

Identifying characteristics of first-time use of charitable community food resources during the COVID-19 pandemic

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Abstract

While national trends in food insecurity prevalence were unchanged in the early COVID-19 pandemic, evidence suggests that millions of people sought food assistance from charitable community sources

for the first time during this period. Understanding the characteristics of first-time users of charitable community food resources may inform future emergency food system responses. This study aimed to identify sociodemographic, household,

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and food access–related factors associated with first-time use of charitable community food resources among low-wage workers in 2020. We conducted a secondary analysis of 2020 data from the Wage\$ Study, a cohort of low-wage workers in Raleigh, North Carolina (NC), and Minneapolis, Minnesota (MN). Participants ($N = 565$) reported their sociodemographic characteristics, experiences of personal and household hardships, food access disruptions, participation in the Supplemental Nutrition Assistance Program (SNAP) and Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), and use of charitable community food resources (defined as food pantries and soup kitchens) during stay-at-home orders from March 2020 to June 2020. To examine multi-level factors associated with first-time use of charitable community food resources, we used descriptive statistics, classification tree analysis, and logistic regression. The prevalence of first-time use of charitable community food resources was 29.0%. Classification tree analysis identified older age, race/ethnicity, receipt of church assistance, and encountering out-of-stock foods at one's local grocery store as key factors associated with first-time use. Logistic regression revealed that SNAP

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Author Contributions

CA led study conceptualization, formal analysis, data interpretation, and writing—original draft. VC contributed to formal analysis, data interpretation, and writing—review & editing. KMG contributed to conceptualization, data interpretation, and writing—review & editing. MEW contributed to conceptualization, methodology, data interpretation, and writing—review & editing. RX contributed to conceptualization, methodology, data interpretation, and writing—review & editing. MGW contributed to formal analysis, data interpretation, and writing—review & editing. CEC contributed to funding acquisition, conceptualization, supervision, data interpretation, and writing—original draft and review & editing.

participants had higher odds of first-time community resource use compared with nonparticipants. Charitable food programs were important for low-wage workers experiencing barriers to food access during the early pandemic. Strengthening both charitable food systems and federal nutrition programs may improve emergency food access during future crises.

Keywords

food insecurity, charitable food, COVID-19, pandemic, food system, community health, food pantry

Introduction

According to the U.S. Department of Agriculture (USDA), food insecurity occurs when households have limited access to adequate food due to a lack of money or other resources (Coleman-Jensen et al., 2021). The food insecurity rate in the U.S. remained stable at 10.5% for 2019 and 2020, according to nationally representative data collected as part of the USDA Economic Research Service Current Population Survey Food Security Supple-

Ethical Considerations

All human subjects procedures were performed in compliance with relevant laws and institutional guidelines, and were approved by the Institutional Review Boards at the University of Minnesota (STUDY00002094; initial approval December 22, 2017), the University of North Carolina (18-0168; initial approval March 14, 2018), and the University of Connecticut (H20-0087; initial approval July 31, 2020). The privacy rights of human subjects were observed.

Consent to Participate

Written informed consent was obtained from all participants for interactions with human subjects.

Consent for Publication

Not applicable; this manuscript contains no identifiable individual person data.

Data Availability

The study codebook is publicly available at <https://doi.org/10.6084/m9.figshare.28360268.v3>, and the study instruments are publicly available at <https://doi.org/10.6084/m9.figshare.28282910.v1>. The analytic dataset used for this manuscript is not publicly available due to confidentiality protections but may be made available from the corresponding author upon reasonable request and subject to institutional approval.

ment (Coleman-Jensen et al., 2021). While trends from this data source did not show statistically significant increases in food insecurity during the first year of the COVID-19 pandemic (Coleman-Jensen et al., 2021), evidence exists to show that some demographic groups—such as racial and ethnic minorities and single-parent households—did experience increases in food insecurity, especially in the early months of the pandemic (Adams et al., 2020; Kowalski et al., 2021; Williams et al., 2024). A number of pandemic-related factors may have driven this increase in food insecurity among certain groups, including the economic downturn associated with business closures, loss of employment, and disruptions in school meal programs that many low-income families relied upon during school closures (Moreland et al., 2020; Niles et al., 2020; Wolfson & Leung, 2020). The pandemic also exposed and exacerbated existing disparities in food access across different demographic groups. Minority communities, mainly Black and Hispanic households, were disproportionately affected by food insecurity during this period due to pre-existing economic vulnerabilities and higher rates of COVID-19 infections (Morales et al., 2021).

In response to these disruptions, federal and state agencies—as well as community organizations—implemented a range of emergency responses. Initiatives included the Coronavirus Food Assistance Program (CFAP), which distributed food boxes at no cost to recipients (USDA, 2020). There was also a significant expansion of federal food assistance programs. SNAP and WIC offered increased benefits and suspended some administrative requirements for participants (Dunn et al., 2020). Specifically, many states offered temporary emergency allotments, allowing all SNAP participants to receive the maximum benefit amount for their household size or an increase of US\$95, whichever was greater. However, these expansions did not uniformly reach those in need of food assistance. For example, increases in SNAP benefits were less likely to reach those who were newly unemployed (Fang et al., 2022).

As a result of pandemic disruptions, many households turned to food assistance from charitable food resources, in some cases for the first time

(Niles et al., 2020). An estimated 60 million people in the U.S. used a food pantry in 2020, an increase of 50% from the previous year (Feeding America, 2021). Together, community-based charitable resources such as food banks, food pantries, and soup kitchens played a critical role in addressing food access when food need surged (Tian et al., 2022; Feeding America, 2021; Garba et al., 2022). They were also essential in ensuring that households experiencing food insecurity could maintain their fruit and vegetable intake during this time (Bertmann et al., 2021).

The disruptions of the early pandemic highlight how food access behaviors are shaped by factors operating at multiple levels. The socio-ecological model conceptualizes behavior as influenced by interacting factors at the individual, household, community, and policy levels (Bronfenbrenner, 1994). Applying this framework is particularly useful for examining food resource-seeking behaviors during periods of acute disruption, including the early months of the COVID-19 pandemic, when a variety of barriers (such as job loss and business closures) and supports (such as economic relief measures and expansions of food programs) emerged simultaneously across these levels.

The COVID-19 stay-at-home period represents a unique moment characterized by sudden economic and food-access disruption, resulting in an acute shock of food insecurity (Kim-Mozeleski et al., 2023). Examining how individuals engaged with food assistance systems during this period provides insight into how households navigate this acute disruption to food security. Although previous studies have examined pandemic-era shifts in how people obtained or consumed food (O'Connell et al., 2022), the association between food insecurity and participation in food assistance programs (Fang et al., 2022), and the role of community food services during the pandemic (Tian et al., 2021), less is known about the characteristics and multilevel factors influencing first-time use of charitable foods during this period. Individuals engaging with charitable food sources for the first time may have distinct needs and less familiarity with accessing and navigating these programs. Exploring factors associated with first-time engagement can help inform emergency food

system responses and offer targeted outreach strategies.

In this study, we apply the socio-ecological model to examine multilevel factors contributing to the complex issue of food insecurity and access. We focus specifically on first-time use of charitable community food resources during the early COVID-19 stay-at-home period, capturing those newly entering the emergency food system during a time of acute need. We aim to identify factors at multiple levels of influence (individual, household, community, food system, and federal programs) during the COVID-19 pandemic associated with first-time use of charitable community food resources, offering insights that may inform efforts to assist those at high risk during future economic or health crises.

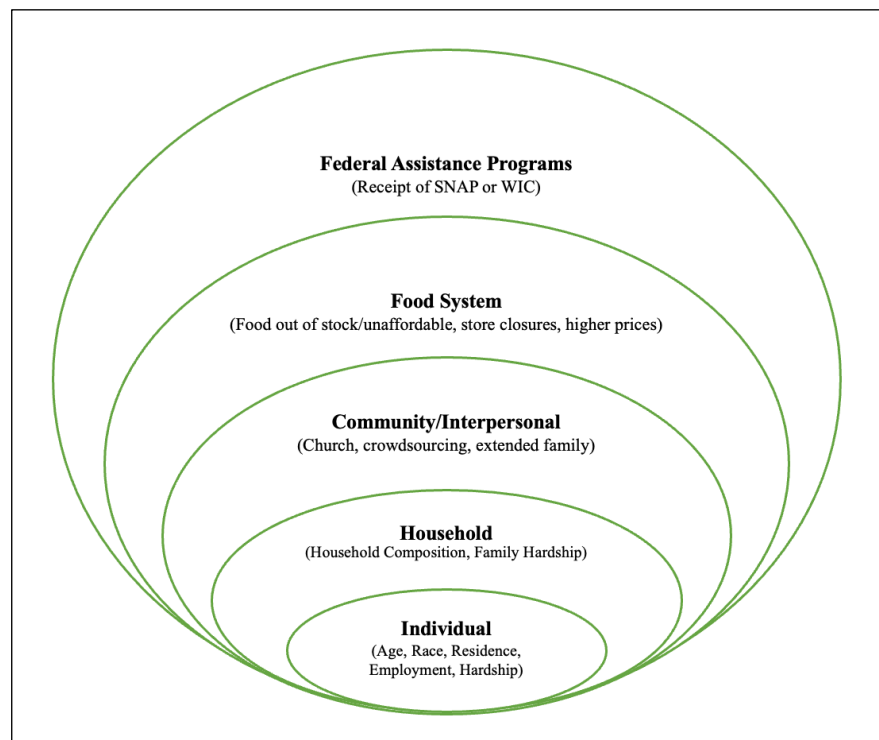
Methods

We conducted a secondary analysis of data from the Wage\$ Study, which was a prospective cohort study comprising low-wage workers from two U.S. cities: Minneapolis, MN, and Raleigh, NC. This study collected data from 2018 to 2022 to track health and economic outcomes associated with wage increases (Caspi et al., 2021, 2023, 2024; Chapman et al., 2021; Shanafelt et al., 2021). The eligibility criteria for the primary study required individuals to be at least 18 years of age, earn no more than US\$11.50 per hour, and work at least 10 hours per week in one of the two study cities (Caspi et al., 2021; Shanafelt et al., 2021). Participants in the study responded to an annual survey that included questions related to food insecurity and food access, receipt of economic and food assistance, and health outcomes. We used data from

the third year of the study, collected from July 2020 through January 2021, in this current study of the early COVID-19 pandemic period. The two cities in the study had similar periods in which a “stay-at-home” or “shelter-in-place” order was in effect at the state level, from the last week of March to the third week of May 2020 (Raifman et al., 2021).

We used variables at five levels of the socio-ecological model to examine their association with the first-time use of charitable community food resources during the COVID-19 pandemic. We organized these variables into individual, household, community, food system, and federal nutrition program factors (Figure 1). Individual factors include the following variables: age categorized as 18-29, 30-39, 40-49, 50-59, and 60+ years; race/ethnicity, categorized as Non-Hispanic Black, Non-Hispanic White, Hispanic, and Non-Hispanic Other; and experiencing an individual-level hardship in the last 12 months. Hardships were assessed by the survey question, “Which of the follow-

Figure 1. Multilevel Factors Hypothesized to Influence First-Time Use of Charitable Community Food Resources among Low-Wage Workers



SNAP = Supplemental Nutrition Assistance Program

WIC = Special Supplemental Nutrition Program for Women, Infants and Children

ing hardships did you or your family experience in the last year (12 months)?” Participants affirmed whether they experienced each hardship (“Yes” or “No”). Individual-level hardships included having medical procedures or emergencies (“Medical Event”), having disruptions in employment to the individual (“Employment Hardship”), having an arrest or incarceration (“Legal Hardship”), experiencing homelessness, or having a loss of transportation (“Housing/Transportation Hardship”).

Household-level factors included household composition (one or more adults with no children, single adults with children, and multiple adults with children), began caring for a loved one, and disruptions in employment or the death of someone in the household (“Family Hardship”).

Community-level factors included location or city of residence (Raleigh, NC, or Minneapolis, MN). Additionally, participants were asked, *“Did you receive financial support from any of these sources during the stay-at-home order?”* Participants responded “Yes,” “No,” or “Unsure” to whether they had received financial assistance from a church (“Church Assistance”), financial assistance from crowdsourcing (“Crowdsourcing”), or financial assistance from extended family (“Family Assistance”).

At the food system level, the survey asked participants to answer “Yes” or “No” to a series of questions about the impacts they experienced in their local food system. The question asks, *“During the stay-at-home order, were your typical food shopping activities affected in any of the following ways?”* Items included being unable to buy typical foods because they were out of stock (“Food Out of Stock”), an affordable size or brand of food being unavailable (“No Affordable Food Available”), food prices being higher than usual (“Higher Food Prices”), or the store where they typically shop was closed (“Grocery Store Closure”).

Federal nutrition program factors include whether participants received SNAP or WIC during the early COVID-19 pandemic. Participants were asked, *“In the last month (30 days), did you or anyone in your household receive any of the following?”* Responses included food stamps (SNAP or EBT) and WIC. Participants responded with answers “Yes,” “No,” or “Unsure.” We categorized participants who said they were “Unsure” as not receiv-

ing these programs ($n = 5$ for SNAP and $n = 2$ for WIC).

The dependent variable in this study is the individual and household self-reported first-time experience with food resources during the early COVID-19 pandemic. Participants were asked, *“Which of the following food support resources did you or anyone in your household use for the first time during the stay-at-home order?”* Options of “Food shelf or pantry,” “Soup Kitchen,” “Garden,” and “Other” were given. In Minnesota, places that distribute food at no cost are often referred to as “food shelves,” instead of the more common term “food pantries.” We assessed these responses as a single binary outcome variable for first-time use of charitable community food resources, such as a food shelf, pantry, or soup kitchen. We excluded responses for “Garden” or “Other,” as these may not fall within the category of charitable community food resources.

We conducted statistical analyses using SAS (ver. 9.4). We conducted chi-squared tests to compare individual, household, community, food system, and federal food program-level characteristics by first-time use of charitable community food resources. We conducted a classification tree analysis to assess the impact of individual, household, community, food system, and federal program factors on participants’ first-time use of charitable community food resources (Lemon et al., 2003). Classification trees are a statistical technique that identifies subgroups based on their likelihood of experiencing a dichotomous outcome (here, first-time use of charitable community food resources). Classification tree analysis begins by examining the entire sample (called the parent node) and selects independent variables that result in a split into two groups (called child nodes) to maximize differences between these groups. Then the algorithm repeats this partitioning procedure recursively unless stopping rules are met, resulting in subgroups known as terminal nodes (leaves). We used cost-complexity pruning to guide the selection of tree size and avoid overfitting. To assess model performance and variable importance, we examined trees with varying numbers of leaves. We evaluated model fit, including Area Under the Curve (AUC) and entropy, and exam-

ined consistency in variable importance rankings across candidate trees.

Additionally, we conducted logistic regression to examine multilevel factors associated with first-time use of charitable community food resources. The model-building approach added a set of variables at each level of the socio-ecological model (individual, household, community, food system, federal food program) in each subsequent version of the logistic regression model. The logistic regression model was specified as follows:

$$\begin{aligned} \text{logit}(P(Y_i = 1)) &= \beta_0 + \beta_1 X_i^{(ind)} + \beta_2 X_i^{(hh)} \\ &+ \beta_3 X_i^{(comm)} + \beta_4 X_i^{(food)} \\ &+ \beta_5 X_i^{(fed)} \end{aligned}$$

where $P(Y_i = 1)$ indicates first-time use of community food resource for participant i ; β_0 represents the log-odds of first-time use for participants not reporting first-time use of charitable community food resources and who had 0 values for all covariates; $\beta_1 X_i^{(ind)}$ represents the vector of coefficient and corresponding individual-level covariates; $\beta_2 X_i^{(hh)}$ represents the vector of coefficients and corresponding household-level covariates; $\beta_3 X_i^{(comm)}$ represents the vector of coefficients and corresponding community-level covariates; $\beta_4 X_i^{(food)}$ represents the vector of coefficients and corresponding food system-level covariates; $\beta_5 X_i^{(fed)}$ represents the vector of coefficients and corresponding federal food assistance covariates.

In addition, as a sensitivity analysis, we collapsed categories with small cell sizes with other similar categories and carried out logistic regression models with the collapsed categories to determine whether results changed.

Results

Of the 647 participants who completed the study survey measure in 2020, we excluded those with missing data on gender ($n = 7$), race or ethnicity ($n = 22$), receipt of WIC ($n = 5$), receipt of SNAP ($n = 12$), food system questions ($n = 23$), and household type ($n = 13$), resulting in an analytic sample of 565 adults.

Overall, 29.0% of low-wage workers in our

study reported using a charitable community food resource for the first time during the COVID-19 stay-at-home order. Several factors were associated with the first-time use of these charitable community food resources (Table 1). Low-wage workers who first used charitable community food resources were more likely to care for a loved one ($p = 0.02$), have older age ($p < 0.01$), have received SNAP ($p < 0.01$), and have their location (city of residence) be Minneapolis, MN ($p < 0.01$; Table 1). All food system-level factors, including grocery store closures ($p < 0.01$), experiencing higher food prices ($p < 0.01$), the unavailability of affordable food ($p < 0.01$), and food being out of stock ($p < 0.01$), also differed by first-time use of charitable community food resources (Table 1).

Results of the cost-complexity pruning analysis examining trees with 10–15 leaves are presented in Appendix Table A1. Improvements in model performance plateaued after 12–13 leaves, and at this point the ranking of the most important variables remained stable across candidate trees. Based on these patterns, we selected a classification tree with 13 leaves as the final model. The final classification tree had an AUC of 0.73. AUC is a statistic that determines how effective a binary classification is, with scores closer to 1 indicating better model performance. Entropy across nodes was 0.76 for first-time use of charitable community food resources, indicating a moderate level of heterogeneity across subgroups.

Results of the classification tree are presented in Table 2 and Figure 2. Factors at multiple levels of the socio-ecological model had high importance scores in training the classification tree (Table 2). Age emerged as the most important factor contributing to the first-time use of charitable community food resources (importance score of 2.88). Church assistance was the second most important factor, with an importance score of 2.46. Race/ethnicity was the third most important factor, with an importance score of 2.42. The tree splits between Hispanic and non-Hispanic participants in 40+ and 18–39 age groups towards the top of the tree. The use of charitable community food resources was 42.9% for those who were older (aged 40+), reported food being out of stock, and had non-Hispanic ethnicity, compared to 11.1% for those

Table 1. Characteristics of Low-Wage Workers from Minneapolis, Minnesota, and Raleigh, North Carolina, by First-Time Use of Charitable Community Food Resources

	First-Time Users of Charitable Community Food Resources N (%)	Non-First-Time Users N (%)	p-value
Gender			
Female	104 (63.6)	247 (61.6)	0.91
Male	59 (36.0)	151 (37.7)	
Nonbinary	1 (0.6)	3 (0.7)	
Age			
18–29	23 (14.0)	116 (28.9)	<0.01
30–39	33 (20.1)	97 (24.2)	
40–49	32 (19.5)	64 (16.0)	
50–59	57 (34.8)	85 (21.2)	
60+	19 (11.6)	39 (9.7)	
Race/Ethnicity			
Non-Hispanic Black	116 (70.7)	286 (71.3)	0.49
Hispanic	7 (4.3)	19 (4.7)	
Non-Hispanic Other	14 (8.5)	21 (5.2)	
Non-Hispanic White	27 (16.5)	75 (18.7)	
Location			
Minneapolis, MN	95 (57.9)	175 (43.6)	<0.01
Raleigh, NC	69 (42.1)	226 (56.4)	
Household Type			
No Children	107 (65.2)	246 (61.4)	0.55
Single Adult with Children	21 (12.8)	65 (16.2)	
Multi-Adult with Children	36 (22.0)	90 (22.4)	
Began Caring for Loved One	22 (13.4)	29 (7.2)	0.02
Medical Event	35 (21.3)	66 (16.5)	0.17
Legal Hardship	4 (2.4)	10 (2.5)	0.97
Housing/Transportation Hardship	40 (24.4)	74 (18.5)	0.11
Employment Hardship	87 (53.1)	223 (55.6)	0.58
Family Hardship	43 (26.2)	105 (28.2)	0.99
Family Assistance	60 (36.6)	119 (29.7)	0.11
Church Assistance	17 (10.4)	13 (3.2)	<0.01
Crowdsourcing	3 (1.8)	8 (2.0)	0.90
Grocery Store Closure	89 (53.6)	154 (38.4)	<0.01
Food Out of Stock at Store	121 (73.8)	224 (55.9)	<0.01
No Affordable Food Available	113 (68.9)	225 (56.1)	<0.01
Higher Food Prices	128 (78.1)	267 (66.6)	<0.01
Received SNAP ^a	105 (64.0)	196 (48.9)	<0.01
Received WIC ^b	16 (9.8)	40 (10.0)	0.94

^a SNAP = Supplemental Nutrition Assistance Program

^b WIC = Special Supplemental Nutrition Program for Women, Infants and Children

who were also older and reported food being out of stock, but had Hispanic ethnicity (Figure 2). Non-Hispanic participants aged 40+ who reported food being out of stock, receiving food assistance, having a family hardship, and having begun caring for a loved one had the highest percentage of participants who reported first-time use of charitable community food resources (100%). In contrast, participants aged 18–39 who did not receive financial assistance from a church and did not report that affordable food was unavailable had the lowest percentage of participants who reported using a community food resource for the first time (9.2%).

The adjusted logistic regression models met the convergence requirements. Several factors emerged as predicting first-time use of charitable community food resources in adjusted logistic regression models (Table 3). This included those aged 40–49 (33.3%, aOR = 2.70, 95% CI = 1.34–5.43), 50–59 (40.1%, aOR = 3.25, 95% CI = 1.66–6.37), and 60+ years (32.8%, aOR = 2.86, 95% CI = 1.23–6.63), compared with those aged 18–29 years (16.6%, Table 3). Participants who reported receiving financial support from a church were more likely to use a community food resource for the first time (aOR = 2.55, 95% CI = 1.12–5.80).

Table 2. Variable Importance in Classification Tree Analysis for First-Time Use of a Community Food Resource among Low-Wage Workers from Minneapolis, Minnesota, and Raleigh, North Carolina

Variable	Importance	Relative Importance
Age (40+ years)	2.88	1.00
Church Assistance	2.46	0.85
Race/Ethnicity	2.42	0.84
No Affordable Food Available	2.27	0.79
Began Caring for Loved One	1.79	0.62
Food Out of Stock at Store	1.55	0.54
Gender	1.54	0.54
Family Hardship	1.47	0.51
Received Assistance from Family	1.36	0.47
Grocery Store Closure	1.18	0.41

Participants who reported food being out of stock at their local grocery also had an increased likelihood of using these community resources (aOR = 2.03, 95% CI = 1.14–3.63) compared with those who did not. Finally, participants who received SNAP were more likely to use a charitable community food resource compared with those who did not (aOR = 1.54, 95% CI = 1.02–2.33; Table 3).

Some statistically significant factors in early models were attenuated in the full model, including variables at all levels of the socio-ecological model. For example, participants living in Minneapolis were more likely to use a community resource in the community-level model (aOR = 1.78, 95% CI = 1.17–2.73) and the food-system level model (aOR = 1.59, 95% CI = 1.00–2.52), but these factors were no longer significant in the federal program level model (aOR = 1.51, 95% CI = 0.95–2.41; Table 3). In sensitivity analyses, results of the logistic regression models did not change after collapsing categories with small cell sizes (results not shown).

Discussion

In this study, we identified multilevel characteristics of low-wage workers who are more likely to use food pantries or soup kitchens for the first

time during the pandemic. We used a classification tree to identify relevant factors at each level of the socio-ecological model that contribute to new use of charitable foods during the stay-at-home orders that were in effect during the early months of the COVID-19 pandemic. Older age, receiving church assistance, and food being out of stock at the store emerged as important factors in both the classification tree and logistic regression models. The classification tree identified subgroups of individuals aged 18–39 who experienced unaffordable or out-of-stock food and had received financial assistance from a church as having a notably higher likelihood of using a community resource for the first time during the stay-at-home order. These results can inform policymakers who are charged with allocating resources through federal and local food assistance programs during times of crisis. Results may also be useful for community food assistance programs when conducting outreach targeting those who may have the greatest need for assistance and outreach during crises.

Charitable community food resources, such as soup kitchens or food pantries, were essential for millions of families during the COVID-19 pandemic (Feeding America, 2021; Hunger Solutions, 2021). The stay-at-home period is notable, especially in Minneapolis, as it coincided with a period in June 2020 in which the city was the epicenter of civil unrest, which resulted in both the closure of food retail stores and the emergence of pop-up food distribution sites (Caspi et al., 2023; Klecker, 2020). Although the frequency of charitable food use was higher for participants in Minneapolis, a notable portion of participants in Raleigh, and more than a quarter of our study sample, reported using a soup kitchen and/or food pantry for the first time during the 2020 stay-at-home period. While government assistance programs may have restrictions on benefits due to eligibility and application processes, these charitable community food resources provide direct assistance to those in acute need regardless of income, citizenship, or other factors. These resources, while able to provide direct assistance, may still be limited in their ability to meet needs due to transportation barriers, service hours, stigma, and resource limitations (Hazzard et al., 2024; McCarthy et al., 2025).

Figure 2. Classification Tree of First-Time Use of Charitable Community Food Resources by Low-Wage Workers from Minneapolis, Minnesota, and Raleigh, North Carolina, During the Stay-at-Home Orders During the COVID-19 Pandemic

Percentages indicate % of people in the box who used a community food resource for the first time; shaded outlined boxes = Greater than 50% in the affirmative.

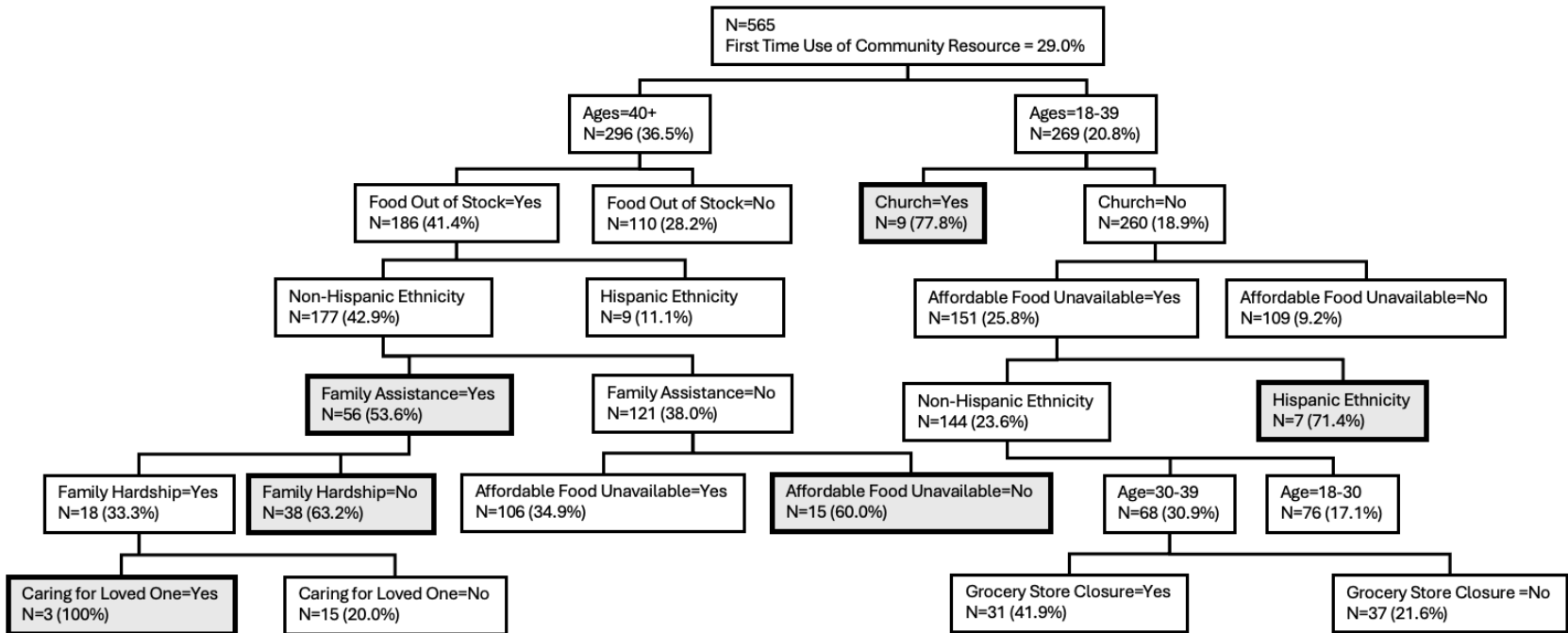


Table 3. First-Time Use of a Community Food Resource among Low-Wage Workers from Minneapolis, Minnesota, and Raleigh, North Carolina, in Relation to Individual-, Household-, Community-, Food System-, and Federal Food Program-Level Factors

Boldface indicates statistical significance at the alpha = 0.05 level.

	First-time use of charitable community food resources, <i>n</i> (%)	Individual-level factors, aOR (95% CI) ^{a, b}	Household-level factors, aOR (95% CI) ^a	Community-level factors, aOR (95% CI) ^a	Food System-level factors, aOR (95% CI) ^a	Federal Food Program-level factors, aOR (95% CI) ^a
Gender						
Female	104 (29.6)	Ref	Ref	Ref	Ref	Ref
Male	59 (28.1)	0.83 (0.56–1.24)	0.86 (0.57–1.30)	0.81 (0.53–1.24)	0.86 (0.56–1.33)	0.91 (0.59–1.41)
Nonbinary	1 (25.0)	1.60 (0.15–16.71)	1.63 (0.15–17.42)	1.61 (0.15–17.36)	2.18 (0.20–23.98)	2.15 (0.20–23.51)
Age						
18–29	23 (16.6)	Ref	Ref	Ref	Ref	Ref
30–39	33 (25.4)	1.81 (0.98–3.34)	1.77 (0.95–3.30)	1.86 (0.98–3.52)	1.75 (0.92–3.34)	1.82 (0.93–3.56)
40–49	32 (33.3)	2.84 (1.50–5.38)	2.95 (1.52–5.70)	2.91 (1.49–5.69)	2.71 (1.38–5.33)	2.70 (1.34–5.43)
50–59	57 (40.1)	3.76 (2.09–6.76)	3.82 (2.05–7.09)	3.39 (1.80–6.40)	3.33 (1.73–6.38)	3.25 (1.66–6.37)
60+	19 (32.8)	2.78 (1.34–5.78)	3.09 (1.43–6.67)	2.79 (1.26–6.19)	2.84 (1.25–6.44)	2.86 (1.23–6.63)
Race/Ethnicity						
Non-Hispanic Black	116 (28.9)	Ref	Ref	Ref	Ref	Ref
Hispanic	7 (26.9)	0.81 (0.33–2.03)	0.79 (0.32–1.98)	0.75 (0.30–1.91)	0.72 (0.28–1.86)	0.74 (0.28–1.95)
Non-Hispanic Other	14 (40.0)	2.06 (0.97–4.34)	2.09 (0.98–4.49)	1.81 (0.83–3.95)	1.74 (0.79–3.86)	1.72 (0.77–3.83)
Non-Hispanic White	27 (26.5)	0.83 (0.50–1.38)	0.82 (0.49–1.37)	0.71 (0.42–1.21)	0.73 (0.42–1.25)	0.72 (0.42–1.24)
Medical Event						
No	129 (27.8)	Ref	Ref	Ref	Ref	Ref
Yes	35 (34.7)	1.39 (0.86–2.25)	1.34 (0.82–2.19)	1.31 (0.80–2.16)	1.28 (0.77–2.13)	1.24 (0.74–2.08)
Legal Hardship						
No	160 (29.4)	Ref	Ref	Ref	Ref	Ref
Yes	4 (28.6)	1.01 (0.29–3.47)	0.98 (0.27–3.51)	1.10 (0.30–4.04)	1.14 (0.31–4.22)	1.09 (0.29–4.08)
Housing/Transportation Hardship						
No	124 (27.5)	Ref	Ref	Ref	Ref	Ref
Yes	40 (35.1)	1.41 (0.88–2.24)	1.42 (0.88–2.27)	1.38 (0.85–2.23)	1.36 (0.84–2.22)	1.38 (0.85–2.24)
Employment Hardship						
No	77 (30.2)	Ref	Ref	Ref	Ref	Ref
Yes	87 (28.1)	1.04 (0.71–1.54)	1.08 (0.73–1.61)	1.18 (0.78–1.77)	1.16 (0.76–1.75)	1.16 (0.76–1.76)
Household Type						
No Children	107 (30.3)		Ref	Ref	Ref	Ref
Single with Children	21 (24.4)		1.04 (0.57–1.93)	1.08 (0.58–2.00)	1.09 (0.58–2.03)	0.89 (0.46–1.72)
Multi with Children	36 (28.6)		1.14 (0.68–1.91)	1.12 (0.67–1.90)	1.16 (0.68–1.98)	1.02 (0.58–1.78)

Caring for Loved One					
No	142 (27.6)	Ref	Ref	Ref	Ref
Yes	22 (43.1)	1.82 (0.97 - 3.42)	1.89 (0.99 - 3.60)	1.74 (0.90 - 3.35)	1.71 (0.89 - 3.35)
Family Hardship					
No	121 (29.0)	Ref	Ref	Ref	Ref
Yes	43 (29.0)	0.80 (0.51–1.25)	0.77 (0.49–1.22)	0.75 (0.47–1.19)	0.75 (0.47–1.19)
Family Assistance					
No	104 (26.9)		Ref	Ref	Ref
Yes	60 (33.5)		1.37 (0.89–2.10)	1.24 (0.80–1.92)	1.22 (0.79–1.90)
Church Support					
No	147 (27.5)		Ref	Ref	Ref
Yes	17 (56.7)		3.03 (1.35–6.80)	2.82 (1.24–6.38)	2.55 (1.12–5.80)
Crowdsourcing					
No	161 (29.1)		Ref	Ref	Ref
Yes	3 (27.3)		0.41 (0.09–1.87)	0.41 (0.09–1.84)	0.44 (0.10–1.91)
Location					
Raleigh	69 (23.4)		Ref	Ref	Ref
Minneapolis	95 (35.2)		1.78 (1.17–2.73)	1.59 (1.00–2.52)	1.51 (0.95–2.41)
Grocery Store Closure					
No	75 (23.3)			Ref	Ref
Yes	89 (36.6)			1.16 (0.74–1.81)	1.15 (0.74–1.80)
Food Out of Stock at Store					
No	43 (19.6)			Ref	Ref
Yes	121 (35.1)			1.91 (1.08–3.41)	2.03 (1.14–3.63)
No Affordable Food Available					
No	51 (22.5)			Ref	Ref
Yes	113 (33.4)			0.95 (0.55–1.66)	0.92 (0.52–1.60)
Higher Food Prices					
No	36 (21.2)			Ref	Ref
Yes	128 (32.4)			1.06 (0.64–1.76)	1.05 (0.63–1.75)
Received SNAP^b					
No	59 (22.4)				Ref
Yes	105 (34.9)				1.54 (1.02–2.33)
Received WIC^b					
No	148 (29.1)				Ref
Yes	16 (28.6)				1.35 (0.64–2.87)

^a Adjusted logistic regression models include all variables in that column.

^b Abbreviations: aOR = adjusted odds ratio; SNAP = Supplemental Nutrition Assistance Program, WIC = Special Supplemental Nutrition Program for Women, Infants and Children

Our results revealed that low-wage workers aged 40 years and older were more likely to use the community food resources for the first time compared to those aged 18–29 years. A study examining U.S. adults age 60 and above revealed that food insecurity rates were much higher for those who lived in multigenerational households or were disabled, unemployed, or living on a fixed income (Ziliak & Gundersen, 2022). Complicated application processes for government assistance programs may also contribute to older adults opting for charitable community food resources (Mabli & Worthington, 2017).

Results of the classification tree reveal a complex intersection of personal and community factors associated with seeking out charitable community food resources. Factors at these levels appear multiple times throughout the classification tree. Studies have demonstrated that those living in predominately Black or Hispanic neighborhoods face increased barriers to accessing healthy foods due to limited access to grocery stores (Bower et al., 2014; Powell et al., 2007; Zhu, 2022). While race/ethnicity was an important factor in training the classification tree, additional factors, such as age and interactions with the food system, compounded the direction of this relationship among Hispanic participants. Older Hispanic participants in our study utilized charitable community food resources less frequently than older non-Hispanic participants. Evidence from the pandemic demonstrated that, while Black and Hispanic adults were more likely to use a food pantry, they also faced increased barriers to access, including language barriers for those whose first language is not English (Marriott et al., 2022; Treloar et al., 2024). This, along with factors such as the cultural appropriateness of food offered in the charitable food system, may explain why an older Hispanic population would be less likely to seek them out (Cordeiro et al., 2018).

Several studies reveal that food shoppers in racial minority communities have used mitigation strategies to navigate their resource-poor areas (Antrum et al., 2024; Colón-Ramos et al., 2018). These strategies include reliance on their social network and church, and participation in SNAP and school lunch programs to help make ends meet for

their family (Colón-Ramos et al., 2018). It is possible that those who responded that they had received financial assistance from a church also received food assistance from a church food pantry or food kitchen located on the premises. Alternately, church staff may have provided referrals or recommendations for other community resources as part of their assistance to members of their congregations. While the literature on the impact of faith-based charitable food resources on reducing food insecurity is limited, researchers recognize the role of faith-based organizations in the charitable food system (Fishbein et al., 2023; Riediger et al., 2022). A descriptive analysis of food pantries in 12 states across the U.S. found that most food pantries in operation were affiliated with a religious organization (Riediger et al., 2022). The precise role and mechanism through which religiously-affiliated organizations promote food security in times of crisis has not been well documented, and should continue to be studied in future research. Understanding the role of churches and other faith-based organizations in offering emergency services will be essential as cuts to U.S. federal nutrition assistance programs are currently being implemented (Bleich & Seligman, 2026). At the same time, stakeholders should continue to advocate for federal food assistance programs that meet the needs of all citizens regardless of their religious affiliation.

Receipt of SNAP appeared as an important variable in the logistic regression models but not the classification tree. The differing role of SNAP participation in these results may reflect methodological differences. While logistic regression estimates adjusted for associations between independent and dependent variables, classification trees identify variables that best split the sample into more homogenous subgroups. Variables that are significant in regression models may not emerge as the best variables for splitting groups if they do not improve subgroup splits. In the regression models, participants receiving SNAP were more likely to have used charitable community food resources for the first time than those not receiving SNAP. The relationship between SNAP participation and receipt of assistance from food pantries or soup kitchens is complex. On the one hand, SNAP is designed to address food insecurity, so those

receiving SNAP may not need other assistance. Yet, previous studies have demonstrated that the benefits provided by SNAP are not always sufficient, and individuals receiving assistance from SNAP may also seek support from charitable community food resources (Lambie-Mumford & Dowler, 2015; Mabli & Worthington, 2017). A study examining food assistance during the COVID-19 pandemic found that SNAP participants still utilized other charitable community food resources, but likely to a lesser extent than expected, due to the emergency allotments that temporarily offered the maximum benefit amount for a participant's household size (Taylor et al., 2022). Additionally, food pantries and soup kitchens have the potential to serve a more broad and heterogeneous population because many of these agencies do not have strict income limits and can reach people who are inadequately served by federal food assistance programs (Lambie-Mumford & Dowler, 2015).

The results of this study reveal the complex characteristics of individuals who sought charitable community food resources for the first time during the early stages of the COVID-19 pandemic. Because these resources do not have restrictions on who they serve and do not have lengthy enrollment processes, they serve an essential role during short-term crises. Stakeholders should consider the role of each of these services, who seeks their assistance, and how to get more support for these programs when additional federal assistance may be limited. Notably, the USDA also supports charitable food agencies like food pantries. During the pandemic, USDA programs such as The Emergency Food Assistance Program (TEFAP) enabled the increased allocation of food to food banks and allowed participants to receive assistance regardless of qualification or citizenship status (Feeding America, n.d.; USDA, 2026b). Additionally, TEFAP and another USDA program, the Commodity Supplemental Food Program (CSFP), are less susceptible to shocks in the food system as they have access to commodity foods that retailers do not (USDA, 2026a, 2026b). Stakeholders should recognize that government food assistance programs, such as SNAP, may not be as nimble in responding to changes like a lack of affordable

food or essential items being out of stock, which are important factors related to people's use of charitable community food resources. The potential chilling effects of current federal policies (The White House, 2025) may cause those in homes with mixed immigration status to rely even more on charitable community food programs (Algert et al., 2006; Bleich & Seligman, 2026; Watson, 2014). Recently, the federal government has abruptly reduced federal funds that support charitable food sources, which could significantly limit their ability to serve those in need (Picchi, 2025). While the federal government should serve a key role in providing funds for these community resources, administrators should look for opportunities at the state or local level to bolster their reach while serving their communities equitably.

This study had several limitations. Participants were asked only whether they used charitable food resources for the first time during the stay-at-home order. As a result, negative responses do not allow us to distinguish those who had never used charitable food resources, those who had used them only in the past, and those who continuously relied on these resources. This lack of distinction is likely to attenuate the associations observed, because the differences between our two comparison groups may be diluted. In particular, prior or continuous users who responded "no" may be more similar to first-time users with respect to food insecurity and household financial insecurity than they are to never-users, who may be more likely to have stable household finances and lower levels of food insecurity. This potential misclassification may bias results towards the null. As an additional limitation, the classification tree analysis was conducted as an exploratory, hypothesis-generating approach to identify potential subgroups and interactions. The relatively modest sample size may have reduced the stability of results for smaller subgroups, and these findings should be interpreted with caution. Logistic regression models did not include interaction terms, although the classification tree captures interactions implicitly. Additionally, the data in this study are from low-wage workers in two U.S. cities. Participants were enrolled based on their status as low-wage workers in 2018, rather than on

their household income. Therefore, the sample is not demographically comparable to low-income households in terms of factors like age and health status. Although our two-site study contributes granular data on multilevel factors associated with first-time use of charitable food resources, it has limited generalizability to other populations, including individuals with higher socioeconomic status, individuals in other geographic regions, and other time periods. However, many COVID-19–related disruptions and federal economic relief expansions were national in scope, which supports the broader relevance of our findings. In future analyses, nationally representative datasets such as the Household Pulse Survey (U.S. Census Bureau, 2020) may be well equipped to address questions about food insufficiency and food pantry visits across states and socioeconomic groups using larger sample sizes.

Conclusion

Charitable community food resources, such as food pantries and soup kitchens, played an important role in supporting household food security during the early COVID-19 pandemic, and are likely to continue to play a large role as federal food assistance programs are scaled back. In this study, we identified subgroups of low-wage workers who were more likely to use these charitable community food resources for the first time during the stay-at-home orders in 2020. These findings help to identify who might be newly reliant on charitable food resources during times of crisis and where charitable food agencies might make changes to better serve the people most in need. These findings also may help inform policymakers and community stakeholders in shaping programs that mitigate food insecurity and offer an understanding of behaviors in times of acute crisis. 

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Appendix Table A1. Cost-Complexity Pruning Examining Trees with 10–15 Leaves

Leaves	AUC	Misclassification	ASE	Entropy	Importance Rank 1	Importance Rank 2	Importance Rank 3	Importance Rank 4	Importance Rank 5	Importance Rank 6
10	0.7	0.2531	0.1799	0.7767	Age (40+ years)	Church Assistance	No Affordable Food Available	Began Caring for a Loved One	Food Out of Stock	Family Hardship
11	0.71	0.2478	0.1772	0.7681	Age (40+ years)	Church Assistance	No Affordable Food Available	Race/Ethnicity	Began Caring for a Loved One	Food Out of Stock
12	0.72	0.2478	0.176	0.7632	Age (40+ years)	Church Assistance	No Affordable Food Available	Race/Ethnicity	Began Caring for a Loved One	Food Out of Stock
13	0.73	0.2478	0.1748	0.7591	Age (40+ years)	Church Assistance	No Affordable Food Available	Race/Ethnicity	Began Caring for a Loved One	Food Out of Stock
14	0.73	0.2425	0.1733	0.7548	Age (40+ years)	Church Assistance	No Affordable Food Available	Race/Ethnicity	Began Caring for a Loved One	Food Out of Stock
15	0.73	0.2407	0.1722	0.7508	Age (40+ years)	Church Assistance	No Affordable Food Available	Race/Ethnicity	Began Caring for a Loved One	Food Out of Stock