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Food security at the nexus of constraints and self-efficacy: The primacy of options

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Abstract

This research investigates the complex interplay between structural constraints, specifically transportation and housing, and personal psychological factors, such as self-efficacy, in shaping the food decisions of residents in urban healthy food priority areas (HFPAs). While traditional food security research often focuses on macro-level availability and affordability, this study explores how individual and household-level contexts influence the navigation of food environments through an exploratory case study of the Central Hillside neighborhood in Duluth, Minnesota. Utilizing focus groups and surveys, we gathered mixed qualitative and demographic data. The study identifies three distinct archetypes of food-insecure households: Microwave Meal Navigators, Family Navigators,

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and Independent Navigators. Findings reveal that for those facing "utilization poverty" (a lack of kitchen infrastructure), structural barriers almost entirely override individual agency. Conversely, among those with kitchens at home, self-efficacy serves as a critical equalizer, enabling individuals to mitigate the "mobility tax" of limited transportation options by leveraging social networking and strategic planning. The study proposes a hierarchy of influence in which time poverty (a lack of time) and housing quality determine the extent to which an individual's belief in their own agency translates into nutritional outcomes. Ultimately, the results suggest that food security interventions must evolve beyond increasing retail density. A holistic approach is required to address the "utilization poverty" of housing, the "time tax" of urban transportation, and the "efficacy gap" through capacity-building programs like meal kits and nutritional education. By fostering food-related self-efficacy, policymakers can empower residents not just to navigate their food environments but to actively reshape them, moving toward a more integrated model of nutritional security.

Keywords
food agency, urban healthy food priority areas, household segmentation, utilization poverty, time poverty, mobility constraints, efficacy gap

Introduction

Food insecurity statistics for the United States are troubling, with some counties where 30% of the population and 50% of the child population are food insecure, and it is 60% among some Black or Latino populations (Feeding America, 2025). In Minnesota, USA, one in five people experience food insecurity; food shelf visits have grown from 3.6 million in 2019 to over 9 million in 2025 (Support Minnesota's Hunger Relief Network, 2026); and grocery stores are increasingly closing (Schmidt, 2019). The former report states that the problem is projected to escalate as work reporting requirements expand. Neighborhoods characterized by low income and limited access to supermarkets or full-service grocery stores, also called Healthy Food Priority Areas (HFPA), experience higher rates of food insecurity (Rahkovsky et al., 2018), and this results from a complex interplay of structural, household, and individual factors (Drewnowski et al., 2020; Frank et al., 2022; Linde et al., 2023).

Structural factors such as transportation and the built environment play a critical role in shaping food access. Many households lack access to private vehicles and therefore rely on walking, public transit, or informal rides to reach grocery stores. These alternatives can be unreliable, time-consuming, or unavailable, particularly for caregivers, older adults, and individuals with disabilities (Bose, 2025). Built environmental characteristics, such as poor walkability, long travel distances to full-service food retailers, and seasonal weather conditions, can further intensify these challenges (Abdul Razak et al., 2025). Studies such as the *Seattle Obesity Study* and the *Kavli Human Project* demonstrate that neighborhood-level food environments and spatial accessibility significantly influence dietary behaviors and health outcomes (Drewnowski & Kawachi, 2015).

At the same time, households in urban HFPAs are frequently treated as a homogeneous group within food access research and policy interventions. A growing body of literature suggests that households experience food insecurity differentially and that food decisions vary substantially depending on household composition, time constraints, and socio-demographic factors (Belon et al., 2016; Feeding America, 2025; Frank et al., 2022; Jabs et al., 2007; Loopstra & Tarasuk, 2013; Monsivais et al., 2014; Rahkovsky et al., 2018). For example, children, many communities of color, households with low incomes, immigrant communities, LGBTQ+ individuals, people with disabilities, people in rural areas vs. cities, formerly incarcerated individuals, and single-parent households face heightened food insecurity (Feeding America, 2025). These variations suggest the need to segment households by socio-demographic characteristics when designing food access interventions.

Beyond structural and socio-demographic influences, psychological factors such as self-efficacy also shape food decisions. Self-efficacy, individuals' beliefs in their ability to perform behaviors necessary to achieve desired outcomes, has been strongly associated with cooking confidence and

healthier dietary patterns across demographic groups (Ellis et al., 2018; French et al., 2024; Lo et al., 2019; Minkow, 2016). Individuals who feel greater control over food planning and preparation are more likely to engage in behaviors that support healthier diets. At the same time, those experiencing higher levels of stress or constraints may prioritize convenience, cost, or immediate satisfaction.

Taken together, these insights align with a socio-ecological perspective developed by Caperon et al. (2019), which emphasizes that food behaviors emerge from interactions among environmental, household, and individual-level factors, among others. However, much of the existing literature examines these influences independently, leaving a limited understanding of how they interact in households' everyday food decisions in urban HFPAs.

Using an exploratory case study approach, this research aims to contribute to food security literature by examining how structural (physical access) constraints, along with socio-demographic and personal psychological factors, can shape the food decisions of urban HFPA residents.

Literature Review

We examine the literature on food decisions in the context of physical access, socio-demographic and psychological characteristics.

Physical Access and Food Decisions

Much of the food security literature focuses on access and affordability, and while access to reliable transportation is crucial, it is often overlooked (Bose, 2025; Saia, 2023). Urban HFPAs lack access to full-service grocery stores, forcing residents without private vehicles to rely on alternatives such as convenience stores and food shelves with limited healthy food options. When available, the quality of affordable healthy foods in independent grocery stores does not match that in wealthier neighborhoods (Hua et al., 2024). Lack of access to a private automobile forces many families to use unreliable, time-consuming, or unavailable modes of transportation (Bodor et al., 2013). These conditions create myriad challenges where even a simple trip to the grocery store can become a stressful, time-consuming experience (Dillahunt & Veinot, 2018; Hua et al., 2024), causing households to shop less frequently and rely more on shelf-stable less healthy foods. Food access programs such as mobile markets, food pantries, and farmers markets offer near-home services (Katre et al., 2025), whereas micro-transportation and home-delivery services aim to eliminate transportation barriers (Lauderback, 2022; Maleki & Smith-Colin, 2023; Reneker, 2022). These programs help bridge some of the most noticeable gaps, but are often restricted by limited schedules, routes, or inventory.

Thus, structural and built environment issues constitute significant barriers to food and nutritional security (Abdul Razak et al., 2025; Antrum et al., 2023; French et al., 2001). Additionally, climatic and seasonal conditions magnify these physical access barriers. In cities like Duluth, Minnesota, these constraints are intensified by steep topography, uneven or snow-covered sidewalks, and limited transit connectivity. Residents often rely on time-consuming travel strategies to meet everyday food needs. In summary, the literature suggests that reliable physical access is a major factor in determining when and where food is sourced.

Socio-Demographic Factors and Food Decisions

Public Health research shows that health campaigns are most effective when they recognize that populations are not homogeneous (Ramirez et al., 2017; Snyder et al., 2004; Whatnall et al., 2019). A critical gap in the food security literature, especially for HFPAs, is the failure to segment low-income populations by socio-demographic context. Only a few healthy food access programs attempt to segment the population (Kitunen et al., 2025); for example, customized programs for adults with disabilities (Schwartz et al., 2019). The Feeding America (2025) report identifies several socio-demographic factors among food-insecure households. For example, seniors with disabilities are more than twice as likely to be food insecure; older adults with disabilities are more than three times as likely to experience food insecurity; seniors and older adults with a grandchild in the household are twice as likely to be food insecure as are seniors and older adults with rental vs. owned homes; food insecurity for Black and Latino groups can reach

60%; 1 in 4 Native American households experiences food insecurity, and the rate at individual level ranges from 16% to 80%. However, the relationship between these socio-demographic groups and how they make food decisions is lacking.

Although not focused on HFPAs, few studies highlight the relationship between a household's socio-demographic factors and their food decisions. Kitunen et al. (2025) developed the SEIFI (Socio-Ecological Index for Individuals), comprising family composition, housing, education, occupation, employment, and income. They identified three segments with high, medium, and low SEIFI scores, each with distinct criteria for food decisions. Socio-demographic factors that lead to time scarcity (unpredictable work schedules and single-parent families) make it difficult for households to cook at home (Belon et al., 2016; Drewnowski & Kawachi, 2015; Jabs et al., 2007; Monsivais et al., 2014). However, the Rahkovsky et al. (2018) study found a time-cost trade-off: for households with more than two children, the cost-benefit of home-cooked food outweighs the convenience of ready-to-eat food. In households with children, adults tend to compromise their diets to protect children, and older children's participation in food preparation promotes a healthy diet (Jabs et al., 2007). Multi-generational, African American, and Hispanic households are more likely to cook at home (Drewnowski & Kawachi, 2015; Monsivais et al., 2014; Sweeney et al., 2021). Even though many fast-food restaurants and convenience stores sell obesogenic foods in urban HFPAs (Walker et al., 2010), studies show that Mexican Americans demonstrate nutritional resilience and can eat better for less (Drewnowski & Kawachi, 2015). Individuals with higher exposure to health and nutrition education have better diet quality (Flores-Luevano et al., 2020; Gans et al., 2018; Marmash et al., 2021; Weber et al., 2018). Furthermore, gendered caregiving roles introduce unique pressures; mothers often experience "time-stress" that forces them to prioritize child-accepted foods over nutritional ideals (Jabs et al., 2007; Whelan et al., 2002).

These insights suggest the need to conceptualize segments within the urban HFPA context to better understand the association between socio-demographic factors and food decisions.

Self-Efficacy and Food Decisions

Despite the importance of the above-mentioned sociocultural and demographic factors, many food access programs (e.g., mobile markets or farmers markets) have little impact because they view households as passive recipients of food rather than active navigators of a complex landscape (Lou et al., 2024). As a result, such interventions often fail to align with households' everyday mobility patterns, caregiving responsibilities, and time constraints, limiting their effectiveness in practice.

Bandura (1997) explains that human agency and individuals' beliefs in their ability to organize and execute the actions required to produce a desired outcome are deeply interconnected. The power to act in pursuit of a given purpose is a key feature of personal agency, but a sense of self-efficacy is required to elicit action. The human mind is generative, creative, and proactive. Developing self-efficacy is important as it helps a person take the actions necessary to succeed and accomplish tasks/goals that ultimately affect their life (Gilbride, 2025).

Self-efficacy in cooking is strongly associated with healthy food choices across demographic groups (Ellis et al., 2018; French et al., 2024; Lo et al., 2019; Minkow, 2016). Research suggests that factors such as higher educational attainment (Lawrence, 2010) and nutritional education during the formative years (Contento et al., 2007; Hashad & Mohamed, 2022) can result in greater self-efficacy and a stronger sense of control over healthy diet-related behaviors. Wang et al. (2020) found that among lower-income people, those who felt they had less control in their lives tended to focus on immediate rewards, such as taste or comfort, whereas those with a greater sense of control made healthier choices. In the study by Whelan et al. (2002), many low-income mothers with young children prioritized cheap, filling foods over healthier options because of their children's preferences. Regarding adolescents' food choices, Muturi et al. (2016) found that environmental support and psychological confidence help them make healthy choices. The authors suggest that improving adolescents' self-efficacy is key to establishing healthy eating behaviors that persist into adulthood. Participation in community food programs reduces stress

surrounding meal planning and makes food preparation enjoyable (Oberle et al., 2020). Persistent participation can thus improve one's self-efficacy for making healthy food choices.

These studies collectively suggest that personal psychological factors play a central role in shaping individuals' food decision-making. Individuals with greater confidence in their ability to plan, shop for, and prepare meals are more likely to adopt and sustain healthier eating practices. In contrast, lower self-efficacy can limit dietary options and reinforce reliance on more convenient, less nutritious foods. However, little is known about how self-efficacy interacts with structural and socio-demographic factors that shape food decisions.

Using an exploratory case study approach, this research seeks to understand if and how the layered barriers presented by transportation, demographic, and sociocultural contexts and one's self-efficacy interact to influence urban HFPA households' food decisions.

Research Design

We begin by providing a context for the study site selection, followed by study design and data analysis methods.

Context

Duluth, Minnesota, USA's Central Hillside neighborhood is a low-income, low-access zone as defined by the U.S. Department of Agriculture, Economic Research Service's food access criteria (USDA ERS, 2026). Roughly one in five Duluth households was food insecure in 2016 (Guidinger, 2016), and the numbers are no different a decade later (Support Minnesota's Hunger Relief Network, 2026). According to the U.S. Census Bureau (2026), the Central Hillside neighborhood has a median household income of US$43,100, which is slightly over half the city's average, and most residents have difficulty finding affordable healthy food options within walking distance. The neighborhood has the highest percentage of BIPOC residents in Northeast Minnesota (24.4%), with the highest concentration of African American residents (9.4%) in Duluth. Over 29% of the residents lack reliable transportation, 27.2% of households receive food stamps, and according to the Bridging Health Duluth (2023) report, 41.6% reported often feeling worried about running out of food. The life expectancy for this neighborhood is staggeringly low, 72.4 years, as compared to 83.4 years for other Duluth neighborhoods. Other alarming statistics for Central Hillside include a 7.5% unemployment rate (compared to 4.8% for the rest of Duluth), higher rates of smoking and obesity (30% and 22%, respectively), high rates of diabetes (13%) and cardiovascular disease (19%). Hunger and extreme food insecurity are addressed by interventions such as food shelves, Meals on Wheels, and free breakfast, lunch, and dinner services offered by nonprofits. However, more work is needed to improve residents' food security. Improving economic and physical access to healthy foods has been a strategic priority for the Central Hillside neighborhood, and while many nonprofit services address food access, a very small percentage address transportation barriers as part of their food access services. Additionally, to the best of our knowledge, none of them address the constraints discussed in the literature review sections. The neighborhood closely aligns with the study's criteria.

Study Design

Research questions exploring if, how, and why aspects of a phenomenon are best suited for qualitative methods (Corbin & Strauss, 2008). We expect this to be the first among a series of studies at the intersection of transportation, demographic, and sociocultural factors and healthy food decisions in urban HFPAs. The study is exploratory, aiming to gain insights and guide more structured, in-depth research. It uses mixed qualitative and quantitative data, designed to establish an understanding of the underlying phenomenon (Creswell & Creswell, 2017). Qualitative data were gathered primarily through focus groups, and surveys were used to collect demographic data and qualitative data through open-ended questions. Appendix A contains the focus group protocol, and Appendix B contains the survey questions. The researchers worked with local nonprofits and distributed recruitment flyers with a QR code that allowed participants to register for one of the three focus groups. Participation was voluntary. Data were col-

lected between February and April of 2025 and consisted of three focus groups involving 26 participants. No identifying information, such as names, addresses, phone numbers, or email addresses, was collected. The survey took less than 10 minutes to complete, whereas the focus groups lasted for 60 minutes each. The focus groups were held in community settings, providing participants with flexibility and the comfort of a familiar environment, and a predetermined notetaker took paper-based notes.

Data Analysis

The note taker at each table, across all three focus groups, recorded detailed notes of the discussions and compiled participants' open-ended survey responses. Focus group participants represented households with an average of two members. Collectively, these respondents reported 14 children living in their households, and 92% reported using SNAP EBT benefits. Vehicle access was evenly split: 50% of respondents reported having a car and 50% reported no access. Most participants were renters (88%), although a smaller portion (12%) reported being unhoused at the time of the focus groups. Demographic data are tabulated in Table 1. The authors individually studied the notes from each focus group and the open-ended survey responses, paying close attention to sociocultural, demographic, and transportation factors, as well as healthy food decisions, such as how often they shop for healthy foods, where they shop, and what they buy. Since the research is exploratory, the researchers did not look for theoretical saturation. Instead, new and insightful findings about the phenomenon guided data collection. Each researcher independently identified, highlighted, and coded relevant excerpts in the notes, focusing on references to healthy food behaviors and transportation decisions. The highlighted text includes getting to food venues and issues such as costs; (lack of) availability of a safe, hygienic place to cook; availability of equipment and cooking utensils; and their knowledge and skills to cook at home. The researchers compared the codes and reconciled differences in data interpretation, providing interrater reliability. Constant comparison of the codes, including the tabulated data (Glaser & Strauss, 1967), revealed three distinct groups, characterized by housing situations, household composition, transportation access, food preparation capabilities, and food-related decision-making behaviors. The researchers reached a consensus on the groups and their descriptions through discussions and deliberations. The groups and their demographic characteristics are summarized in Table 2.

Table 1. Focus Group Demographic Data Tabulation

Total Participants	26
Average Household Size	2.04 people
Total Children in Household	14
Households with Children	9 (35%)
SNAP/EBT Users*	22 of 24 (92%)
Car Access*	12 of 24 (50%)
Renters	23 (88%)
Unhoused	3 (12%)

*These percentages do not include missing or N/A responses.
Note: SNAP/EBT: Supplemental Nutrition Assistance Program/Electronic Benefits Transfer

Results

The analysis revealed three distinct archetypes of food-insecure households in urban HFPAs. While all groups faced structural constraints, their agency was expressed differently based on the interplay of housing infrastructure, household composition, and mobility.

Microwave Meal Navigators: Reactive Agency

This group consisted of 10 participants with the highest level of structural constraints, in which housing conditions influenced many aspects of their food decisions. Some lived in communal homes with a shared kitchen and minimal kitchen equipment. For individual tenants, kitchen equipment was limited to a microwave, toaster, or hot plate. Others in this group either lived in shelters or were unhoused. Participants in this group described how the lack of space and cooking equipment at home shaped nearly every aspect of their food decisions. For many, the only reliable

Table 2. Groups and Demographic Characteristics

Group Name	Demographic Characteristics	Number of Participants
Microwave Meal Navigators	Households living in rental communal homes with limited cooking space, equipment, and utensils; those living in temporary shelters; or those who are unhoused. Some had car access, and others did not. All but one accessed SNAP benefits.	10
Family Navigators	Households with children living in rental homes with moderately equipped kitchens (at a minimum). The majority did not have access to a car. Eight of the ten accessed SNAP benefits.	10
Independent Navigators	Households with adults only, living in rental homes with moderately equipped kitchens (at a minimum). Half of them had access to a car. Five of the six accessed SNAP benefits.	6

Note: SNAP: Supplemental Nutrition Assistance Program

food options were community food venues that served ready-to-eat meals, Meals on Wheels (a home-delivered prepared meals program for older adults), or food that could be prepared with minimal kitchen equipment, such as a microwave. Without full or regular access to kitchens, participants explained that it was difficult to consistently prioritize healthy eating. Despite these constraints, some participants made efforts to eat healthily when possible. A few described walking or biking to places where healthier, ready-to-eat foods were available at affordable prices. Participants in this group also highlighted the trade-offs between calories and nutrition. Several spoke about choosing smaller portions or skipping meals altogether if it meant eating something more nutritious. These strategies often require extra time and energy. Importantly, not everyone in this group was able to sustain these practices over time.

Transportation was a factor when accessing venues that offered onsite meal programs or stores where microwaveable foods could be purchased. When healthier food venues were not within walking distance or along established bus routes, these participants felt cut off. Even when participants were motivated to eat healthier, limited options for cooking at home, limited healthy food venues, and transportation barriers left them with very few realistic choices for consuming healthy foods.

Taken together, these accounts showed that food decisions for microwave meal navigators were driven less by personal preference and more by housing, infrastructure, and mobility constraints. Viewed through the transportation-housing-food nexus, these decisions show how limits on movement, storage, and food preparation shape what is practical, affordable, and possible in everyday life.

Family Navigators: Relational Agency

This group consisted primarily of single-parent households with children. Living in rental homes and accessing SNAP benefits, they had a kitchen with basic equipment and utensils but most lacked access to a private vehicle. These individuals depended on family and friends for transportation to grocery stores. We did not hear of any cases in which participants used public transportation, walked, or biked to healthy food venues. Still, we were not surprised, as much of the built environment is not favorable for walking and biking. Likewise, Duluth's topography, extreme cold, and icy roads make it difficult to access public transportation for grocery shopping. In case of urgency, households resorted to buying food at gas stations. Participants did not access the sole neighborhood grocery store due to the higher cost of healthy food. Participants instead mentioned maximizing the amount of food they could purchase at chain grocery stores for the same amount of money.

For this group, the researchers found that children became the most important priority. Decisions about what to buy were influenced by their

relationship with children. The data showed that they consider what the children should and could eat, with one individual (FG1, P5) saying, "kids get picky," and another (FG3, P6) saying they try to incorporate fruits and vegetables into the meals they cook for their children. Having children in the mix prompted them to consider not only what their children would eat, but also what they should be eating, which, in turn, influenced their diet and purchasing choices to be more health-conscious. Since the group relied on friends and family for transportation to grocery stores, the timing, frequency, and where to shop for food were less planned and more conditional. In many cases, adults preferred to avoid taking children grocery shopping, further constraining when, where, and how often shopping occurred. Although no one explicitly mentioned their food budgets, we believe that reliance on SNAP benefits may limit food budgets.

In summary, while individuals may have an orientation toward making healthy food choices, their household structure, reliance on friends and family for grocery shopping, and financial and built environments are limiting factors. Taken together, these conditions shape what is realistically accessible and affordable in everyday life.

Independent Navigators: Proactive Agency

This group of participants consisted of adults without children in their households. These participants lived in rented homes but had basic cooking equipment, utensils, and a safe, hygienic place to cook. All of them were SNAP beneficiaries and mentioned economic hardships in accessing healthy foods. Some emphasized their approach to finding deals at grocery stores, such as by paying attention to weekly sales at one supermarket to get more from their SNAP dollars. While some had their own cars, others relied on friends and family members to help them shop for healthy foods.

When describing their food behaviors and decision-making, all participants in this group reported eating at least one healthy meal. Some participants were recipients of weekly partially prepared meal kits provided by a local nonprofit. Participants reported that the meal kits were improving their cooking skills and helping them eat healthily. All participants in this group indicated a strong motivation to eat healthily, even though, as they described, their confidence in planning, buying, or cooking healthy meals ranged from low to high. Participants mentioned that they were getting better at cooking, which motivated them to continue their journey of improving their diet.

However, some participants found it difficult to bring their cooking skills down to cooking for just one person, especially when they were used to cooking for a larger family. For example, participant 2 from FG3 said, "I don't know how to cook small portion meals," which seemed to impede their consumption of healthy foods, leading them to choose easier, less time-intensive options.

In their shopping mode, participants in this group, regardless of whether they owned a private vehicle, did not raise transportation as a concern. Mentions of transportation were minimal, occurring only in response to questions about the mode of transportation they frequently used and if they were car owners. Participants described a pattern of going with friends and family, in one case motivating their colleagues to go shopping with them. Participation in healthy meal programs heightened their awareness of healthy eating, which translated into paying closer attention to what they buy and where they shop for food. For example, one participant mentioned their goal of eliminating sugar and switching to natural alternatives, and that they use a shopping list when grocery shopping.

In summary, participants in this group felt less constrained by housing and transportation conditions and more empowered by personal factors, such as exposure to healthy eating and confidence in making healthy food choices. As a result, they described greater flexibility in planning, shopping for, and preparing meals.

Cross-Group Observations: The Primacy of Self-efficacy

While structural factors such as transportation, housing, income, and kitchen equipment or access undeniably shaped food choices, these factors did not fully explain healthy food behaviors. We observed a spectrum of navigation strategies. Some participants with stable factors, such as access to a car, still struggle to incorporate healthy foods into

their diet. Yet others who are not in ideal situations, such as those without a car or with work schedules so demanding that they have little time to travel across town to a grocery store, still manage to include healthy foods in their diet. For example, some participants in our study lacked access to a personal vehicle or lived in a shared communal space with limited cooking facilities. Yet they still made a consistent effort to choose healthy options when available, to leverage social networks for transportation, to make strategic food purchases on a budget, to utilize SNAP, and/or to prioritize small but intentional dietary improvements.

Discussion

This study sought to illuminate the complex interplay among sociocultural and demographic factors and physical access constraints on households' food decisions in urban HFPAs. Our findings suggest that structural constraints shape the range of food options available to households, while self-efficacy influences how individuals navigate those options when obtaining, preparing, and consuming food. Thus, food-insecure populations are not a monolith; rather, they comprise distinct segments whose food-related decisions reflect varying degrees of self-efficacy within segment-specific constraints. Three clear segments emerged from our study. We discuss the need to expand on the segments identified in the literature and highlight food decisions arising from the nexus of structural constraints, socio-demographic conditions, and agency.

Reconceptualizing Segmentation in HFPAs

The literature segments food-insecure individuals and households using socio-demographic characteristics for the extent of food insecurity (Feeding America, 2025; Kitunen et al., 2025), where they source food (Rahkovsky et al., 2018), and their diet and health (Drewnowski & Kawachi, 2015; Jabs et al., 2007; Monsivais et al., 2014; Sweeney et al., 2021). Our study extends the concept of segmentation by examining structural and personal psychological factors that influence food decisions.

According to Kitunen et al.'s (2025) SEIFI score-based segmentation, all participants in our study would fall into the "low SEIFI" category due to their income and location. However, our data reveal that even within this low-resource bracket, there is profound heterogeneity. For instance, the Microwave Meal Navigators are defined primarily by "perceived utilization poverty," a lack of kitchen infrastructure that renders raw ingredients useless regardless of physical access and an individual's self-efficacy. Surprisingly, this segment seemed unaware of options for cooking at home with a restricted environment, such as using Instant Pots and microwave-friendly healthy recipes, and including sourcing strategies, such as those available at USDA's Snap Express (n.d.). Further, this study conforms with prior research that has identified segments such as low-income households with children, their food-insecurity levels, stressors, and food decisions (Jabs et al., 2007; Rahkovsky et al., 2018). However, our findings suggest that the food decisions of such households are a function of the agency of the primary decision maker, often the mother, reinforcing Muturi et al.'s (2016) assertion that psychological factors and personal attitudes differentiate food decisions even within a segment. Our study recommends treating family navigators as a separate segment; to the best of our knowledge, prior research has not done so.

The Constraint-Agency Nexus

The concept of trade-offs among low-income food-insecure individuals and households is not new. Trade-offs such as time-cost (Rahkovsky et al., 2018), adults compromising their diets to protect children (Jabs et al., 2007), and choosing between buying food and paying household bills have been studied. This research identifies segment-specific trade-offs, deepening our understanding of the segments. Across all three segments, structural factors such as physical access, and socio-demographic factors such as housing and family structure, created constraints and a choice set for food decisions. Prior research examines psychological factors and exercising agency primarily in healthy diet decisions, that is, which foods to source and consume, and whether to cook at home (Hashad & Mohamed, 2022; Lawrence, 2010; Wang et al., 2020). This research adds to our understanding of self-efficacy in the context of

structural constraints. For example, the lack of adequate cooking and refrigeration infrastructure (stoves and refrigerators) meant that for Microwave Meal Navigators, meals that can be made with restricted resources, ready-to-eat meals, or community meal programs were more viable options, and physical access to these sources was a lifeline to food. In this segment, a trade-off between housing and nutrition is observed. We argue that the housing filter in this segment mediates their agency in making healthy food decisions.

In contrast, family navigators exercise their agency to navigate mobility and time poverty constraints. Lacking private vehicles means these households rely on the social capital of friends and family, making shopping conditional and erratic rather than planned. Concurring with the findings of Whelan et al. (2002), we find that family navigators avoid the stress tax of taking children on difficult transit trips, shop less frequently, and rely more on expensive neighborhood gas stations for urgent needs. However, as in the Wang et al. (2020) study, this behavior was not consistent. In some cases, children act as a catalyst for nutritional discipline. Decisions are a constant negotiation between the needs of the children, the availability of social transportation networks, and the limits of food budgets. Thus, agency for this segment is relational.

Finally, independent navigators have the most stable utilization infrastructure and express the highest levels of individual self-efficacy. Many in this group focus on tools to build cooking capacity and confidence for cooking at home. Notably, transportation was a minimal concern for this group. Whether they owned a car or not, they proactively leveraged social networks (e.g., motivating colleagues to go on group shopping trips). Their strong motivation to eat healthily served as a buffer against transportation barriers that stymied other groups. For some older adults in this group, the inability to "cook small" was a barrier. The agency for this segment is proactive, less constrained by the physical environment, and more influenced by its internal confidence and motivation.

The constraints did not fully predict behavior. We observed a spectrum of tactical navigation strategies. A central contribution of this study is the identification of how segment characteristics act as "filter layers" for agency. If structural factors set the boundaries by creating a set of choices, self-efficacy determines how an individual moves within them. Bandura (1997) argues that personal agency requires the belief that one can produce a desired outcome. Our study highlights that this belief is a powerful predictor of healthy food behaviors, often transcending material conditions.

We observed that Independent Navigators displayed the highest levels of self-efficacy, largely bolstered by capacity-building interventions like meal kits. These kits did more than provide food; they improved cooking literacy and psychological confidence, allowing these individuals to navigate the food environment more effectively than those with more resources but lower efficacy (French et al., 2024; Lo et al., 2019). The findings align with Wang et al. (2020), who found that a higher perception of control leads to healthier, long-term food choices rather than immediate, taste-based rewards. In sum, the nexus shows that structural constraints shape food choice, while self-efficacy influences whether people can make healthier decisions within those constraints.

The Hierarchy of Influence

We propose a hierarchy regarding how structural factors moderate the power of self-efficacy. We believe that certain demographic and structural conditions mute the impact of a person's belief in their own agency:

1. Microwave Meal Navigators (Highest Suppression): Structural lack of housing and/or kitchens largely overrides individual self-efficacy.
2. Family Navigators (Moderate Suppression): Time poverty and the mobility tax create friction, making it harder for high self-efficacy to translate into action.
3. Independent Navigators (Lowest Suppression): With fewer relational and infrastructure barriers, individual self-efficacy is the primary determinant of behavior.

To improve food security in urban HFPAs, interventions must move beyond the macro view of building more stores, especially at a time when

supermarkets are closing (Schmidt, 2019) and food shelf visits are increasing (Feeding America, 2025). Our research demonstrates that transportation, housing, and agency are inseparable. A holistic approach must address the "utilization poverty" of housing, the "time tax" of transportation, and the "efficacy gap" of the individuals themselves. By fostering food-related self-efficacy, we can empower residents not just to navigate but to reshape their food environments actively.

Conclusion

This study examined how structural constraints, such as limited access to reliable private transportation and housing, and personal psychological factors shape food decision-making among residents of urban HFPAs. Taking an exploratory approach allowed the researchers to move beyond macro-level spatial analysis and better understand how households navigate the transportation-housing-food nexus. Our findings reveal generalizable insights about urban HFPAs in towns that serve as nodes for rural communities, with possible relevance to HFPAs in larger urban communities.

Our findings suggest that transportation does not affect all households equally; rather, its influence is moderated by housing infrastructure and family structure. For Microwave Meal Navigators, structural housing barriers, specifically the lack of utilization infrastructure, render transportation access almost secondary. In these cases, the environment suppresses individual agency to such a degree that even high self-efficacy cannot easily translate into nutritional outcomes.

Conversely, for Family and Independent Navigators, self-efficacy acts as a critical equalizer. Individuals with a robust belief in their own agency, often bolstered by community-based interventions, demonstrated a remarkable ability to mitigate the negative influences of limited vehicle access or the time tax of caregiving. These findings suggest that while transportation and housing are the stage upon which food decisions are made, self-efficacy is the driver that determines how effectively a household can navigate that stage.

This research is subject to several limitations. First, the sample was composed exclusively of low-income households in urban HFPAs, intentionally excluding higher socioeconomic groups to focus on the most vulnerable navigators. Second, the findings rely on self-reported data, which may be subject to recall bias or social desirability bias regarding food behaviors. Finally, since this was an exploratory study, we did not seek theoretical saturation across all demographics but rather intended to provide a foundational framework for future inquiry.

To build upon this work, future research should develop a validated scale to measure Healthy Food-Related Self-Efficacy specifically for households in urban HFPAs. Longitudinal studies are needed to determine if capacity-building programs, such as meal kits or nutritional education, permanently shift a household's "navigator profile" over time. Furthermore, more granular research is required to examine how intersecting identities (e.g., race, gender, and age) shape a resident's perceived behavioral control. To confirm the validity of the findings, comparative studies across urban HFPAs similar to Duluth, Minnesota, can be conducted.

Ultimately, this study posits that food security policy must evolve. We cannot solve nutritional inequality by simply adding more grocery stores to a map; we must also address the housing that stores the food, the transportation that carries it, and the agency of the person making the choice.

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Appendix A. Focus Group Guide

1. Warm-up
2. Demographics:
    a. Household members, children in the household
    b. Household rental or owner
    c. Own a car / access to a car
    d. SNAP participant
    e. Closest bus stop (to a grocery store)
    f. Grocery shopping times
3. Can you walk me through whether and how you typically plan for your grocery shopping? Specifically, how do you decide what to buy, where to shop, and whether nutrition plays a role in your decisions?
4. Can you describe your grocery shopping habits over the past month? How did you decide what to buy, where to shop, and what factors influenced your choices?
5. Can you tell me about the foods you've been eating over the past few weeks? Would you say your diet has been balanced, and what factors influenced your food choices?
6. How would you describe the cooking skills in your family? How often do you cook, and what influences your decisions on what to prepare with the groceries you have?

Appendix B. Survey Instrument

1. How many vehicles are currently owned or leased by your household, that you have access to?
    a. None, One, Two, More than two

2. "In the last month, how often have you used the following modes of transportation for grocery shopping?" (Rarely, Sometimes, Most of the time)
    a. Personal vehicle
    b. Friend or relative's vehicle
    c. Public transit
    d. Delivery services
    e. Walking
    f. Biking
    g. Lyft/Uber/Taxi
    h. DTA/Stride

3. What does 'healthy' or 'nutritious' food mean to you?

4. How often do you shop for healthy foods?
    a. Daily, Once a week, 2-3 times a week, Once a month, Never

5. Do you choose your mode of transport for grocery shopping based on your budget or cost considerations?
    a. Rarely, Sometimes, Often

6. If you answered 'sometimes' or 'often' in the previous question: How do you typically get to the grocery store, and what factors influence your choice of transportation?

7. Which of the following services do you use?
    a. Community Action Duluth's Mobile Market
    b. Community Action Duluth's Grocery Delivery Service
    c. Neighborhood Farmers Market
    d. Food Forward's Meal Kit
    e. Food Forward's Food Box
    f. Grocery Stores' online purchase and home delivery service
    g. Other
    h. None

8. Please tell us about the nature of "other" services used for access to healthy foods.

9. Is there anything else that we need to know (or you would like to share) about transit factors that influence your grocery shopping?