

## Food sources and acquisition by consumers of low income in urban neighborhoods: A conceptual framework and food decision tree

Gabriela M. Vedovato<sup>a</sup>, Zoya N. Rehman<sup>b</sup>, Natasha B. Bunzl<sup>b</sup>, Angela C. B. Trude<sup>b,\*</sup> 

<sup>a</sup> Federal University of Sao Paulo, Institute of Health and Society, 136 Silva Jardim, Santos, SP, 11015-020, Brazil

<sup>b</sup> New York University, Steinhardt School of Culture, Education, and Human Development, Department of Nutrition and Food Studies, 411 Lafayette St, 5th floor, New York, NY, 10003, USA

### ARTICLE INFO

#### Keywords:

Consumer behavior  
Decision tree  
Food assistance programs  
Food security

### ABSTRACT

Food decision-making among urban consumers of low income is comprised of a complex interplay of strategies, influenced by sociodemographic and environmental factors. This study was conducted in the Bronx, New York City, a borough marked by disparities and limited healthy food access. The study aimed to co-develop with urban consumers of low income a conceptual framework representing food procurement decision-making, with special attention paid to the multifaceted dynamics of food acquisition in the context of food insecurity. In-depth interviews and focus group discussions were conducted with bodega customers and food pantry clients to inform a food procurement decision tree. The framework illustrated the hierarchical order of food sources and coping strategies influenced by factors like household income, food assistance program participation, perceived access to food sources, living conditions, and immigration status. While grocery stores and supermarkets were the primary food sources, secondary sources like bodegas and food pantries were relied upon when physical or financial access was constrained, and superstores when resources were available. Farmers' markets and online grocery shopping were tertiary sources and oftentimes unrealistic options for participants. This study highlights the challenges faced by consumers of low income in accessing healthy food and underscores the need for food pantries to meet nutritional and cultural food needs. The findings emphasize the importance of considering contextual factors in interventions and policies to address food insecurity and their implications on community health.

### 1. Introduction

Food decision-making by urban consumers of low income includes a range of monetary and non-monetary strategies for procuring food (Middleton, Mehta, McNaughton, & Booth, 2018; Symmank et al., 2017). Food acquisition choices and values, particularly within households living in underserved areas, can be influenced by a complex interplay of sociodemographic and environmental factors (Middleton et al., 2018; Symmank et al., 2017; A. C. Trude, Ali, et al., 2022; Verdeau & Monnery-Patris, 2024). These factors encompass income and living conditions, participation in food assistance programs (i.e., Supplemental Nutrition Assistance Program - SNAP/Special Supplemental Nutrition Program for Women, Infants and Children - WIC), access to transportation and grocery shopping services, and the physical availability, variety, quality, and cost of foods (A. C. Trude, Ali, et al., 2022). Furthermore, these structural elements interact intricately with

psychosocial and cultural dimensions and phenomena, such as stigma, racism, low literacy levels, and the presence of physical conditions like diet-related diseases and disabilities (Vedovato, Ali, Lowery, & Trude, 2022). For consumers of low income, especially those experiencing food insecurity, these interactions can influence diet quality, and eventually, generate negative long-term consequences for the mental and physical health of families (Jia, Fung, Meigs, & Thorndike, 2021; Williams & Do, 2023).

Food procurement is complex and takes place in a variety of settings (Symmank et al., 2017). In the U.S., smaller retail stores like corner stores and bodegas often serve as important sources for food purchasing among consumers of low income due to their proximity and convenience (Dannefer, Adjoian, Brathwaite, & Walsh, 2016; Kiszko et al., 2015; O'Malley, Gustat, Rice, & Johnson, 2013; Ruff, Akhund, & Adjoian, 2016), especially among families eligible for government assistance programs, like the SNAP (A. C. Trude, Ali, et al., 2022). It is worth noting

\* Corresponding author.

E-mail address: [angela.trude@nyu.edu](mailto:angela.trude@nyu.edu) (A.C.B. Trude).

<https://doi.org/10.1016/j.appet.2024.107798>

Received 26 March 2024; Received in revised form 20 November 2024; Accepted 26 November 2024

Available online 4 December 2024

0195-6663/© 2024 Elsevier Ltd. All rights reserved, including those for text and data mining, AI training, and similar technologies.

that only 5% of SNAP benefits are spent at such stores, compared to the 52% spent at superstores, and 27% in grocery stores/supermarkets, and the remaining 16% across fourteen other types of food retailers (FNS, 2021).

Visits to food pantries play a key role in providing immediate food assistance to families with limited purchasing power, many of whom are facing food insecurity (Bazerghi, McKay, & Dunn, 2016; Caspi et al., 2021; Ginsburg et al., 2019; Grier-Welch, Marquis, Spence, Kavanagh, & Anderson Steeves, 2021; Hosler, Cong, & Alharthy, 2021; Middleton et al., 2018). Food pantry use among consumers of low income living in New York State has been associated with participation in food assistance programs, low supermarket physical access, and frequent shopping at bodegas (Hosler et al., 2021). In the face of the COVID-19 pandemic, a considerable number of families relied on food pantries, and continue to do so (Azhar, Ross, Keller, Weed, & Acevedo, 2023; Marriott et al., 2022). In particular, these resources are often a survival strategy for consumers of low income due to an array of challenges, ranging from limited incomes to eligibility restrictions of welfare programs (Mares, 2013), making them a non-monetary strategy employed for food procurement. However, food pantries also present limitations such as restricted hours, stigma, and an inconsistent supply of fresh, healthy, and culturally diverse foods (Ginsburg et al., 2019; Gu et al., 2021; Kihlstrom, Long, & Himmelgreen, 2019). Food pantry use among adults of low income living in New York State has been associated with participation in food assistance programs, low supermarket physical access, and frequent shopping at bodegas (Hosler et al., 2021).

It is necessary to identify the dynamics that inform how consumers of low income perceive and navigate the food environment in urban underserved areas, as these decisions have shown to be associated with food access, food security, and ultimately, health. Furthermore, it is imperative to understand how these perceptions shape food procurement decisions to develop successful strategies to support healthy food acquisition among this hard-to-reach population (Aragon, Armstrong Shultz, Bush-Kaufman, & Barale, 2019; Caspi et al., 2021; Dannefer et al., 2016; Grier-Welch et al., 2021; Kihlstrom et al., 2019; Kiszko et al., 2015). Therefore, this study examines the food decision-making process among consumers of low income by co-developing a conceptual framework and decision tree with participants. The conceptual framework, which incorporates a food decision tree, identifies key factors that influence food acquisition and highlights associated strategies that these consumers may use to cope with food insecurity. This study focuses on consumers of low income, defined as individuals and families with limited financial resources and purchasing power. Living on a low income is a key determinant of food insecurity, and thus these two groups are closely related, but distinct (Gundersen, 2013). Food insecurity is an important dimension in the lives of many individuals living on a low income and thus is crucial for understanding their food decision-making processes.

## 2. Methods

### 2.1. Subjects and setting

The study took place in the Bronx, New York City (NYC), with a diverse and multiethnic population. Of its nearly 1.5 million residents (U.S. Census, 2023), 24% live in poverty, a number above the city (17.3%) and country (11.6%) estimates. Over half of its residents (51%) participate in SNAP (NYC, 2017). The prevalence of obesity in the Bronx is the highest of NYC (31.7%).

The Bronx is marked by disinvestment, dismantling of public infrastructure, and disproportionately lower access to social services compared to other parts of the city (Bailey & Moon, 2020; Sbicca & Myers, 2017). The South Bronx has approximately 571 food establishments, with bodegas accounting for the largest component of the food environment (n = 265, 46%) (NYC, 2014). Bodegas (or corner stores) are self-service convenience stores that offer a limited line of

convenience items, are typically open long hours to provide easy access for customers, and are primarily engaged in retail sale of a variety of canned goods, dairy products, pre-packaged meats and other grocery items in limited amounts (USDA, 2023b). Supermarkets constitute only a small proportion of the South Bronx food environment (n = 26, 5%) (NYC, 2014). In this study, “supermarket” and “grocery store” are used interchangeably and refer to establishments primarily engaged in the retail sale of an extensive variety of grocery and other store merchandise store typically has ten or more checkout lanes with registers, bar code scanners, and conveyor belts (USDA, 2023b). Food pantries, or local, volunteer-run providers of emergency food assistance that distribute unprepared foods for offsite use (USDA, 2022b), tend to be located in areas with low physical and economic access to supermarkets (Mabli, Jones, & Kaufman, 2013). The list of food pantries recently released by the NYC Department of Youth and Community Development identifies 13 units in the Bronx (NYC, 2023). Depending upon the season, farmers’ markets (single or multi-stall markets that sell agricultural products, particularly fresh fruit and vegetables, to the general public at a single or multiple locations) (USDA, 2023b) are also present in the Bronx, where the NYS Department of Agriculture and Markets recognizes 15 entities (NYS, 2023). Superstores, while not a significant part of the food environment in NYC (NYC, 2014), are, along with supermarkets and other large grocery stores, the source of nearly two-third (65%) the calories consumed in US households (USDA, 2023a), and the primary food source of over half (52%) of WIC households (USDA, 2015). In this paper, “superstores” are distinct from supermarkets, and refers to very large supermarkets, “big box” stores, super stores and food warehouses primarily engaged in the retail sale of a wide variety of grocery and other store merchandise, including stores that are large food/drug combo stores and mass merchandisers under a single roof, and membership retail/wholesale hybrids offering a limited variety of products in warehouse-type environment (USDA, 2023b).

### 2.2. Procedure

Qualitative methods were adopted to investigate the community’s perspectives on food access, food sourcing, and food acquisition strategies. In-depth interviews (IDIs) and member check interviews were conducted with bodega customers, and subsequently, focus group discussions (FGDs) with food pantry clients. This use of methodological and data triangulation expanded the representation of consumers of low income residing in the Bronx, refined and validated the data, and ultimately facilitated the co-creation of the conceptual framework and food decision tree (Carter, Bryant-Lukosius, DiCenso, Blythe, & Neville, 2014).

The recruitment of bodega customers for in-depth interviews occurred on weekdays from May 2022 to July 2022 in high foot traffic areas of the South Bronx. Adult pedestrians were approached at recruitment sites that included the exterior of a local settlement house and human service organization, participating bodegas, a nearby local fruit and vegetable cart, and a GrowNYC farmers’ market. To advertise the study at participating bodegas, research assistants hung flyers next to the cash register or in the window/door and distributed flyers to customers. The flyers were in English and contained QR codes for a Qualtrics survey to determine customers’ eligibility and availability for an in-depth interview. Although both flyers and the Qualtrics survey were available only in English, bilingual research staff was present with study tablets during recruitment and approached interested individuals who preferred to speak Spanish to explain the study procedures and assist in the completion of the baseline survey when needed. Adults (>18 years old) who self-identified as the primary grocery shopper for the household (more than once/month), frequently shopped at bodegas (at least once a month), owned a smartphone, and met the income eligibility criteria (self-reported annual household income of  $\leq 130\%$  of the federal poverty level and/or enrolled in SNAP) were considered eligible and invited to participate in in-depth interviews for the parent

study that investigated customers' perception of online grocery shopping from bodegas (A. C. Trude et al., 2023) and were included in the present analysis.

Interested participants (n = 103) scanned the QR code either with their own devices or available study tablets and were directed to a screener that contained questions to ascertain eligibility and to gather data on sociodemographic factors (i.e., age, education, race/ethnicity, household size, children in the household). Participants self-reported their race/ethnicity from the following list: White or Caucasian, African American or Black, Hispanic or Latin American, Asian or Asian American, Middle Eastern or North African, American Indian or Alaska Native, or Native Hawaiian/Pacific Islander, or Another race or ethnicity not listed above. A total of 47 participants were eligible for the interview. The research team texted and emailed eligible participants in their preferred language to confirm interview time and sent a second link to another Qualtrics survey that assessed grocery shopping habits and food security in the past 12 months using the validated 6-item household food security module (USDA, 2022a).

All interviews (n = 25) were conducted via telephone at the participant's requested date and time. The remaining 22 participants either had wrong contact information or were no-shows. The interview guide was initially drafted in English and then translated into Spanish by bilingual research team members. The interview guide included questions on general and bodega-related food purchasing behaviors, the role of the bodega in community health, online grocery shopping from supermarkets and bodegas, and general SNAP experiences (**Supplemental document**). The interviews averaged 20 min in length (range from 12 to 54 min) and were audio recorded. Each respondent received a \$10 Amazon e-gift card for their participation. Following preliminary data analysis, the research team re-contacted three participants who had previously agreed to a follow up and invited them to be a part of the member check interviews.

Two FGDs (n = 9 in each) were conducted in a food pantry at a community-based organization (CBO) in the South Bronx on a Saturday in December 2022. Participants were eligible for the FGDs if they were the primary grocery shopper acquiring food for their household and were of low income. The participant pool of food pantry clients was chosen to increase representativeness of the South Bronx community and to enable further exploration of the links between food insecurity and food assistance, bodegas, and the community food environment. Participants were recruited through the food pantry with posters and flyers in English and Spanish on the day of the FGDs. Posters were also hung at the CBO prior to the day. All bodega customers eligible for the initial in-depth interview (n = 48) received invitations via email and text to participate; one interviewee attended. The focus group was conducted to refine and validate the IDI findings, enhancing the generalizability by including additional views of families with children (< age 18), as the majority of the IDIs were conducted with participants belonging to households without children. Further, the FGDs promoted a collective interpretation of the findings from the interviews (**Supplemental document**) and the collaborative development of a conceptual framework about food decisions, allowed in-person data collection as opposed to telephone interviews, and provided an opportunity for interaction and discussion among participants. During each FGD, researchers summarized main themes and topics discussed in a white board while gathering feedback from the entire group on relations and hierarchies formed. Each FGD generated their own food procurement decision tree that was later combined by researchers.

The research team involved in data collection and interpretation included racially diverse female researchers with graduate-level training and experience in qualitative methods, sociology, food security, nutrition, and health. The team included both bilingual (English/Spanish) speakers and those who were raised in the target community, and none had pre-existing connections with any of the study participants.

The study was conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving human subjects

were approved by the New York University (NYU) Institutional Review Board (IRB-FY2022-6394). Online and verbal informed consent was obtained from all subjects.

### 2.3. Data analysis

Throughout data collection, researchers filled out debrief documents to summarize IDIs and FGDs to identify salient, new, and recurring themes. The consistent recurrence of similar themes and lack of new themes identified were signs of data saturation and informed the conclusion of data collection.

All IDIs and FGDs were transcribed by a study team member or professionally by an online transcription service (Rev.com) before being double-checked by a different study team member to ensure the quality and accuracy of the transcription. Interviews conducted in Spanish were first transcribed in the original language and then translated into English by the same team member. A second researcher checked the translated transcription for error and accuracy.

To develop a codebook for the interviews, three researchers independently coded one transcript using the interview guide and research questions to generate an initial code. For the initial code, researchers used a line-by-line coding approach to identify keywords and topics using a grounded theory approach and compared their coding. Next, two coders independently applied the codebook to a second transcript to refine existing codes and develop new ones. On double analysis of the second transcript, the coders met to discuss and consolidate the codebook, and re-applied the final codebook to the first transcript. Coding disputes were resolved by the entire data analysis team. The codebooks included a brief description of each code, examples of when to use or not to use the code, and an exemplary quote. Using the refined codebook, the same pair of researchers double-coded four transcripts until no discrepancies emerged. The remaining 21 transcripts were then independently coded and cross-checked by a second researcher. Then, a member check interview guide was generated based on a preliminary analysis of the data to ensure that the team's interpretation was consistent with the views and experiences of the participants and to co-create a conceptual framework which included a decision tree and contextual factors affecting and affected by it. The framework and decision tree aimed to capture various facets of participants' decision-making processes according to contextual factors and the community food environment. Decision trees serve as valuable tools for visually portraying heuristic decision-making within a hierarchical framework, a utility that extends even to qualitative approaches. (Auld et al., 2007; Pettigrew et al., 2016).

The MAXQDA software (VERBU software, Berlin, Germany, 2020) was used for the qualitative analysis, using separate, offline versions of the platform to maintain confidentiality in coding before consolidation.

## 3. Results

### 3.1. Demographic characteristics

Overall, study participants were female, African American/Black and Hispanic/Latin American, and had a lower level of education (Table 1). Bodega customers (IDI participants) were aged 50 or older (48%), living at or below 130% of the federal poverty line (92%), and approximately 44% experienced some degree of food insecurity, with 60% reporting no participation in SNAP within the previous year. Although food pantry clients (FGD participants) shared a similar sociodemographic profile, precise numbers are not available due to missing data.

### 3.2. Food procurement conceptual framework with decision tree

Based on participants' perspectives, a conceptual framework was developed, within which a decision tree for food procurement was embedded and contextualized by factors affecting and affected by it,

**Table 1**

Characteristics of bodega customers and food pantry clients from households of low income who participated in a qualitative study on food source and acquisition.

Demographics	In-depth Interview n = 25	Focus Group Discussion n = 18
<b>Age, years, n (%)</b>		
18-29	8 (32)	1 (5.6)
30-39	4 (16)	6 (33.3)
40-49	1 (4)	0 (0)
50 or Older	12 (48)	6 (33.3)
Missing	–	5 (27.8)
<b>Gender, n (%)</b>		
Female	20 (80)	6 (33)
Male	4 (16)	1 (5)
Non-binary	1 (4)	0 (0)
Missing	–	11 (62)
<b>Race/ethnicity, n (%)</b>		
African American or Black	7 (28)	1 (5.5)
Hispanic or Latin American	13 (52)	6 (3.3)
Another Race or Ethnicity not Listed Above <sup>a</sup>	2 (8)	0 (0)
More than One Race/Ethnicity <sup>b</sup>	1 (4)	0 (0)
Missing	2 (8)	11 (91.2)
<b>Education<sup>c</sup>, n (%)</b>		
Below College	17 (68)	7 (39)
Completed College	8 (32)	0 (0)
Missing	–	11 (61)
<b>130% Federal Poverty Line, n (%)</b>		
At or Below	23 (92)	6 (33)
Above	2 (8)	1 (1)
Missing	–	11 (66)
<b>Household Size: Median (range)</b>	3 (1–7)	5 (4–6)
<b>Household Composition, n (%)</b>		
With Children (< age 18)	17 (68)	7 (39)
Without Children (< age 18)	8 (32)	0 (0)
Missing	–	11 (61)
<b>Food Security<sup>d</sup>, n (%)</b>		
High Food Security	1 (4)	0 (0)
Marginal Food Security	8 (32)	1 (5)
Low Food Security	5 (20)	1 (5)
Very-Low Food Security	6 (24)	4 (22)
Missing	5 (20)	12 (68)
<b>SNAP<sup>e</sup> participation in the past 12 months, n (%)</b>		
Yes	10 (40)	1 (5)
No	15 (60)	12 (66)
Missing	–	5 (29)
<b>Online grocery shopping experience, n (%)</b>		
Ever Shopped	8 (32)	–
Never Shopped	13 (52)	–
Missing	4 (16)	–

– Not missing or not asked.

<sup>a</sup> Other response option was a prespecified survey response category not specified.

<sup>b</sup> Participants who selected multiple of the provided racial groups were categorized as “Multiracial”.

<sup>c</sup> High-school or below (n = 6), General Education Development (GED) (n = 5), Some college (n = 6).

<sup>d</sup> USDA 6-item Household Food Security Survey.

<sup>e</sup> SNAP = Supplemental Nutrition Assistance Program.

including sociodemographic and environmental factors, associated coping strategies and the perceived mental and physical health of the community. The conceptual framework (Fig. 1) illustrates the most salient factors that influenced food procurement behaviors among urban consumers of low income in neighborhoods with a high ratio of bodegas to grocery stores. Correspondingly, the included decision tree is based on participants' views of resources and factors influencing their food procurement decisions, which lie along an axis depicting the direction of their influence on food source decisions. Participants reported that the position of food sources on the decision tree directly influenced, either positively or negatively, both their perceived food security and perceived physical and mental health. Therefore, food sources are

presented on the decision tree in alignment with participants' experiences, and in hierarchical order along a gradient of perceived food security and perceived health status, which are linked to tangible coping strategies at the household level. Coping strategies are linked to their associated food source through arrows. Arrows directed from food source to coping strategy representing ways participants described making do with the food they received at that source, whereas arrows directed from coping strategy to food source indicate how participants used certain sources to cope with food insecurity. Illustrative quotations of coping strategies are shown in Table 2.

Grocery stores and supermarkets were the primary food sources utilized by consumers of low income. However, in the absence of sufficient monetary resources to purchase food, or a lack of physical access to stores or time to shop, they opt for a secondary plan, consisting of food pantries and bodegas respectively. The utilization of food pantries and bodegas moved consumers down the gradients of perceived food security and health status, and was associated with a range of coping strategies and circumstances marked by lower sociodemographic status, environmental barriers, and poorer physical and mental health. In sharp contrast to these circumstances, superstores offered a secondary option for food purchasing among consumers of low income that had their own vehicle. Tertiary food sources mentioned included online grocery shopping (for those with limited physical access or time) and farmers' markets (when in season and scheduled reliably, offer a fair price, and physical access to them is positively perceived), although these options did not appear to be viable for most consumers of low income in the urban community included in the study. Superstores, farmers' markets moved consumers of low income in the positive direction along the perceived food security and perceived health status gradients, and were associated with distinct coping strategies.

The conceptual framework and associated decision tree revealed that the community food environment was multilayered, with hierarchical food sources. Grocery stores and supermarkets are located at the point of origin of the decision tree. Consumers of low income viewed grocery stores as offering a variety of high-quality products and fresh produce that was affordable, and thus, as facilitating the ability to meet specific health requirements and preferences, making them the primary or preferred food source for consumers of low income to acquire foods for themselves or their households.

*“[I go to the supermarket] When I want to do a big grocery shopping. Big, like I find a lot of things. It's sales [that motivates me]. Sometimes, I get good sales.”* (Lucy, Female, 60–64, African-American or Black, Customer, IDI participant)

Even so, participants described using coupons and discounts at grocery stores, and sometimes visiting multiple stores, to get the most out of the available sources. However, based on contextual factors such as household income, SNAP participation, and/or perceived physical accessibility of grocery stores, consumers of low income supplemented their household groceries with food and beverages from other food sources on the decision tree located along the gradients of perceived food security and perceived health status. In addition to these factors, immigration status was distinctly identified from the FGDs as a factor restricting access to social benefits, and therefore, income to purchase food.

In the presence of greater resources, participants described moving up the decision tree and along the gradients of perceived food security and physical and mental health in the positive direction. As a secondary food source, superstores offered more variety and often, cheaper prices, but required significant planning prior to visits because they were further from participants' households. This distance is particularly significant for individuals lacking personal transportation, made having access to personal vehicles a requirement for most consumers of low income when utilizing superstores.

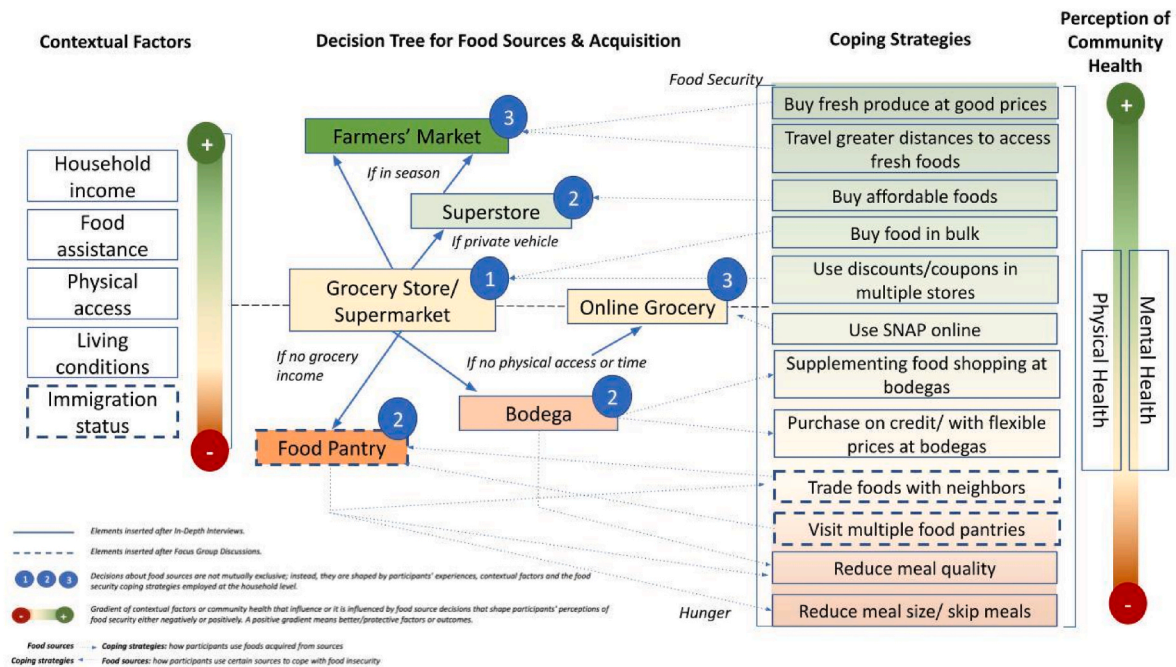


Fig. 1. Conceptual framework on Community Food Access and Health from the perspective of consumers of low income in urban setting.

"I have a vehicle and I drive, and I can go to Walmart outside of the state. I can go to Target. I can go to a different supermarket, but for people that are in the area, [this is not an option]" (Ava, Female, 50–51 Hispanic or Latin American, Customer, IDI participant)

Less frequently, grocery trips were also supplemented with visits to tertiary food sources, such as farmers' markets, when in season or in the neighborhood, or when personal transportation was available. Farmers' markets were viewed to offer a variety of fresh and oftentimes, seasonal produce at reasonable prices. However, consumers of low income usually perceived them to be in inconvenient locations and have uncertain or unreliable schedules.

"[in the Bronx] In the summer months, when they let us have a farmers' market, which this month, was extremely late [...] I mean, that was a year [late]. They said that a year in advance, then they came in June, and not in May. So, yeah, that was really horrible! [...]]" (Lily, Female, 50–54, Another race or ethnicity not listed above, English, Customer, IDI participant)

Finally, online grocery services were reportedly utilized by some consumers of low income when physical access to the primary food source was a barrier but time was short.

"Because there's a lot of people who work also, and there's days that they can't get to the supermarket, so they can probably order and it'll just be in front of their door or something by the time they get home." (Ella, Female, 50–54, African-American or Black and Hispanic or Latin American, Customer, IDI participant)

However, online grocery services were not a viable option for some participants, especially those of lower income.

"I can't really think of supermarkets around my neighborhood that people bought online and deliver it." (Sam, Male, 50–54, Race Not Disclosed, Customer, IDI participant)

Customers experiencing greater food insecurity made food shopping decisions informed by their experiences, moving down the decision tree from grocery stores and along the perceived food security and perceived health status gradients in the negative direction. Coping strategies for dealing with household food insecurity varied depending on household

income, government food assistance participation, and living conditions (e.g., shared housing, rented, shelter). When physical access to grocery stores was restricted due to time or distance, bodegas became a secondary food source for groceries and convenient foods for the week for consumers of low income, both in the context of household food supplies and individuals on the go.

"The supermarket closes on Sunday early. But then some people don't feel like walking all the way to the supermarket, so they go to the bodega and be having you know, fresh fruits and vegetables right there. Not a variety, but, you know, the basics." (Alex, Non-binary, 40–44, Another race or ethnicity not listed above, Customer, IDI participant)

During periods of severe food insecurity, bodegas were seen as a source of unofficial food assistance, in the context of community members' ability to shop on informal lines of credit or at reduced prices as a function of community relationships. Consumers of low income reported turning to food pantries, an alternative secondary food source, when experiencing financial constraint, sometimes at extreme levels, which also resulted in worrying about food sufficiency. Food pantry use involved a range of coping strategies of varying intensity, such as trading foods acquired at the food pantry with neighbors to construct complete meals or overcome occasional insufficient or incompatible foods available at any one pantry, visiting multiple pantries, reducing meal quality and quantity, and finally, skipping meals. In this situation, consumers perceived their mental health decline. Consumers of low income reported an increase in food prices driven by the COVID-19 pandemic, and consequently, greater utilization of food pantries by members of the community. Additionally, consumers of low income who identified as immigrants living in the United States without documentation ( $n = 5$ ) reported routinely relying on food pantries to acquire food for their households, and identified them as an essential resource to mitigate hunger. However, consumers reported difficulties in accessing sufficient food for the entire family from food pantries, emphasizing the importance of coping strategies employed in these situations.

"The things with the SNAP is they don't have [immigration] papers. They're not gonna receive that. They [undocumented immigrants], they need to at least to be... they are not qualified. You need at least a social

**Table 2**

Reported experiences related to coping strategies by consumers of low income in underserved neighborhoods.

Food Security Coping Strategies	Selected quotes
Buy fresh produce at good prices	<i>[My experience using SNAP in farmer's markets] is good, because they only have fresh products, and sometimes they have good price too. (Mia, Female, 65+, Hispanic or Latin American, customer, English, IDI participant)</i>
Travel greater distances to access fresh food	<i>And actually, for other fruits and vegetables, I would go to the farmer's market in Union Square, because they're open all year. (Zoe, Female, 50–54, Another race or ethnicity not listed above, English, Customer, IDI participant)</i>
Buy affordable foods	<i>I buy it in Walmart or I buy it in New Jersey. It's different, where I go out more, more economical for me too. (Ivy, Female, 35–39, Another race or ethnicity not listed above, Customer, IDI participant)</i>
Buy food in bulk	<i>I would say in the long run, Aldi's would probably be cheaper because they do sell in bulk. In my bodega, you probably get one or two or a couple, but Aldi's, you can get big boxes and bags. So for I feel like if you did the math, it would be cheaper. (Eva, Female, 18–24, Hispanic or Latin American, Customer, IDI participant)</i>
Use discounts/coupons in multiple stores	<i>I look for supermarket flyers, because there are a lot of supermarkets around. One here is cheap, for example, the chicken [by the] pound is cheaper here than there. So I buy chicken here and there I buy bread, juice. I buy from different supermarkets to save money. (Sarah, Female, Unknown age and ethnicity, FGD participant)</i>
Use SNAP online	<i>It's good [to use SNAP online], it's basically the same thing [as in-store] because there are some things that let you use it and it's basically the same thing: it's money and it's money you can use to buy food for your kids. (Maria, Female, 30–34, Hispanic or Latin American, Customer, IDI participant)</i>
Supplementing supermarket shopping with convenience purchases from bodegas	<i>I still buy food in supermarket, but more than things- you know, sometimes I might miss something, which is, like I said, in every day, because I cook every day for my family. So I just go and run to the bodega. It's easier." (Anna, Female, 18–24, African-American or Black, Customer, IDI participant)</i>
Purchase on credit/with flexible prices at bodegas	<i>It also allows people who may not be able to afford prices at the supermarket, you can go to the bodega. And, like I said, the prices may fluctuate. If they know your situation or whatever the case may be, they may say, "Okay, you know, pay me tomorrow." (Liv, Female, 25–29, African-American or Black, Customer, IDI participant)</i>
Trade food with neighbors	<i>There's our exchange, for example, there's a lot of vegetables that you can get, but I don't have time to eat them. So, I need potatoes, I don't have milk, can you give me some milk?...yes. (Beth, Female, Unknown age and ethnicity, FGD participant)</i>
Visit multiple food pantries	<i>The food they [food pantries] give you is not enough ... so you down stop looking for different pantries. And I don't know why but it seems that you go there and get less and less from the pantries. And also, the long lines, you have to get in line very early in the morning and stay for hours. (Kai, Female, Unknown age and ethnicity, FGD participant)</i>
Reduce meal quality	<i>Is, you tend to find food that's not necessarily healthy. What is filling? Because to eat healthy is more expensive. Like five</i>

**Table 2 (continued)**

Food Security Coping Strategies	Selected quotes
	<i>fresh fruit and vegetables is more expensive. So you tend to fill up with carbohydrates. (Maya, Female, Unknown age and ethnicity, FGD participant)</i>
Reduce meal size	<i>We have to reduce portions sometimes ... (Elle, Female, Unknown age and ethnicity, FGD participant)</i>

Abbreviations: IDI = In-depth interviews (with bodega customers); FGD = Focus group discussions (with food pantry clients). Names are pseudonyms to protect participants' privacy.

*security. And they, if you don't have like you're immigrant, illegal, you go." (Lia, Female, Unknown age and ethnicity, FGD participant)*

#### 4. Discussion

This food decision tree and its conceptual framework illustrate the food acquisition decision-making processes of urban consumers of low income, as determined by environmental and individual factors perceived by adult consumers, and its influence on food security and associated coping strategies, and mental and physical health illuminating the multifaceted dynamics at work in underserved communities (Bazerghi et al., 2016; Jia et al., 2021; Symmank et al., 2017; Williams & Do, 2023). The current study highlights that while supermarkets or grocery stores are often consumers' first choice due to their relative convenience and perceived price/quality relationship, they also use secondary sources depending on their access to resources such as money, time, or convenience. Greater financial flexibility coming from higher household income or access to SNAP benefits, and improved mobility stemming from private vehicle ownership, allows consumers of low income to move up the decision tree (i.e., shop at superstores and farmers' markets). On the other hand, impediments to access, such as a lower income or ineligibility for food assistance programs due to immigration status, force consumers to turn to other alternatives (i.e., bodegas and food pantries). These food sourcing decisions are influenced by socio-demographic and environmental factors, and are linked with different strategies devised to cope with food insecurity, which have direct implications on physical and mental health (Dlamini et al., 2023; Leung et al., 2022).

Prior research conducted in the U.S. demonstrates that supermarkets and superstores constitute primary food sources due to perceived quality and economic advantage of food purchasing, corroborating the findings of this study (Aragon et al., 2019; Dannefer et al., 2016; Hosler et al., 2021; O'Malley et al., 2013). The existence of a supermarket in a neighborhood can influence local food purchasing behavior, affecting both the acquisition of healthy items, such as fresh produce, and unhealthy food choices like soft drinks and snacks (Kiszko et al., 2015). Dannefer et al. (2016) explored food purchasing behaviors in two neighborhoods in the Bronx, NYC, and identified the central role of neighborhood supermarkets in residents' fruit and vegetable purchasing. The impact of superstores on consumer purchasing behaviors in the context of nutritional quality warrants further research. Previous studies have noted that superstores improve food security (Courtemanche, Carden, Zhou, & Ndirangu, 2019). However, it has also been suggested that consumers shopping at superstores tend to purchase less healthy options (Ailawadi et al., 2018; Taillie et al., 2016; Volpe, Okrent, & Leibtag, 2013).

In the present study, when consumers of low income need to buy food and face physical access and time constraints, they opt to shop at bodegas. Bodegas emerged as a significant supplementary food source within the examined neighborhood, as in previous studies that showed a trend of daily food procurement from bodegas (Dannefer et al., 2016; Kiszko et al., 2015; Ruff et al., 2016). This is likely because they are the

most common food sources in the location studied (Cohen, Chrobok, & Caruso, 2020). In addition to their physical accessibility, bodegas may establish sociocultural bonds with the community, as shown here by flexibility in monetary transactions where trust serves as the guarantor. Community relationships are key to improving access to healthier food options for consumers of low income and should be considered in interventions that aim to improve the food environment of underserved urban communities (O'Malley et al., 2013; Ruff et al., 2016).

Each of the food sources mentioned offers consumers of low income the opportunity to employ different coping strategies. The more limited the individual's financial and social resources, the more likely they are to resort to coping strategies such as visiting food pantries or reducing meal quantity or quality. The utilization of food pantries underscores the vulnerability of communities in the face of economic disruptions. Consumers of low income utilizing food pantries reported employing more coping strategies to avoid hunger, for example, visiting multiple pantries and sharing the food obtained with neighbors. Existing literature shows several additional barriers to food access in U.S. food pantries, such as restricted opening hours, irregular supply, limited food options, and difficulty obtaining fruits, vegetables and culturally appropriate foods (Caspi et al., 2021; Ginsburg et al., 2019; Kihlstrom et al., 2019; Long et al., 2023).

The present findings emphasize the challenges faced particularly by immigrants without documentation in accessing healthy and adequate food for their families. Although other studies identify food pantry clientele as being racially, ethnically and culturally diverse (Caspi et al., 2021; Long et al., 2023), there is little evidence that has explored this immigration perspective (Mares, 2013; Payán, Perez-Lua, Goldman-Mellor, & Young, 2022). Insufficient documentation for participation in food assistance programs like SNAP exacerbates social vulnerability, which imposes a dependence on food pantries and informal support networks to acquire food for the household (Mares, 2013). From a food security perspective, food pantries should prioritize addressing the cultural food needs of the specific and diverse communities that they serve (Bazerghe et al., 2016; Payán et al., 2022). For example, in a city in the north of New York State, Hosler et al. (2021) identified that the types of secondary food sources influence the need for a food pantry; consumers who shopped at corner stores and dollar stores were more likely to rely on a food pantry than those who shopped at ethnic markets.

At the tertiary level of food decision-making are farmers' markets and online grocery services, which appear to have little or no place in the daily routines of consumers of low income. Farmers' markets are important food venues for increasing fruits and vegetable consumption. To mitigate barriers related to physical accessibility and affordability of farmers' markets, it is necessary to increase the number of farmers' markets across the city and ensure that they accept SNAP/Electronic Benefits Transfer (EBT) (Ritter, Walkinshaw, Quinn, Ickes, & Johnson, 2019).

In this study, online grocery shopping was recognized as a salient option for consumers of low income with limited mobility, but it was seen to be available only to those with relatively greater financial resources. Online grocery shopping seems promising to address inequities in healthy food access, particularly for the elderly, people with disabilities and families with young children living in underserved areas with limited access to reliable transportation (A. C. Trude, Ali, et al., 2022; A. C. B. Trude, Lowery, et al., 2022; Vedovato et al., 2022). In the context of SNAP OPP, online grocery services are positively perceived by families of low income as a means of facilitating physical access to food, despite some identified barriers, such as delivery fees, lack of literacy and internet/technology access (Vedovato et al., 2022).

As previous studies have demonstrated (Andress & Fitch, 2016; USDA, 2022a; Wolfson, Ramsing, Richardson, & Palmer, 2019), long-distance grocery trips, occasionally to other states, were planned when income, food assistance benefits, and personal vehicles were available. Many participants reported shopping at multiple stores and

searching for the lowest prices, even though distance and transportation were barriers, underscoring the primary importance of cost. This highlights the value of time as a key component of food procurement, particularly for consumers of low income. This finding is in line with the time tax, which recognizes, as a cost, the amount of time that consumers of low income spend navigating a complex bureaucratic structure in order to receive benefits (Lowrey, 2021). It is necessary to evaluate the time required by consumers of low income to access daily necessities in an economic frame in order to understand these decision-making processes (IOM & NRC, 2013). By Becker's economic model (1965) for an evaluation of the value of the time spent on an activity, the monetary cost of food procurement must be considered along with the cost of time spent performing the activity (Becker, 1965). This study shows that these individuals often face an additional time burden in actually acquiring food, which is also experienced as a financial barrier, corroborating findings from other qualitative investigations (Andress & Fitch, 2016).

Consistent with previous evidence highlighting the vital role of interpersonal relationships in enabling coping strategies for food insecurity like borrowing food or money, (Kempson, Keenan, Sadani, & Adler, 2003), trading foods for variety (Hoisington, Shultz, & Butkus, 2002) and sharing harvests from gardens (McKay, McKenzie, & Lindberg, 2023), purchasing on credit from bodegas and trading food pantry acquisitions between neighbors took place, when necessary, in the current study. This finding aligns with the association between social capital and food security (Hippert, 2017; Nosratabadi et al., 2020; Paul, Paul, & Anderson, 2019), and emphasizes the need to recognize community networks and social support as mediators of food insecurity. Despite multiple coping strategies, consumers of low income indicate little control over their food choices and an inability to adhere to their personal values due to their socioeconomic vulnerability. Therefore, the current results should be interpreted alongside existing literature on individual-level factors that influence food decisions among consumers of low income (Brunet et al., 2024; Verdeau & Monnery-Patris, 2024).

To our knowledge, no previous study has developed a food decision tree embedded in a conceptual framework using a participatory approach with populations facing socioeconomic and environmental vulnerabilities. The present study provides a valuable understanding of the hierarchical order of food sources used and coping strategies employed by consumers of low income, based on gradations in levels of food security and perceived physical and mental health status. It is worth noting that, in addition to food-based coping strategies, consumers of low income experiencing food insecurity also adopt other coping strategies related to economic survival, like seeking employment and assistance and reducing expenditure on goods and services, which is particularly crucial for women with children (Chaudhuri, Roy, McDonald, & Emendack, 2021) and people with disabilities (Williams & Do, 2023). Household food insecurity and the associated coping strategies are closely associated with food-related comorbidities (Jia et al., 2021), psychological distress and increased mental health risks (Williams & Do, 2023). By focusing on the dynamics of food decisions, the study offers a holistic perspective that introduce novel insights and unexplored elements to inform policies and interventions that aim to improve the food environment, food security and promote health in similar urban environments.

It is necessary to recognize and discuss the limitations of this study. Firstly, the generalization of the results to other regions is limited as the study was carried out in the Bronx, NYC, which has unique sociocultural, demographic, and infrastructural characteristics. Additionally, the participant recruitment, particularly focusing on bodega customers and food pantry clients, may have introduced a sampling bias as individuals who frequent these places may have different perspectives and experiences compared to general consumers of low income in underserved urban areas. However, the omission of the bodega customer eligibility criterion for the FGDs and the inclusion of participants who did not frequently shop at bodegas helped improve the representativeness of the

study population. Likewise, the eligibility criteria of owning a smartphone may have introduced a sampling bias, but was not required for participation in the FGDs. Although efforts were made to translate and conduct interviews in English and Spanish, language proficiency may have some influence on the depth and accuracy of participants' responses. However, this concern is mitigated by the fact that the research team comprised bilingual interviewers, and the analyzed data was reviewed in both languages and written in English. Finally, due to technological issues during the FGDs, missing sociodemographic data are reported for FDGs participants.

In conclusion, this study elucidates the intricate interplay of factors influencing food acquisition behaviors in underserved urban areas, offering insights to design policy and future studies to address the challenges faced by consumers of low income. Grocery stores and supermarkets emerged as the preferred food sources, driven by factors like affordability, variety, and perceived product quality. However, contextual factors such as family income, SNAP participation, housing, and perception of accessibility influenced the use of supplementary food sources, which could vary positively for superstores or negatively for bodegas. Notably, immigration status posed a major barrier to accessing food assistance benefits, resulting in a strong dependence on food pantries among undocumented immigrants. Poverty and limited access to commercial and non-profit food resources significantly influence food purchasing decisions, leading individuals to adopt diverse coping strategies, correlated with diminished levels of both physical and mental health in the community.

#### CRedit authorship contribution statement

**Gabriela M. Vedovato:** Writing – original draft, Visualization, Formal analysis. **Zoya N. Rehman:** Writing – review & editing, Formal analysis, Data curation. **Natasha B. Bunzl:** Writing – review & editing, Project administration, Investigation, Formal analysis, Data curation. **Angela C. B. Trude:** Writing – review & editing, Validation, Supervision, Software, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization.

#### Ethical statement

This study was conducted according to the guidelines laid down in the Declaration of Helsinki, and all procedures involving human subjects were approved by the New York University Institutional Review Board (IRB-FY-2022-6394).

#### Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

#### Acknowledgment

This research was supported by a grant from the Center of Health and Rehabilitation Research at New York University

#### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.appet.2024.107798>.

#### Data availability

Data will be made available on request.

#### References

- IOM, & NRC. (2013). Individual, household, and environmental factors affecting food choices and access. In Y. A. Caswell JA (Ed.), *Supplemental nutrition assistance program: Examining the evidence to define benefit adequacy. Committee on examination of the adequacy of food resources and SNAP allotments; food and nutrition board; committee on national statistics; institute of medicine*. Washington (DC): National Academies Press (US). National Research Council; Caswell JA, Yaktine AL.
- Ailawadi, K. L., Ma, Y., & Grewal, D. (2018). The club store effect: Impact of shopping in warehouse club stores on consumers' packaged food purchases. *Journal of Marketing Research*, 55(2), 193–207. <https://doi.org/10.1509/jmr.16.0235>
- Andress, L., & Fitch, C. (2016). Juggling the five dimensions of food access: Perceptions of rural low income residents. *Appetite*, 105, 151–155. <https://doi.org/10.1016/j.appet.2016.05.013>
- Aragon, M. C., Armstrong Shultz, J., Bush-Kaufman, A., & Barale, K. (2019). Low-income respondents' perceptions about food retail and food pantry shopping environments. *Journal of Hunger & Environmental Nutrition*, 14(1–2), 110–127. <https://doi.org/10.1080/19320248.2018.1434097>
- Auld, G. W., Diker, A., Bock, M. A., Boushey, C. J., Bruhn, C. M., Cluskey, M., ... Olson, B. H. (2007). Development of a decision tree to determine appropriateness of NVivo in analyzing qualitative data sets. *Journal of Nutrition Education and Behavior*, 39(1), 37–47. <https://doi.org/10.1016/j.jneb.2006.09.006>
- Azhar, S., Ross, A. M., Keller, E., Weed, J., & Acevedo, G. (2023). Predictors of food insecurity and childhood hunger in the Bronx during the COVID-19 pandemic. *Child and Adolescent Social Work Journal*, 1–14. <https://doi.org/10.1007/s10560-023-00927-y>
- Bailey, Z. D., & Moon, J. R. (2020). Racism and the political economy of COVID-19: Will we continue to resurrect the past? *Journal of Health Politics, Policy and Law*, 45(6), 937–950. <https://doi.org/10.1215/03616878-8641481>
- Bazerghi, C., McKay, F. H., & Dunn, M. (2016). The role of food banks in addressing food insecurity: A systematic review. *Journal of Community Health*, 41, 732–740. <https://doi.org/10.1007/s10900-015-0147-5>
- Becker, G. S. (1965). A theory of the allocation of time. *The economic journal*, 75(299), 493–517. <https://doi.org/10.2307/2228949>
- Brunet, G., Machín, L., Fajardo, G., Bonilla, L., Costa, M., González, F., ... Curutchet, M. R. (2024). Coping strategies of food insecure households with children and adolescents in Uruguay, a high-income Latin American country: A qualitative study through the lens of Bourdieu's theories of capitals and practice. *Appetite*, 198, Article 107383. <https://doi.org/10.1016/j.appet.2024.107383>
- Carter, N., Bryant-Lukosius, D., DiCenso, A., Blythe, J., & Neville, A. J. (2014). The use of triangulation in qualitative research. *Oncology Nursing Forum*. Paper presented at the.
- Caspi, C. E., Davey, C., Barsness, C. B., Gordon, N., Bohlen, L., Canterbury, M., ... Pratt, R. (2021). Peer reviewed: Needs and preferences among food pantry clients. *Preventing Chronic Disease*, 18. <https://doi.org/10.5888/pcd18.200531>
- Chaudhuri, S., Roy, M., McDonald, L. M., & Emendack, Y. (2021). Coping behaviours and the concept of time poverty: A review of perceived social and health outcomes of food insecurity on women and children. *Food Security*, 13(4), 1049–1068. <https://doi.org/10.1007/s12571-021-01171-x>
- Cohen, N., Chrobok, M., & Caruso, O. (2020). Google-truthing to assess hot spots of food retail change: A repeat cross-sectional street view of food environments in the Bronx, New York. *Health & Place*, 62. <https://doi.org/10.1016/j.healthplace.2020.102291>
- Courtemanche, C., Carden, A., Zhou, X., & Ndirangu, M. (2019). Do Walmart supercenters improve food security? *Applied Economic Perspectives and Policy*, 41(2), 177–198. <https://doi.org/10.1093/aep/ppy023>
- Dannefer, R., Adjoian, T., Brathwaite, C., & Walsh, R. (2016). Food shopping behaviors of residents in two Bronx neighborhoods. *AIMS public health*, 3(1), 1. <https://doi.org/10.3934/publichealth.2016.1.1>
- Dlamini, S. N., Craig, A., Mtintsilana, A., Mapanga, W., Du Toit, J., Ware, L. J., et al. (2023). Food insecurity and coping strategies and their association with anxiety and depression: A nationally representative South African survey. *Public Health Nutrition*, 26(4), 705–715. <https://doi.org/10.1017/S1368980023000186>
- FNS. (2021). SNAP retailer management year-end summary [online PDF]. USDA food and nutrition service. <https://fns-prod.azureedge.us/sites/default/files/resource-files/2021-snap-retailer-management-year-end-summary.pdf>.
- Ginsburg, Z. A., Bryan, A. D., Rubinstein, E. B., Frankel, H. J., Maroko, A. R., Schechter, C. B., ... Lucan, S. C. (2019). Unreliable and difficult-to-access food for those in need: A qualitative and quantitative study of urban food pantries. *Journal of Community Health*, 44, 16–31. <https://doi.org/10.1007/s10900-018-0549-2>
- Grier-Welch, A., Marquis, J., Spence, M., Kavanagh, K., & Anderson Steeves, E. T. (2021). Food acquisition behaviors and perceptions of food pantry use among food pantry clients in rural Appalachia. *Ecology of Food and Nutrition*, 60(1), 70–88. <https://doi.org/10.1080/03670244.2020.1793138>
- Gu, Y., Ali, S. H., Yan, S., Gunen, B., Park, R., Poirier, L., ... Gittelsohn, J. (2021). Associations between food pantry size and distribution method and healthfulness of foods received by clients in Baltimore city food pantries. *International Journal of Environmental Research and Public Health*, 18(13), 6979. <https://doi.org/10.3390/ijerph18136979>
- Gundersen, C. (2013). Food insecurity is an ongoing national concern. *Advances in Nutrition*, 4(1), 36–41. <https://doi.org/10.3945/an.112.003244>
- Hippert, C. (2017). The moral economy of corner stores, buying food on credit, and Haitian-Dominican interpersonal relations in the Dominican Republic. *Food and Foodways*, 25(3), 193–214. <https://doi.org/10.1080/07409710.2017.1343065>
- Hoisington, A., Shultz, J. A., & Butkus, S. (2002). Coping strategies and nutrition education needs among food pantry users. *Journal of Nutrition Education and Behavior*, 34(6), 326–333. [https://doi.org/10.1016/S1499-4046\(06\)60115-2](https://doi.org/10.1016/S1499-4046(06)60115-2)



- Hosler, A. S., Cong, X., & Alharthy, A. (2021). Food pantry use and its association with food environment and food acquisition behavior among urban adults. *Journal of Hunger & Environmental Nutrition*, 16(3), 356–369. <https://doi.org/10.1080/19320248.2020.1848687>
- Jia, J., Fung, V., Meigs, J. B., & Thorndike, A. N. (2021). Food insecurity, dietary quality, and health care utilization in lower-income adults: A cross-sectional study. *Journal of the Academy of Nutrition and Dietetics*, 121(11), 2177–2186. <https://doi.org/10.1016/j.jand.2021.06.001>. e2173.
- Kempson, K., Keenan, D. P., Sadani, P. S., & Adler, A. (2003). Maintaining food sufficiency: Coping strategies identified by limited-resource individuals versus nutrition educators. *Journal of Nutrition Education and Behavior*, 35(4), 179–188. [https://doi.org/10.1016/S1499-4046\(06\)60332-1](https://doi.org/10.1016/S1499-4046(06)60332-1)
- Kihlstrom, L., Long, A., & Himmelgreen, D. (2019). Barriers and facilitators to the consumption of fresh produce among food pantry clients. *Journal of Hunger & Environmental Nutrition*, 14(1–2), 168–182. <https://doi.org/10.1080/19320248.2018.1512923>
- Kiszko, K., Cantor, J., Abrams, C., Ruddock, C., Moltzen, K., Devia, C., ... Elbel, B. (2015). Corner store purchases in a low-income urban community in NYC. *Journal of Community Health*, 40, 1084–1090. <https://doi.org/10.1007/s10900-015-0033-1>
- Leung, C. W., Laraja, B. A., Feiner, C., Solis, K., Stewart, A. L., Adler, N. E., et al. (2022). The psychological distress of food insecurity: A qualitative study of the emotional experiences of parents and their coping strategies. *Journal of the Academy of Nutrition and Dietetics*, 122(10), 1903–1910. <https://doi.org/10.1016/j.jand.2022.05.010>. e1902.
- Long, C. R., Bailey, M. M., Cascante, D. C., Purvis, R. S., Rowland, B., Faitak, B. M., ... McElfish, P. A. (2023). Food pantry clients' needs, preferences, and recommendations for food pantries: A qualitative study. *Journal of Hunger & Environmental Nutrition*, 18(2), 245–260. <https://doi.org/10.1080/19320248.2022.2058334>
- Lowrey, A. (2021). The time tax. *Why is so much American bureaucracy left to average citizens?* Retrieved from <https://www.theatlantic.com/politics/archive/2021/07/how-government-learned-waste-your-time-tax/619568/>.
- Mabli, J., Jones, D., & Kaufman, P. (2013). Characterizing food access in America: Considering the role of emergency food pantries in areas without supermarkets. *Journal of Hunger & Environmental Nutrition*, 8(3), 310–323. <https://doi.org/10.1080/19320248.2013.786663>
- Mares, T. M. (2013). "Here we have the food bank": Latino/a immigration and the contradictions of emergency food. *Food and Foodways*, 21(1), 1–21. <https://doi.org/10.1080/07409710.2013.764783>
- Marriott, J. P., Fiechtner, L., Birk, N. W., Taitelbaum, D., Odoms-Young, A., Wilson, N. L., ... Zack, R. M. (2022). Racial/ethnic disparities in food pantry use and barriers in Massachusetts during the first year of the COVID-19 pandemic. *Nutrients*, 14(12), 2531. <https://doi.org/10.3390/nu14122531>
- McKay, F. H., McKenzie, H., & Lindberg, R. (2023). The coping continuum and acts reciprocity—a qualitative enquiry about household coping with food insecurity in Victoria, Australia. *Australian & New Zealand Journal of Public Health*, 47(1), Article 100004. <https://doi.org/10.1016/j.anzjph.2022.100004>
- Middleton, G., Mehta, K., McNaughton, D., & Booth, S. (2018). The experiences and perceptions of food banks amongst users in high-income countries: An international scoping review. *Appetite*, 120, 698–708. <https://doi.org/10.1016/j.appet.2017.10.029>
- Nosratabadi, S., Khazami, N., Abdallah, M. B., Lackner, Z., Band, S. S., Mosavi, A., et al. (2020). Social capital contributions to food security: A comprehensive literature review. *AgriRxiv*, (2020), Article 20203503319. <https://doi.org/10.3390/foods9111650>
- NYC. (2014). New York city department of health and mental hygiene. Epi data brief. Describing the food environment in the South Bronx neighborhood of crotona-tremont. <https://www.nyc.gov/assets/doh/downloads/pdf/epi/databrief44.pdf>.
- NYC. (2017). New York city food policy center at hunter college. A foodscape of the South Bronx. [https://www.nycfoodpolicy.org/wp-content/uploads/2017/03/FS10567\\_2017.pdf](https://www.nycfoodpolicy.org/wp-content/uploads/2017/03/FS10567_2017.pdf).
- NYC. (2023). Department of Youth and community development. Food pantries. Bronx. [https://www.nyc.gov/site/dycd/services/food\\_pantries.page](https://www.nyc.gov/site/dycd/services/food_pantries.page).
- NYS. (2023). New York state. Department of agriculture and markets. *Farmer's Markets*. Retrieved from <https://agriculture.ny.gov/farmers-markets-county>.
- O'Malley, K., Gustat, J., Rice, J., & Johnson, C. C. (2013). Feasibility of increasing access to healthy foods in neighborhood corner stores. *Journal of Community Health*, 38, 741–749. <https://doi.org/10.1007/s10900-013-9673-1>
- Paul, C. J., Paul, J. E., & Anderson, R. S. (2019). The local food environment and food security: The health behavior role of social capital. *International Journal of Environmental Research and Public Health*, 16(24), 5045. <https://doi.org/10.3390/ijerph16245045>
- Payán, D. D., Perez-Lua, F., Goldman-Mellor, S., & Young, M.-E. D. T. (2022). Rural household food insecurity among Latino immigrants during the COVID-19 pandemic. *Nutrients*, 14(13), 2772. <https://doi.org/10.3390/nu14132772>
- Pettigrew, S., Biagioni, N., Jones, S. C., Stafford, J., Chikritzhis, T., & Daube, M. (2016). Factors influencing young people's use of alcohol mixed with energy drinks. *Appetite*, 96, 408–415. <https://doi.org/10.1016/j.appet.2015.09.037>
- Ritter, G., Walkinshaw, L. P., Quinn, E. L., Ickes, S., & Johnson, D. B. (2019). An assessment of perceived barriers to farmers' market access. *Journal of Nutrition Education and Behavior*, 51(1), 48–56. <https://doi.org/10.1016/j.jneb.2018.07.020>
- Ruff, R. R., Akhund, A., & Adjoian, T. (2016). Small convenience stores and the local food environment: An analysis of resident shopping behavior using multilevel modeling. *American Journal of Health Promotion*, 30(3), 172–180. <https://doi.org/10.4278/ajhp.140326-QUAN-121>
- Sbicca, J., & Myers, J. S. (2017). Food justice racial projects: Fighting racial neoliberalism from the Bay to the Big Apple. *Environmental Sociology*, 3(1), 30–41. <https://doi.org/10.1080/23251042.2016.1227229>
- Symmank, C., Mai, R., Hoffmann, S., Stok, F. M., Renner, B., Lien, N., et al. (2017). Predictors of food decision making: A systematic interdisciplinary mapping (SIM) review. *Appetite*, 110, 25–35. <https://doi.org/10.1016/j.appet.2016.11.023>
- Taillie, L. S., Ng, S. W., & Popkin, B. M. (2016). Global growth of "big box" stores and the potential impact on human health and nutrition. *Nutrition Reviews*, 74(2), 83–97. <https://doi.org/10.1093/nutrit/nuv062>
- Trude, A. C., Ali, S. H., Lowery, C. M., Vedovato, G. M., Lloyd-Montgomery, J., Hager, E., et al. (2022). A click too far from fresh foods: A mixed methods comparison of online and in-store grocery behaviors among low-income households. *Appetite*, Article 106038. <https://doi.org/10.1016/j.appet.2022.106038>
- Trude, A. C., Bunzl, N. B., Rehman, Z. N., Elbel, B., Lau, S., Talal, L. A., et al. (2023). "I don't want an app to do the work for me": A qualitative study on the perception of online grocery shopping from small food retailers. *Journal of the Academy of Nutrition and Dietetics*. <https://doi.org/10.1016/j.jand.2023.12.005>
- Trude, A. C. B., Lowery, C. M., Ali, S. H., & Vedovato, G. M. (2022). An equity-oriented systematic review of online grocery shopping among low-income populations: Implications for policy and research. *Nutrition Reviews*, 80(5), 1294–1310. <https://doi.org/10.1093/nutrit/nuab122>
- U.S. Census. (2023). U.S. Department of commerce. Quarterly retail E-Commerce sales. 4th quarter 2023. [https://www.census.gov/retail/mrts/www/data/pdf/ec\\_current.pdf](https://www.census.gov/retail/mrts/www/data/pdf/ec_current.pdf).
- USDA. (2015). Economic research service. U.S. Department of agriculture. Most U.S. Households do their main grocery shopping at supermarkets and supercenters regardless of income. <https://www.ers.usda.gov/amber-waves/2015/august/most-us-households-do-their-main-grocery-shopping-at-supermarkets-and-supercenters-regardless-of-income/>.
- USDA. (2022a). Economic research service. U.S. Department of agriculture. *Food & nutrition assistance*. Food Security in the U.S. Key Statistics & Graphics. Retrieved from <https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-u-s/key-statistics-graphics/#children>.
- USDA. (2022b). *Statistical supplement to household food security in the United States in 2021, AP-105*. U.S. Department of Agriculture, Economic Research Service. Retrieved from <https://www.ers.usda.gov/webdocs/publications/104663/ap-105.pdf?v=3410#:~:text=In.202021.2C.2069.0.20percent.20of,31.0.20percent.20were.20food.20insecure.>
- USDA. (2023a). Economic research service. U.S. Department of agriculture. *FoodAPS national household food acquisition and purchase survey. Summary findings*. Retrieved from <https://www.ers.usda.gov/data-products/foodaps-national-household-food-acquisition-and-purchase-survey/summary-findings/>.
- USDA. (2023b). SNAP store type definitions. <https://www.fns.usda.gov/snap/store-def-definitions>.
- Vedovato, G. M., Ali, S. H., Lowery, C. M., & Trude, A. C. (2022). Giving families a voice for equitable healthy food access in the wake of online grocery shopping. *Nutrients*, 14(20), 4377. <https://doi.org/10.3390/nu14204377>
- Verdeau, B., & Monnery-Patris, S. (2024). When food is uncertain, how much does sustainability matter? A qualitative exploration of food values and behaviours among users of a social grocery store. *Appetite*, 194, Article 107175. <https://doi.org/10.1016/j.appet.2023.107175>
- Volpe, R., Okrent, A., & Leibtag, E. (2013). The effect of supercenter-format stores on the healthfulness of consumers' grocery purchases. *American Journal of Agricultural Economics*, 95(3), 568–589. <https://doi.org/10.1093/ajae/aas132>
- Williams, M. R., & Do, D. P. (2023). Income disparities in mental health: Investigating the role of food insecurity by disability status. *Public Health Nutrition*, 26(4), 866–876. <https://doi.org/10.1017/S1368980022002063>
- Wolfson, J. A., Ramsing, R., Richardson, C. R., & Palmer, A. (2019). Barriers to healthy food access: Associations with household income and cooking behavior. *Preventive medicine reports*, 13, 298–305. <https://doi.org/10.1016/j.pmedr.2019.01.023>