Not to Answer

[c] Refers to more than one race/ethnicity

[d] Includes living with a partner

[e] Includes widowed or separated

[f] Includes participants with and without college education

[g] Calculated using the 2021 United States Census Bureau Poverty Thresholds

Table 5. Association Between Very Low Food Security and Type of Pantry Visited Among Adults in Atlanta, Georgia, US (Multivariable Logistic Regression)

Independent Variables	Model 1 OR, 95% CI N=685	Model 2 OR, 95% CI N=685	Model 3 OR, 95% CI N=540[a]	Model 4 OR, 95% CI N=537[a]
Food Security				
Very low food secure	1.43 [0.97 – 2.12]	1.13 [0.74 – 1.71]	1.39 [0.86 – 2.24]	1.48 [0.90 – 2.43]
Not very low food secure[b]	Ref	Ref	Ref	Ref
Age	--	0.98 [0.97 – 0.99]**	0.98 [0.97 – 0.996]*	0.98 [0.96 – 0.996]*
Race/Ethnicity				
White	--	Ref	Ref	Ref
Hispanic	--	1.57 [0.76 – 3.25]	1.89 [0.81 – 4.38]	2.10 [0.88 – 5.01]
Black/AA	--	0.66 [0.40 – 1.08]	0.82 [0.47 – 1.43]	0.89 [0.49 – 1.61]
Asian	--	0.73 [0.19 – 2.77]	0.91 [0.19 – 4.23]	0.83 [0.17 – 4.01]
Other[c]	--	0.58 [0.25 – 1.33]	0.51 [0.17 – 1.55]	0.53 [0.16 – 1.72]
Multiple[d]	--	0.99 [0.40 – 2.46]	0.99 [0.36 – 2.74]	1.07 [0.36 – 3.14]
Gender				
Female	--	0.67 [0.47 – 0.97]*	0.65 [0.43 – 0.99]*	0.67 [0.41 – 1.08]
Male	--	Ref	Ref	Ref
Relationship Status				
Married[e]	--	--	0.77 [0.48 – 1.26]	0.93 [0.56 – 1.54]
Divorced[f]	--	--	0.62 [0.39 – 0.98]*	0.67 [0.41 – 1.08]
Never been married	--	--	Ref	Ref
Education				
Less than high school graduate	--	--	0.91 [0.54 – 1.53]	0.91 [0.54 – 1.55]
High school graduate[g]	--	--	Ref	Ref
Income[h]				
Below poverty line	--	--	0.47 [0.25 – 0.87]*	0.40 [0.21 – 0.76]**
100-150% of poverty line	--	--	0.56 [0.28 – 1.12]	0.54 [0.26 – 1.11]
150-200% of poverty line	--	--	0.54 [0.23 – 1.26]	0.48 [0.20 – 1.16]
Above 200% of poverty line	--	--	Ref	Ref
SNAP				
Enrolled	--	--	0.80 [0.54 – 1.18]	0.74 [0.49 – 1.12]
Not enrolled	--	--	Ref	Ref
Proximity of Pantry to Participant Home				
Same zip code	--	--	--	Ref
Outside of home zip	--	--	--	0.34 [0.22 – 0.53]***

code				
Location of Pantry				
Inside Atl perimeter	--	--	--	Ref
Outside Atl perimeter	--	--	--	1.45 [0.97 – 2.18]

Note: The dependent variable in this analysis is pantry type visited coded so that 0 = non-choice pantry and 1 = choice pantry

Abbreviations: AA = African American, Ref = Reference group

*P < 0.05; **P < 0.01; ***P < 0.001

[a] Change in N due to missing data for income variable

[b] Includes high food security, marginal food security, and low food security

[c] Includes American Indian or Alaska Native, Middle Eastern or North African, Native Hawaiian or other Pacific Islander, Don't Know, and Prefer Not to Answer

[d] Refers to more than one race/ethnicity

[e] Includes living with a partner

[f] Includes widowed or separated

[g] Includes participants with and without college education

[h] Calculated using the 2021 United States Census Bureau Poverty Thresholds

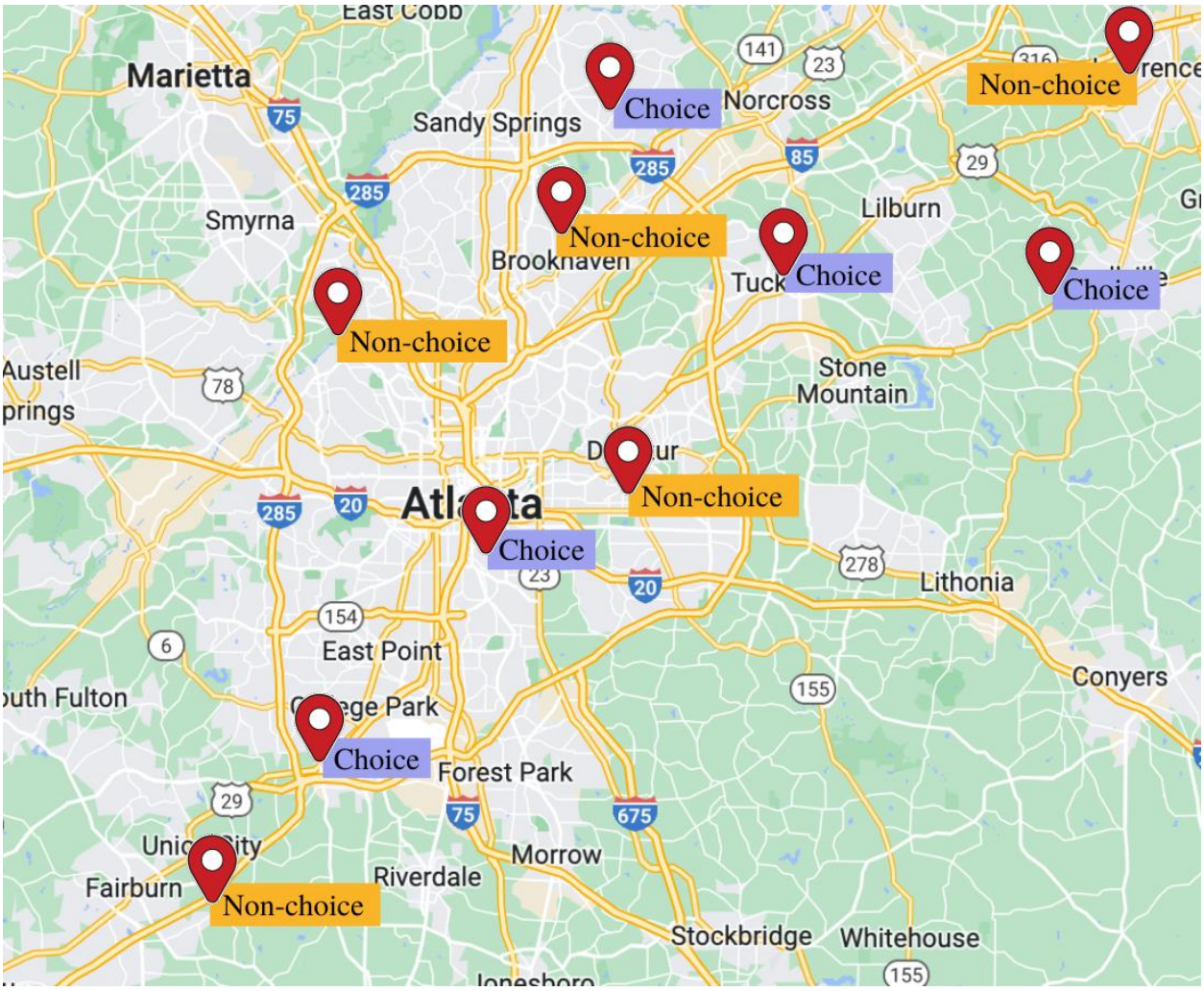

Figure 1. Map of food pantries in Atlanta, GA enrolled in the study

Supplementary Table 1. Association Between Food Insecurity and Type of Pantry Visited Among Adults in Atlanta, Georgia, US (Backward Stepwise Regression)

Independent Variables	Model 1 OR, 95% CI N=537
Food Security	
Food insecure	1.38 [0.95 – 2.01]
Food secure	
Age	0.97 [0.96 – 0.99}***
Gender	
Female	0.65 [0.43 – 0.99]
Male	Ref
Income[a]	
Below poverty line	0.42 [0.22 – 0.78]**
100-150% of poverty line	0.54 [0.26 – 1.09]
150-200% of poverty line	0.46 [0.19 – 1.09]
Above 200% of poverty line	Ref
SNAP	
Enrolled	0.68 [0.46 – 1.02]
Not enrolled	Ref
Proximity of Pantry to Participant Home	
Same zip code	Ref
Outside of home zip code	0.36 [0.24 – 0.56]***
Location of Pantry	
Inside Atl perimeter	Ref
Outside Atl perimeter	1.48 [1.01 – 2.17]*

Note: The dependent variable in this analysis is pantry type visited coded so that 0 = non-choice pantry and 1 = choice pantry

Abbreviations: AA = African American, Ref = Reference group

*P < 0.05; **P < 0.01; ***P < 0.001

[a] Calculated using the 2021 United States Census Bureau Poverty Thresholds