Understanding the local implementation of Double Up Food Bucks

by

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Abstract

Nutrition incentive programs aim to improve food access by increasing the purchasing power of households receiving Supplemental Nutrition Assistance Program (SNAP) benefits, but the availability of participating retailers does not ensure that households can access these programs. Double Up Food Bucks (DUFB) is a nutrition incentive program that matches SNAP dollars spent on fruits and vegetables. This study examines the local implementation of DUFB in Chattanooga and Hamilton County, Tennessee, focusing on accessibility, program awareness, and barriers to participation. This study combines GIS analysis of 19 participating locations in relation to census-tract level SNAP participation with interviews involving customers and retailers. The spatial analysis examined retailer distribution, proximity, public transportation, and operating schedules, while interviews explore awareness, affordability, and implementation. Findings showed that 11 locations were situated in census tracts where 17.2%-47.7% of households received SNAP benefits, while three high-SNAP participation census tracts were outside the half-mile and one-mile retailer buffers. Although most locations were near public transportation, mobile markets were also used to bring food into residential communities. Interviews highlighted affordability and community partnerships as benefits along with challenges involving outreach, program awareness, and operational capacity. Taken together, these findings indicate that geographic proximity is only one dimension of DUFB accessibility, with transportation, operating schedules, and program awareness also shaping the potential for individuals to participate in the program.

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Chapter 1 - Introduction

What happens when a community has programs designed to improve food access, but the people those programs are meant to serve may not be able to access them? How do awareness, geography, and implementation of these programs shape a household's ability to benefit from food assistance programs? These questions matter as communities seek to address food insecurity while also supporting healthier diets and local food systems.

The Supplemental Nutrition Assistance Program (SNAP) provides an important resource for households experiencing food insecurity, but benefit levels often do not stretch far enough for recipients to buy the fruits, vegetables, and culturally preferred foods they want. In response, many communities rely on nutrition incentive programs, many supported by the USDA's GusNIP, that increase SNAP recipients' purchasing power for fruits and vegetables. These programs operate at the intersection of nutrition policy, public health, and local food systems. By providing a financial incentive for purchasing fruits and vegetables, nutrition incentive programs seek to make healthy foods more affordable for SNAP participants. When these incentives are used at farmers' markets and local food retailers, they can direct additional spending toward local producers.

Studies across multiple states consistently demonstrate that financial incentives increase fruit and vegetable consumption and strengthen household food security, particularly when participation occurs over longer periods of time (Olsho et al., 2015; Parks et al., 2021; Dsouza et al., 2025; Savoie-Roskos et al., 2016). Additional research suggests that nutrition incentive programs may contribute to broader improvements in well-being, including reduced financial strain and enhanced mental health outcomes (Harvey et al., 2022; Durward et al., 2019). Beyond individual-level dietary impacts, these programs also generate market-level benefits by

increasing farmers' market sales and strengthening local food systems through expanded SNAP purchasing power (Becot et al., 2018; Oberholtzer et al., 2012). Together, these findings suggest that nutrition incentive programs operate as both public health interventions and local economic development tools.

Research on nutrition incentives provides evidence that financial incentives can influence food purchasing behavior. In their evaluation of the USDA Healthy Incentives Pilot, Olsho et al. (2015) found that providing a 30% rebate on fruit and vegetable purchases increased fruit and vegetable intake and improved diet quality among participants. Earlier research by Jones and Bhatia (2011) also found that implementing EBT transactions at farmers' markets was associated with a 57% increase in annual sales. Together, these findings demonstrate the potential for nutrition assistance programs to influence purchasing behavior and local food systems.

Double Up Food Bucks (DUFB) is an example of a nutrition incentive program that seeks to accomplish this. DUFB provides additional purchasing power for fruits and vegetables when SNAP participants use their benefits at participating retailers, connecting food assistance with healthy food purchasing and creating opportunities for SNAP dollars to enter local food systems. Research examining DUFB and similar programs has generally found positive outcomes for participating households. Parks et al. (2021) found that longer participation in nutrition incentive programs was associated with greater fruit and vegetable intake and higher levels of food security. Dsouza et al. (2025) found that prolonged participation in DUFB increased fruit and vegetable purchasing and increased profitability for farmers' market vendors.

However, existing research also highlights that program effectiveness depends heavily on awareness of the program, accessibility, and implementation conditions at the local level. Studies show that awareness of program availability, proximity to participating markets, household

characteristics, and administrative barriers all shape participation outcomes (Cohen et al., 2017; Farmer et al., 2019; Kellegrew et al., 2018; Garner et al., 2020). While reviewing studies on nutrition incentive programs, Engel and Ruder (2020) found that 16 out of 19 studies were conducted at farmers' markets and that 18 reported positive effects on fruit and vegetable purchasing power or consumption. The authors also identified the need for research on participant use and retention, demographic characteristics, and the long-term effects of incentive programs. While these findings demonstrate the importance of local program infrastructure and outreach strategies, most existing research focuses on the Midwest (Farmer et al., Cohen et al., Parks et al., Manuel et al.), and the West (Alaofè et al., Dsouza et al., Durward et al., Savoie-Roskos et al.). Less is known about how these factors affect local implementation in mid-sized cities in the Southeast.

Chattanooga, Tennessee provides an opportunity to examine these questions at a local level with a large number of SNAP households as well as farmers' markets and farm stores participating in DUFB. The local implementation of the program creates a geographic relationship between participants and retailers, while the experiences of retailers provide insight into how the program is implemented. This study examines the local implementation of Double Up Food Bucks in Chattanooga, Tennessee with a focus on accessibility and awareness. The study uses a mixed-methods approach to examine the relationship between DUFB retailers and SNAP households and to understand the experiences of participating retailers. Geographic Information Systems (GIS) is used to examine the relationship between DUFB retailers and SNAP households, while interviews provide insight into retailer and customer experiences with program implementation and awareness.

The purpose of this study is not to determine whether DUFB is effective. Previous research has demonstrated positive relationships between nutrition incentive program participation, fruit and vegetable purchasing, food security, and other measures of well-being. Rather, this study examines the conditions that may influence whether eligible households benefit from the program. By examining accessibility alongside awareness and implementation, this research seeks to better understand the difference between program availability and accessibility. If nutrition incentive programs are a connection between federal nutrition programs, healthy food access, and local food systems, their implementation must account for the geographic and social contexts in which households and food retailers interact. Examining local conditions can help identify opportunities to improve outreach, accessibility, and implementation and may contribute to broader efforts to make food assistance programs fit the communities they serve.

This study is guided by three research questions:

1. How are DUFB retailers geographically distributed in relation to households receiving SNAP in Chattanooga, Tennessee?
2. How do awareness and access surrounding DUFB vary across locations?
3. What factors may influence SNAP participants' ability to access and use DUFB?

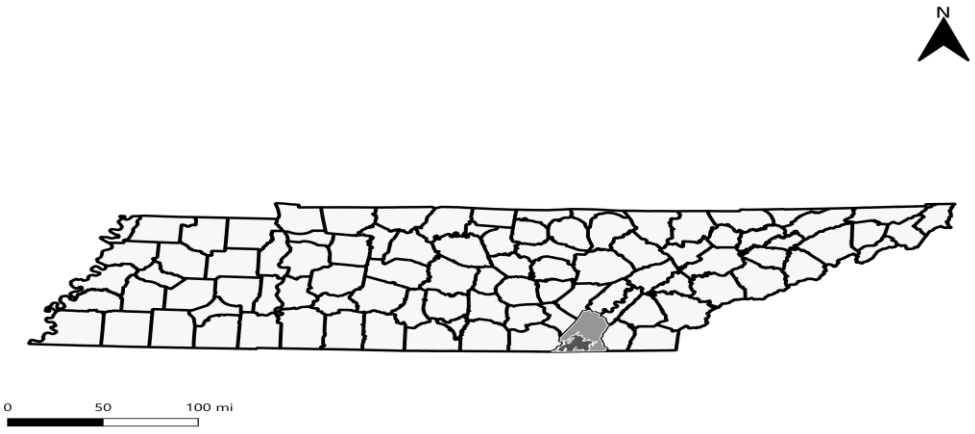
The remainder of this thesis provides a background on SNAP and nutrition incentive programs, research design and methods, study findings, and opportunities for future research.

Chapter 2 - Background

Study Area

Chattanooga is located in southeastern Tennessee, near the Georgia state line, within Hamilton County. The city serves as a regional hub for employment, commerce, and community services for surrounding areas in southeast Tennessee and northwest Georgia. According to the 2020 decennial census, Hamilton County had a population of 366,207, with 181,099 of those individuals living in Chattanooga. This study focuses on the geographic distribution of DUFB retailers in relation to SNAP participants within Hamilton County. The study area includes different types of participating locations, including farmers' markets, farm stores, and mobile market sites. Examining these locations in relation to the distribution of SNAP households provides a perspective on where the program is available and how locations are situated relative to potential participants.

Figure 2.1. Location of Hamilton County, Tennessee



Food Availability vs. Food Access

The USDA identifies four dimensions of food security: availability, access, utilization, and stability. (USDA Economic Research Service, 2026). Availability is defined as "a sufficient

quantity of food available for the entire population", and access is defined as "each person has economic and physical access to these available calories." This study focuses on the dimensions of availability and access as they relate to the implementation of DUFB in Chattanooga. Availability is examined through the geographic distribution of participating DUFB retailers, while access is examined through geographic proximity, program awareness, and factors that may influence SNAP participants' ability to use the program.

SNAP and Nutrition Incentive Programs

SNAP is the largest federal nutrition assistance program in the United States and is intended to help eligible low-income households purchase eligible food items through an electronic benefits transfer (EBT) card. Eligibility is determined through household income and other program requirements (U.S. Department of Agriculture Economic Research Service, 2026.). In the context of food access, SNAP addresses the economic aspect by increasing the resources available for food purchases. However, participation in SNAP does not indicate that households can consistently obtain the foods they prefer or need. Transportation, retailer locations, shopping hours, food prices, and the availability of culturally preferred foods may influence purchasing decisions. These considerations are especially important when examining access to fresh fruits and vegetables. While SNAP is an important resource, additional strategies may help address the affordability of specific food choices, such as nutrition incentive programs.

Table 2.1. SNAP Participation and Characteristics of SNAP Households in Tennessee and Hamilton County (U.S. Census Bureau, 2024 ACS 1-year Estimates)

Indicator	Tennessee	Hamilton County
Households receiving SNAP (%)	9.4%	9.0%
Households receiving SNAP, by characteristic		

With one or more people aged 60 or older (%)	39.0%	43.8%
With children under 18 (%)	49.7%	45.7%
Below the poverty level (%)	51.2%	58.6%
With one or more people with a disability (%)	51.3%	51.8%
Householder identifies as White alone (%)	58.7%	39.9%
Householder identifies as Black or African American Alone (%)	30.2%	44.0%
Householder identifies as Hispanic or Latino	6.0%	10.1%
Median household income (dollars)	$25,112	$20,600

Table 2.1 presents selected characteristics of households receiving SNAP benefits in Tennessee and Hamilton County using 2024 ACS estimates. Although the percentage of households receiving SNAP is similar in Hamilton County (9.0%) and Tennessee (9.4%), the demographic and socioeconomic characteristics of SNAP households differ. In Hamilton County, 58.6% of SNAP households were below the poverty level, compared to 51.2% statewide. The reported median household income among SNAP households was also lower in Hamilton County ($20,600) than in Tennessee ($25,112). These findings suggest that SNAP households in Hamilton County experience tighter economic constraints that may influence food purchasing decisions. The racial and ethnic composition of SNAP households also differs between Hamilton County and the state. Black or African American residents represented 44.0% of SNAP households in Hamilton County compared to 30.2% statewide, Hispanic or Latino residents accounted for 10.1% of households in the county compared to 6.0% statewide. White residents represented a smaller share in Hamilton County (39.9%) than in Tennessee (58.7%). The demographic findings show the importance of considering the demographic context in which nutrition assistance programs operate.

Household composition provides additional context. A greater share of SNAP households in Hamilton County included at least one person aged 60 or older (43.8%) than in Tennessee (39.0%), while households with children under 18 represented a smaller share of SNAP households in Hamilton County (45.7%) than statewide (49.7%). The proportion of SNAP households reporting at least one person with a disability was similar across Hamilton County and Tennessee. Overall, the comparison shows that similar rates of SNAP participation can exist with differences in socioeconomic characteristics and provides a context for the study.

Gus Schumacher Nutrition Incentive Program (GusNIP)

The Gus Schumacher Nutrition Incentive Program (GusNIP) is a federal grant administered by the USDA's National Institute of Food and Agriculture (NIFA). Authorized under the 2018 Farm Bill, GusNIP supports projects that provide incentives to income-eligible consumers to increase their purchases of fruits and vegetables (USDA National Institute of Food and Agriculture, 2026). The program includes three grant areas: the Nutrition Incentive Program, the Produce Prescription Program, and the Training, Technical Assistance, Evaluation, and Information Centers program. Through these programs, GusNIP brings professionals from the food and healthcare sectors to improve nutrition and support communities. The Nutrition Incentive Program supports projects that increase fruit and vegetable purchases among SNAP participants, which provides federal funding for Double Up Food Bucks.

Double Up Food Bucks

Double Up Food Bucks (DUFB) is a nutrition incentive program designed to increase the purchasing power of households participating in SNAP. The Fair Food Network started the program in Detroit in 2009 and has expanded to over 25 states. The program generally matches SNAP purchases with additional benefits that can be used to purchase eligible fruits and

vegetables. Although matching amounts and participating retailers vary by location, the program's goal is to make fresh produce more affordable for SNAP participants. By encouraging purchases at participating retailers, DUFB can also increase sales for local farmers, markets, and farm stores. In Tennessee, DUFB operates at 34 locations in the eastern part of the state with 19 locations in Chattanooga. (DUFB Tennessee, accessed 17 Oct. 2026) Nourish Knoxville started the program in 2019 along with the Fair Food Network, and Gaining Ground Grocery expanded the program into Chattanooga. Examining DUFB in Chattanooga provides an opportunity to investigate how the program is implemented within a specific local food system. This study considers the geographic relationship between participating locations and SNAP households, alongside consumer awareness and retailer experiences, to better understand how the program is implemented at the local level.

Chapter 3 - Methods

Research Design

This study uses a mixed-methods research design to examine the local implementation of DUFB in Chattanooga, Tennessee. The research focuses on how the program connects SNAP participants with local DUFB retailers and the factors that may influence awareness of and access to the program. To examine these factors, this study combines GIS analysis with qualitative interviews. The spatial component examines the geographic relationship between participating DUFB retailers and areas with higher concentrations of SNAP households. The qualitative component explores experiences and perspectives related to program awareness, accessibility, and implementation. Together, these methods provide a way to examine the geographic distribution of resources and the experiences that may influence whether those resources are accessible. The study is guided by three research questions. First, how are DUFB retailers geographically distributed in relation to households receiving SNAP in Chattanooga, Tennessee? Second, how do awareness and access surrounding DUFB vary across locations? Third, what factors may influence SNAP participants' ability to access and use DUFB? GIS analysis is used to examine the geographic distribution of participating retailers in relation to SNAP participation and interviews to provide insight into program awareness, consumer experiences, and retailer implementation. Together, these methods allow the study to examine accessibility geographically and experientially.

GIS Analysis

The study focuses on Chattanooga, Tennessee and the surrounding study area, with the spatial analysis examining participating DUFB retailers in relation to SNAP households in Hamilton County, Tennessee. The study area provides a local context for investigating how a

nutrition incentive program operates within Chattanooga and Hamilton County. The two primary sources of data that inform the spatial analysis are participating DUFB locations and publicly available demographic data. Retailer addresses were compiled to identify participating locations, including farmers' markets, mobile markets, and farm stores. A total of 19 retailer locations were identified for the analysis and were categorized by retailer type to distinguish between the different types of location. The retailer list was obtained through Double Up East Tennessee in July of 2026. Retailer locations were compiled in a spreadsheet and imported into QGIS as a geographic point layer and categorized as farmers' markets, farm stores, and mobile markets to distinguish among retailer types. Demographic Data was obtained from the U.S. Census Bureau's 2020-2024 ACS 5-year estimates, Table S2201 (*Food Stamps/Supplemental Nutrition Assistance Program [SNAP])* to provide estimates of household participation in SNAP and allow geographic differences in SNAP participation to be examined. The ACS data was incorporated into a geographic layer representing SNAP participation by census tract. In QGIS, the census tracts were classified into five categories using the Equal Count (Quantile) classification method in QGIS to visualize differences in SNAP participation across Hamilton County.

GIS analysis was conducted using QGIS to map participating DUFB retailers and SNAP participation. To examine geographic proximity, buffers of one half-mile and one-mile were selected around participating retailer locations. These distances were used to compare proximity at two spatial scales and were informed by the USDA Economic Research Service's Food Access Research Atlas, which uses half-mile and one-mile thresholds in its urban food-access measures. The buffers represent straight-line distances rather than distances across transportation networks. OpenStreetMap was used as a basecamp in QGIS to visualize the spatial relationship between DUFB locations and the surrounding transportation network. To further examine

accessibility, retailer locations were compared with nearby bus stops using CARTA's Trip Planner to assess their proximity to transit access, and retailer operating days and hours were examined to consider the temporal dimension of accessibility. The GIS analysis is intended to identify spatial patterns rather than indicate program use. A household's proximity to a retailer does not indicate that they can access the location or have used the program. For this reason, spatial findings are considered alongside qualitative data.

Qualitative Interviews

Qualitative interviews were used to provide context for understanding how DUFB is implemented locally. While GIS was used to examine geographic distribution, interviews explore factors that may influence awareness, accessibility, and participation in the program. The interview component included customers and retailers. Customer interviews explore awareness of DUFB, experiences accessing the program, and potential barriers to participation. Retailer interviews examine the program from the perspective of participating retail representatives, including their experiences implementing the program and interacting with customers.

This study received approval from the Kansas State University Institutional Review Board (IRB) before data collection began (IRB-13903). All interviewees were informed of the study's purpose and the voluntary nature of participation, and informed consent was obtained before each interview using consent form before each interview. Interviewees were informed about the purpose of the study and how their responses would be used. Customer identities were protected by assigning identification numbers rather than using personal names. Retailer participants were identified by name, job title, and organization only when they consented to being identified. The following interview questions guided data collection. Follow-up questions were asked when appropriate.

(DUFB retailers)

1. What motivated your store to participate in Double Up Food Bucks?
2. How long is your store in operation and since when did you start participating in DUFB?
3. What factors have influenced locating this store in its current location? Were there any recent changes in location or services provided?
4. What benefits have you observed from participating in DUFB?
5. What challenges or barriers has your store/market experienced while implementing the program?
6. How do customers typically learn about DUFB at your location?
7. Are there any changes that would make participation easier for your store or customers?

(DUFB Participants)

1. How did you first learn about the DUFB program?
2. What factors influence where you choose to shop for groceries?
3. What makes it easier or harder for you to utilize DUFB?
4. How accessible are participating stores from your home or transportation routes? Which mode of transportation (walk, bus, bike, or car) do you use and how long does it take you to come to this store?
5. What improvements would help you use the program more often?

Recruitment and Interview Procedures

Customer interviews were conducted in person at participating DUFB locations in Chattanooga, Tennessee. Two customers were interviewed at Orchard Knob mobile market, and

one customer was interviewed at Main Street Market, for a total of three customer interviews. Some individuals declined to participate, and customer participation was limited at the locations visited. Customers were approached at participating locations and invited to discuss their awareness of DUFB, experiences accessing the program, and factors that influenced their ability to use it. Eligible interviewees were customers with experience or knowledge relevant to the program. A total of seven customers utilizing DUFB were approached, and three completed interviews. In addition to customer interviews, interviews were conducted with representatives of organizations involved in administering or implementing DUFB and with vendors participating in the program. An email was sent to representatives from each participating retailer, and an interview was conducted with at least one representative from each site. These interviews explored program implementation, retailer experiences, customer outreach, and factors affecting access to locations. One interviewee had experience as both a former customer and a vendor; this person's responses were considered in relation to the role and experiences discussed during the interview.

Interviews were designed to last approximately 5-10 minutes. With consent, responses were recorded using voice memos and transcribed for analysis. The number and roles of interviewees, along with interview lengths, are summarized in Table 3.1.

Table 3.1. Summary of Interviewees and Interview Characteristics

Interviewee	Role	Organization or Location	Duration (minutes)
Customer 1	Customer	Orchard Knob mobile market	1:45
Customer 2	Customer	Orchard Knob mobile market	2:01
Customer 3	Customer	Main Street Market	4:26
Elizabeth Agee	DUFB retailer	Crabtree Farms	12:06

Jason Bartlett	DUFB retailer	YMCA Mobile Markets/Bingo's Market	10:43
Cori Cruz	DUFB retailer	Gaining Ground	25:16
Amelia Dillard	DUFB retailer	Brainerd Farmers' Market	12:00
Jessie Gantt Temple	DUFB retailer	Main Street Market	13:16
Corey Hagen	DUFB retailer	Crabtree Farms	12:06
Logan Lewis	DUFB retailer/former customer	Stem & Stipe	26:23

Data Analysis and Integration

The spatial and qualitative data were examined in relation to the study's research questions. The qualitative data was analyzed using an inductive thematic approach. Interview transcripts were reviewed in Microsoft Word, and responses addressing recurring topics or similar experiences were color-coded. Related responses were then grouped to identify patterns across interviews. Themes were developed from topics that emerged during this review, with attention to shared experiences and differences between customer and DUFB representative perspectives. The researcher conducted the coding and organized responses into primary themes presented in the findings chapter.

The GIS analysis focuses on the distribution of participating retailers, variation in SNAP participation across the study area, and the relationship between retailer locations and surrounding areas at half-mile and one-mile scales buffers, proximity to nearby bus stops, and retailer operating days and hours. The spatial and qualitative findings were examined together to consider how geographic patterns related to interviewees' accounts of program awareness, transportation, accessibility, and local implementation. A joint table was used to summarize

connections between selected GIS findings and qualitative themes. The two forms of evidence are considered together to develop a broader understanding of accessibility.

Limitations

A few limitations should be considered when interpreting the findings of this study. First, the GIS analysis measures proximity to participating DUFB retailers rather than accessibility or program use. Although half-mile and one-mile buffers provide a way to examine the geographic relationship between participating retailers and areas with SNAP participation, proximity alone does not account for access to transportation, travel time, store hours, or awareness of the program. As a result, proximity does not mean that the household can access DUFB.

Second, the spatial analysis relies on publicly available demographic data from the ACS. This provides estimates of SNAP participation at the geographic level used in the analysis but does not identify households that use DUFB. Consequently, the maps illustrate the relationship between whether the program reaches specific households. The analysis is also dependent on the accuracy of the geocoding process and the resolution of the demographic data.

Third, the qualitative component was limited by participant recruitment. Only three individuals from two markets participated in interviews, as some potential participants declined, and opportunities to recruit participants were limited by the low levels of participation observed during market visits. This small sample size restricts the range of experiences represented and limits the extent to which findings reflect the perspectives of consumers and retailers more broadly. The limited participation observed at the markets also provides context for recruitment challenges, but these observations represent activity during the visits conducted and cannot establish overall participation.

Fourth, changes in SNAP participation and benefit levels may have implications for the spatial and qualitative components of this study. Recent federal policy changes have contributed to declines in SNAP participation, and additional changes are expected to reduce benefits for some households (Center on Budget and Policy Priorities, 2026). 696,791 Tennesseans received SNAP benefits in July 2025 when reconciliation law P.L.199-21 affecting federal funding for SNAP was enacted, compared to 611,359 Tennesseans receiving SNAP benefits in September 2026, resulting in a –12.26% change. These changes may have influenced the number of individuals currently receiving SNAP who are eligible to participate in DUFB, and the pool of potential interview participants. Because this study relied on recruiting individuals at participating markets, changes in SNAP participation may have further limited opportunities to recruit participants.

Finally, the combination of GIS analysis and qualitative interviews provide complementary perspectives on local DUFB accessibility, but neither method independently captures the full range of factors influencing participation. The spatial analysis identifies geographic patterns, while the interviews provide individual perspectives on program experiences and challenges. Given the limitations of the interviews sample and geographic nature of the spatial data, the findings should be interpreted within the scope of the data collected. Despite these limitations, the study offers a preliminary examination of the relationship between the geographic distribution of DUFB retailers and the experiences of individuals involved with the program.

Chapter 4 - Findings

GIS Analysis

The GIS analysis examined the spatial distribution of DUFB retailers in relation to households receiving SNAP benefits in Chattanooga. In addition to mapping retailer locations and geographic proximity, the analysis considered two practical dimensions of accessibility: proximity to public transportation, and retailer operating hours. These measures provide additional context for understanding the accessibility of participating locations.

Figure 4.1. DUFB Retailer Locations and Transportation Network in Hamilton County

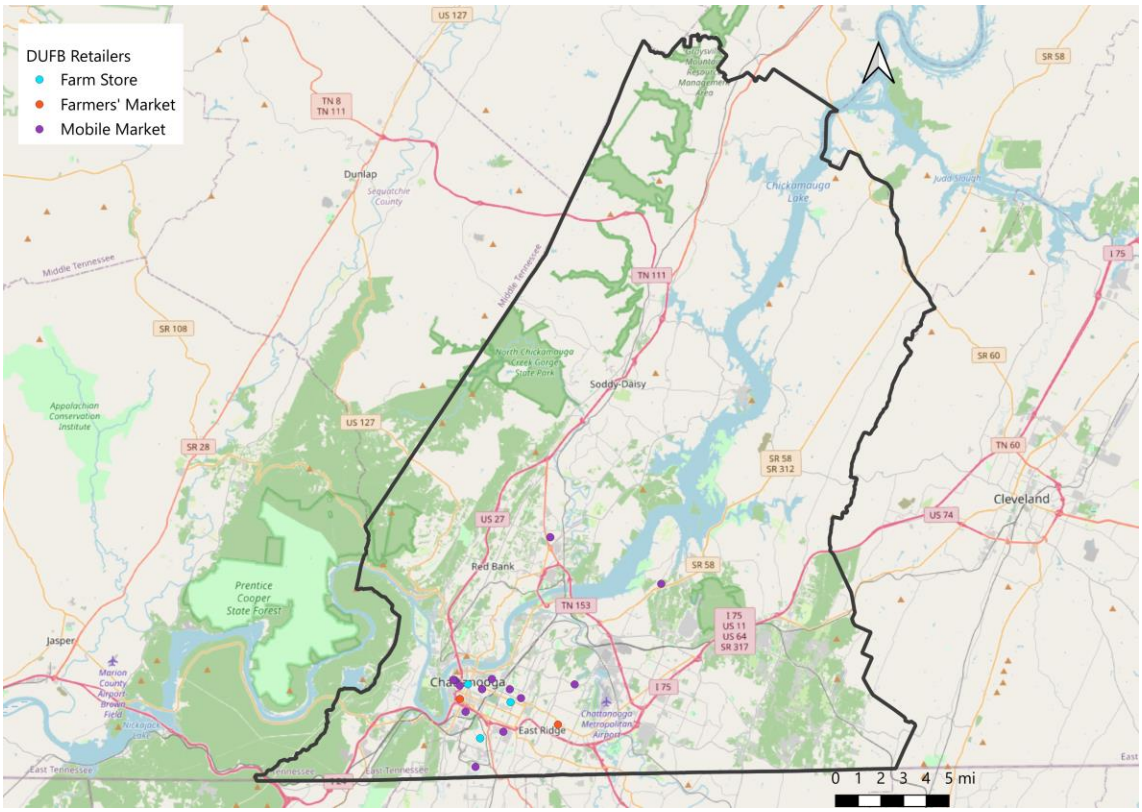
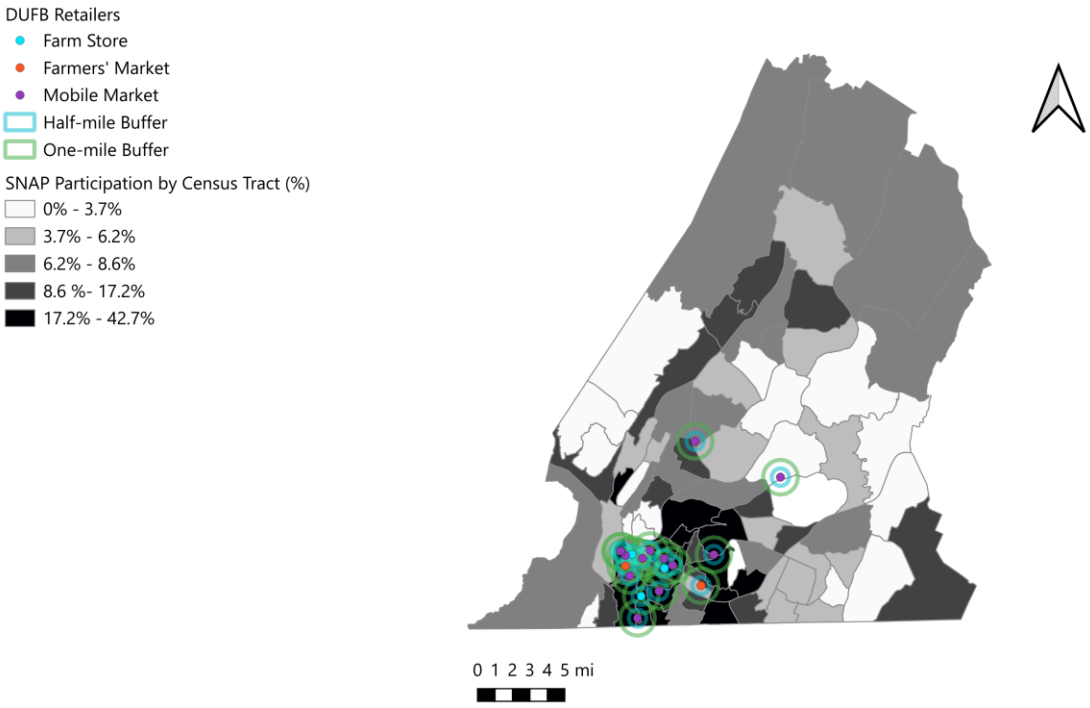


Figure 4.1 shows the distribution of the 19 participating DUFB locations across the study area with the road network and Hamilton County boundary providing geographic context. The OpenStreetMap basemap uses different colors to distinguish road classifications, with red representing primary roads and orange representing secondary roads (Kaart: Road Classification

Guides). Analysis of this map shows that 11 locations are not within a one-half mile of a primary road, while two locations are not within one-half mile of a secondary road. These findings illustrate variation in proximity of DUFB retailers to different road classifications.

Figure 4.2. SNAP Participation and DUFB Retailer Proximity



The analysis identified 19 participating DUFB markets within the study area. Of the 19 locations, 11 (57.9%) were located in census tracts in which between 17.2% and 47.7% of household received SNAP benefits, which was the largest category. Three locations (15.8%) were in census tracts where 8.6% to 17.2% of households receive SNAP. Together, these categories account for 14 out of 19 locations, meaning that nearly three quarters of the DUFB

retailers were located in census tracts with higher SNAP participation (17.2-47.7%). The remaining five locations were distributed across census tracts with lower SNAP participation rates. Two locations were in tracts where 6.2% to 8.6% of households receive SNAP benefits, and three locations were in tracts where 3.7% to 6.2% of households receive SNAP.

Although the distribution of DUFB retailers showed a concentration in census tracts with higher SNAP participation, the analysis also identified gaps in geographic coverage. Ten census tracts in the highest SNAP participation category did not contain a DUFB retailer within their boundaries. When looking at the half-mile and one-mile buffers, all but three of the highest SNAP participation census tracts intersected with a buffer surrounding at least one DUFB retailer. It indicates that the census tracts with high SNAP participation without a retailer in their boundaries were near a participating location. The three census tracts that did not partly or fully fall within any retailer buffer represent gaps in geographic coverage. These three census tracts are also geographically separated from one another, indicating gaps across different parts of the study area.

Additional data on the three census tracts that did not intersect with the half-mile and one-mile retailer buffers were gathered using the 2020 Census Demographic Data Viewer and OpenStreetMap. Census tract 34 is in Chattanooga, Tennessee and houses neighborhoods such as Brainerd Hills, Marimont, and Ela Wada Terrace with a population of 4,245 individuals. Census tract 109.04 is in Red Bank, Tennessee and houses neighborhoods such as Mountain Creek and Spring Valley with a population of 2,535 individuals. Census tract 122 is in Chattanooga, Tennessee and houses the Avondale community with a population of 1,984 individuals.

These findings illustrate the importance of examining both retailer location and proximity when evaluating the geographic distribution of DUFB retailers. Census tract boundaries do not

reflect where residents obtain food, and a retailer located outside a tract may be close to households within it. At the same time, proximity does not always indicate accessibility. The buffer analysis does not account for walking routes, transportation availability, or other factors that may influence whether recipients can access retailers.

Table 4.1. Transportation Analysis

DUFB Retailer	Retailer Type	Nearest Bus Stop	Bus Route
Bingo's Market	Farm Store	0.03 mi	10 (Avondale/Glenwood)
Boynton Terrace Apartments	Mobile Market	0.01 mi	21 (Golden Gateway)
Brainerd Farmer's Market	Farmers' Market	0.1 mi	4 (Eastgate/Hamilton Place)
CEMPA Community Care	Mobile Market	0.04 mi	10 (Avondale/Glenwood)
Crabtree Farms	Farm Store	1.4 mi	1 (Alton Park)
Dogwood Manor	Mobile Market	0.07 mi	21 (Golden Gateway)
East Lake Courts	Mobile Market	0.02 mi	9 (East Lake)
Eastwood Manor	Mobile Market	0.05 mi	4 (Eastgate/Hamilton Place)
Emma Wheeler Homes	Mobile Market	0.3 mi	1 (Alton Park)
Gaining Ground	Farm Store	0.1 mi	10 (Avondale/Glenwood)
Gateway Towers	Mobile Market	0.05 mi	21 (Golden Gateway)
John Calvin Apartments	Mobile Market	0.3 mi	16 (Northgate)
Mary Walker Towers	Mobile Market	0.02 mi	1 (Alton Park)
Main Street Market	Farmers' Market	0.2 mi	21 (Golden Gateway)

Orchard Knob Apartments	Mobile Market	0.5 mi	10 (Avondale/Glenwood)
Parkridge Medical Center	Mobile Market	0.2 mi	10 (Avondale/Glenwood)
Silvertree Seniors	Mobile Market	1.8 mi	10c (Campbell St. / Highway 58)
Westside Community Center	Mobile Market	0.4 mi	10 (Avondale/Glenwood)
Whiteside Faith Manor	Mobile Market	1.0 mi	10 (Avondale/Glenwood)

The transportation analysis found that most of the 19 participating locations were situated relatively close to a bus stop. The bus route that each location was situated along was open during operating hours. Sixteen locations (84.2%) were within one-half mile of the nearest stop, and 12 (63.2%) were within one-quarter mile. The median distance to the nearest bus stop was 0.1 miles. However, access varies across locations. Silvertree Seniors was 1.8 miles from the nearest stop, Crabtree Farms was 1.4 miles away, and Whiteside Faith Manor was 1.0 mile away, representing potential transportation barriers. Twelve of the mobile market locations are also at low-income and elderly apartment complexes, bringing the opportunity to residents rather than requiring them to travel.

Table 4.2. Schedule Analysis

DUFB Retailer	Retailer Type	Days Open	Operating Hours
Bingo's Market	Farm Store	Monday-Tuesday/ Thursday-Friday	10am-4pm
Boynton Terrace Apartments	Mobile Market	Wednesday	3:30pm-5:30pm

Brainerd Farmer's Market	Farmers' Market	Saturday	10am-1pm April-November 11am-1pm December-March
CEMPA Community Care	Mobile Market	Tuesday	1pm-3pm
Crabtree Farms	Farm Store	Friday and Saturday	10am-3pm
Dogwood Manor	Mobile Market	Tuesday	3:30pm-5:30pm
East Lake Courts	Mobile Market	Thursday	3:30pm-5:30pm
Eastwood Manor	Mobile Market	Monday	1pm-3pm
Emma Wheeler Homes	Mobile Market	Tuesday	10am-12pm
Gaining Ground	Farm Store	Wednesday-Saturday	12pm-6pm
Gateway Towers	Mobile Market	Thursday	10am-12pm
John Calvin Apartments	Mobile Market	Monday	10am-12pm
Mary Walker Towers	Mobile Market	Wednesday	10am-12pm
Main Street Market	Farmers' Market	Wednesday	4pm-6pm April-October 4pm-5:30pm November-March
Orchard Knob Apartments	Mobile Market	Friday	3:30pm-5:30pm
Parkridge Medical Center	Mobile Market	Friday	10am-12pm
Silvertree Seniors	Mobile Market	Wednesday	1pm-3pm
Westside Community Center	Mobile Market	Friday	1pm-3pm
Whiteside Faith Manor	Mobile Market	Thursday	1pm-3pm

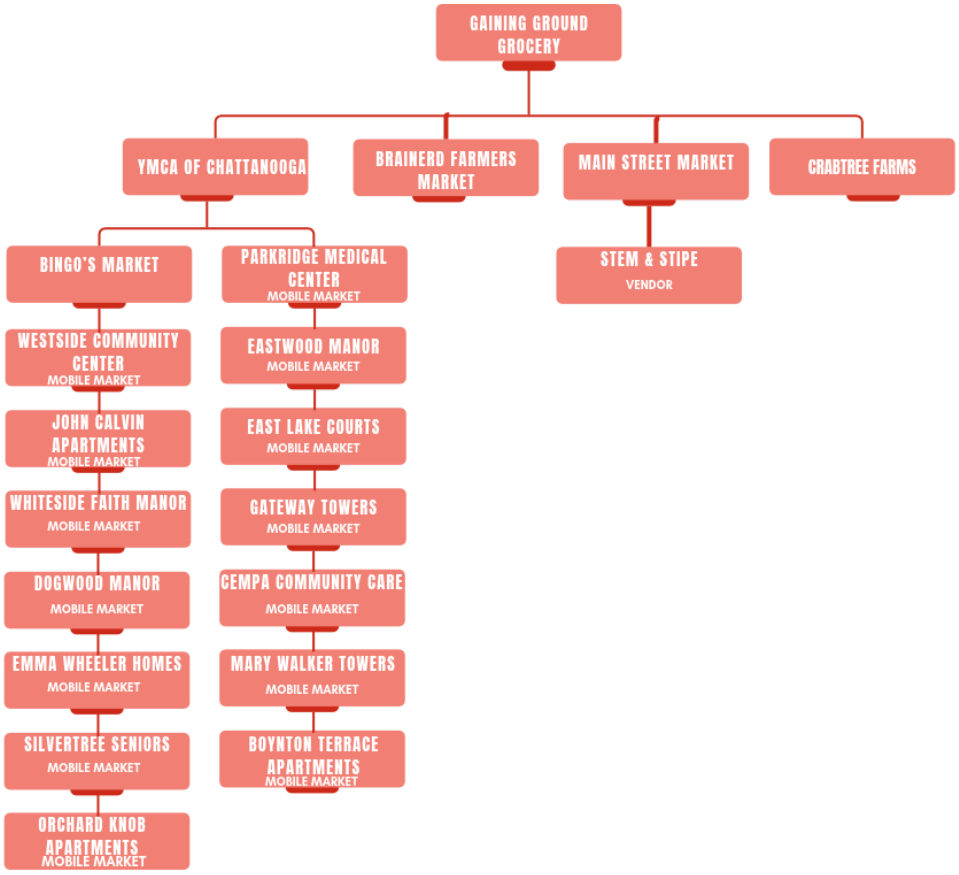
Operating schedules also vary by retailer type and location. The mobile market locations offered scheduled two-hour distribution windows once per week, while farm stores and other farmers' markets generally had longer or more frequent periods. Saturday availability was concentrated at Brainerd Farmers' Market, Crabtree Farms, and Gaining Ground Grocery.

Several mobile market locations offered late-afternoon distribution windows, while Main Street Farmer's Market operated on Wednesday afternoons and evenings with seasonal changes regarding closing time.

Qualitative Interviews

To better understand the local implementation of DUFB in Chattanooga, I conducted interviews with customers and retailers connected to participating markets. The interviews explored participants' awareness and experiences with the program, factors influencing market accessibility and participation, and perspectives on opportunities to improve the program. Examining both customer and retailer perspectives provides insight into how DUFB operates at the local level and how program implementation is experienced by those who use and facilitate it. Figure 4.3 presents a map of the market locations and stakeholder connections represented in the interviews. Created by the author, this figure provides context for the findings by identifying the organizational settings in which interviews took place and illustrating the relationships examined in the analysis.

Figure 4.3. Organizational Map of DUFB in Hamilton County



Retailer Interviews

Six interviews include representatives from Gaining Ground Grocery, YMCA of Metropolitan Chattanooga, Main Street Market, Brainerd Farmers Market, and Crabtree Farms, as well as a vendor with Stem & Stipe who had prior experience as a DUFB customer. To maintain consistency, interviewees are identified by a letter and their professional role (e.g., Retailer A, farm store manager). These interviews provided perspectives from organizations involved in program coordination and implementation, as well as a vendor with firsthand experience using the program as a customer. Analysis of these interviews identified six primary themes: geographic accessibility and food deserts, program continuity and implementation,

community partnerships, affordable fresh food, unexpected benefits, and program awareness and outreach as barriers.

Geographic Accessibility/Food Desert

Five out of seven interviewees highlighted the importance of having DUFB markets in areas where residents experience limited access to fresh food. Retailer D, a farmers' market representative, described the loss of a grocery store and explained that residents in the surrounding neighborhood must now travel over two miles to reach a grocery store. As Retailer D explained:

> There's a lot of affordable housing within the area and stuff, there's nothing within walking distance for food except for a Dollar General, and that's really it, so it's important for our market, being in that situation, to have accessibility for people that can't access fresh food at all.

However, the location of a market does not guarantee accessibility for residents who live farther away or lack transportation. Retailer F, a farm store representative, noted that the store's location in Clifton Hills improves access for some residents but may not benefit those living in nearby neighborhoods, stating:

> The fact that we're located in Clifton Hills makes it much more accessible to people that don't have transportation.... but it's not any more accessible to somebody in Alton Park than it is to go to a grocery store, and you still have to get transportation to get here.

Mobile markets offer one approach to addressing these barriers. Retailer B, a mobile market representative, described how the program operates a grocery store on wheels that

provides fresh produce alongside other grocery staples, bringing food directly into communities. Retailer B explained how the program considers local food access when selecting locations, stating "Of course, it'll go along with food deserts and areas that don't have access to stores or options other than gas stations or fast food." Overall, the retailer interviews suggest that improving access to DUFB requires addressing transportation barriers and bringing resources into communities that have limited options for fresh groceries.

Program Continuity/Implementation

Six out of seven interviewees also revealed that DUFB implementation is influenced by organizational capacity, funding, and changes in program operations. Four interviewees described challenges with organization capacity and staffing. Retailer D described how changes in leadership affected the local market, stating "The market used to be really vibrant and have a lot going for it, and it kind of died out when they had different managers that weren't doing a lot for it." Retailer B similarly described staffing limitations that affected the market's ability to expand, stating "Since I've started, we've had at least three or four people ask if we can come but right now, we're pretty well maxed out...I would like to have a part timer do weekends..." Retailers A and F described closing for the season after discovering a fungal disease on the farm, shifting the focus to distributing through community partners. These experiences illustrate how leadership transitions, staffing limitations, and disruptions can affect an organization's capacity to sustain market operations and participate in DUFB. Three retailers discussed challenges regarding day-to-day implementation, such as managing tokens, training staff, and coordinating vendor attendance.

Two retailers discussed challenges regarding funding and program requirements. Retailer C, a farm store representative, described an upcoming change that would increase the amount

SNAP customers could receive through DUFB and broaden the range of eligible foods. Although the change presented an opportunity to increase the program's benefits for customers, the retailer also expressed concern about declining SNAP customer participation amid changes to federal benefit and work requirements. As retailer C stated:

> The SNAP landscape is obviously really under fire right now, so I think that we've noticed some considerable declines in the amount of customers that we have, and a lot of our loyal SNAP customers have lost their benefits because of work requirements...

This highlights how changes in SNAP eligibility and access may affect customer participation, even when funding is available. Three retailers discussed challenges regarding day-to-day implementation, such as managing tokens, training staff to accept EBT transactions, and coordinating vendor attendance.

Community Partners

Five of the seven interviewees highlighted the role of community partnerships in implementing DUFB. Partnerships support the program through funding, program development, customer access, and operating markets. Retailer C described how collaborating with Nourish Knoxville helped expand the program to Chattanooga, showing how experienced practitioners helped facilitate the program locally. Retailers A and F described how partnerships helped customers access participating markets, stating how the AIM center had previously transported people to their market to utilize DUFB, showing how partnerships can help customers reach the market.

Three retailers described how community organizations contributed space and outreach. Retailer D described the partnership with a local church, stating:

> Grace Episcopal is very involved with things like the ShowerUp[1] initiatives...they're just really involved in that kind of thing...and they let us use the parking lot for free and a lot of people with the church are involved in helping [the market] grow and spread the word.

Access to space and the involvement of community members helped support market operations and outreach. Retailer B described efforts to expand partnerships with existing healthcare organizations to see if they would provide vouchers. These examples illustrate how community partnerships provide resources, strengthen outreach, and create opportunities for customers to participate in DUFB.

Affordable Fresh Food

All seven interviewees described affordability as an important benefit of DUFB, particularly for SNAP customers seeking to purchase fresh and local foods. Retailer B explained how the incentive allows customers to use their SNAP benefits for other groceries while purchasing produce through DUFB, stating "So you could use your SNAP benefits and get...say like your meat, or whatever you want to do, and get your Double Up Food Bucks and then turn around and get your veggies to go with that and have a complete meal for the table." This account shows that DUFB can help customers stretch their food budgets across different food groups even though the incentive is for fruits and vegetables. Retailer C also explained the matching structure, stating "They can spend up to $20 a day at any of the sites and they'll get a free $20 matched, and that $20 can be spent on fresh fruits and vegetables." By matching

[1] ShowerUp is a mobile unit that travels to different locations and provides individuals with a warm shower. (ShowerUp, Accessed 29 Oct 2026.)

customers' SNAP purchases, the program increases the amount customers can spend on eligible produce.

All seven interviewees also described DUFB as an opportunity to make fresh food more accessible to customers who may find it unaffordable. Retailer E, a farmers' market representative, described the program as "really appealing to a larger demographic of folks who want to eat fresh but can't necessarily afford to eat fresh." Retailer B stated that the incentive "definitely ups the amount of fruits and vegetables people are purchasing and actually consuming." Retailer A connected this benefit to the organization's mission, stating "I think our whole mission here is to make healthy food available, and I think [DUFB] really makes it easy for people." Retailer G, a vendor representative and former customer, described using nearly all of his benefits at farmers' markets because of how much more he was able to purchase. These accounts show that DUFB is viewed as a way to reduce the cost of fresh foods and make local foods more accessible.

Unexpected Benefits

Five retailers described the benefits of DUFB beyond its role as a nutrition incentive. These benefits included opportunities for food education, exposure to unfamiliar foods, allowing customers to grow their own foods, and support for local vendors. Retailer C described how their program connects nutrition education with opportunities for families to prepare food at home. Through cooking classes and school-based education, customers could visit a participating market to purchase ingredients to recreate recipes. As the retailer explained, "I've gotten to see kids try their first melon, or...certain produce that maybe they wouldn't be able to afford otherwise, which is really awesome." Retailer A described that their farm store offers native pollinator plants and edible plants, noting that customers using could purchase these through

SNAP, describing it as a "cool benefit to think about people are able to provide for themselves, grow their own food in that way."

Beyond customer benefits, Retailer D explained that increased participation helps vendors who depend on market sales for income, stating "as that customer base grows because of Double Up, our vendors are also benefitting." By bringing more customers into the market, DUFB may help support both access to fresh food and the local businesses that sell it. Retailer G described an unexpected pathway from being a DUFB customer to becoming involved in the local food system as a vendor. Together, these accounts demonstrate how interviewees perceived DUFB's benefits as extending beyond a nutrition incentive to food education, food-growing opportunities, and participation in the local economy.

Program Awareness and Outreach as Barriers

Program awareness and outreach emerged as barriers to the local implementation of DUFB. Five out of seven retailers described difficulties informing potential customers about the program, increasing awareness of participating locations, and reaching audiences beyond their existing customer base. Retailer E expressed uncertainty about how customers learned about DUFB, explaining "I honestly don't know how customers can find out more about the Double Up program. I mean, we have the A-frame sign, but because this isn't a permanent location for us...we include it in the newsletter...we should probably do it more." This shows how temporary market locations make it difficult to communicate program availability to potential customers. Retailer E also described the need for permanent signage to help visitors identify the market and how to shop there. Retailer D similarly suggested that roadside signage and more frequent social media posts could help address limited awareness. These accounts indicate that customers may

encounter barriers to participation because they are not familiar with DUFB or do not know that EBT is accepted there.

Retailer C described challenges reaching people unfamiliar with the program. She recalled attending community events to share information about available resources, explaining "Every single time it's like a room full of people who have never heard of it before...it's just so hard to spread the word." This demonstrates difficulty spreading awareness when retailers are already engaging in outreach. Retailer C also raised concerns about reaching Spanish-speaking residents, asking "With our Latin population, for example, how do you bring people if there is a language barrier and things like that?", highlighting how language barriers limit the reach of program information. Retailers A and F also identified limited awareness as a concern, stating the need to increase general knowledge of the market and use "targeted outreach." These accounts suggest that limited program awareness, inconsistent market visibility, and challenges reaching diverse audiences constrain the reach of DUFB. Although retailers described several possible outreach strategies, their accounts indicate that connection with potential customers remains a challenge.

Customer Interviews

Three customer interviews were conducted to better understand experiences with DUFB at participating markets in Chattanooga. Two interviews took place at the YMCA mobile market at Orchard Knob Apartments, and one took place at Main Street Market. These interviews explored customers' awareness of DUFB, experiences accessing markets, the perceived value of the incentive, and suggestions for program improvement. Four themes emerged from the interviews: awareness and participation, food access and affordability, potential barriers and convenience, and suggestions for improvement.

Awareness and Participation

Customers described different experiences with learning about markets and the DUFB program. Both customers interviewed at Orchard Knob Apartments were unfamiliar with the terminology, responding "not really" and "no" when asked whether they knew what Double Up Food Bucks was despite being familiar with the market itself and utilizing the program. Customer 1, a customer at Orchard Knob Apartments, explained that they began visiting after moving into the apartment complex, stating "When I moved here, they came and I came out, so I see it." Customer 2, another customer at Orchard Knob Apartments, recalled seeing a sign announcing the market and noticing it each week.

Customer 3, a customer at Main Street Market, described learning about DUFB after regularly shopping at the market. The customer explained "We didn't realize what the booth was at first, and then we saw something about food stamps one time, and then we came up and approached and asked about it." The customer was already drawn to the market by preferences for organic and locally sourced foods, as well as products with simple ingredient lists. After learning how the program worked, the customer continued participating and shopped at the market regularly. These interviews show the difference between awareness of a market and awareness of the program itself. While the Orchard Knob customers regularly utilized DUFB, they were unfamiliar with the program's name and the way it worked. The Main Street Market customer described learning about DUFB through repeated visits, a visible sign, and interaction with market staff.

Food Access and Affordability

Two out of three customers highlighted the importance of being able to access food and the value of DUFB. When asked what influenced where they purchased groceries, Customer 1 stated "The

ability to get it," which emphasized the importance of accessibility when deciding where to shop. Customer 3 described how the incentive affected their food budget, explaining that it helped them manage expenses between weeks, stating "Sometimes it even holds us off until the next week...in case, you know, the end of the month when you run out you got the extra couple coins from the last week still." This shows how the customer saw the program as a way to extend their food budget. The customer also stated that they typically had $10 to $15 in tokens at the end of each month and suggested that a larger incentive could make the program more appealing.

Potential Barriers and Convenience

Convenience was a prominent aspect of the Orchard Knob customers' experiences. Both customers emphasized the benefits of having the mobile market located at their apartment complex. Customer 1 stated "Well if I had to go up there, it would be tough, but he brings it to me so that makes it easy." Customer 2 echoed how easy attending the market was, stating "I don't have to get in the car and drive nowhere, I just walk across the parking lot." These responses suggest that locating a market within a residential area can reduce barriers related to transportation and make fresh food more accessible to residents. Customer 3 also identified convenience as an important part of using DUFB. The customer described that the process using tokens was straightforward and explained that the location made participation easier. Although Customer 3 lived 45 minutes away, working in Chattanooga connected them to the market, showing that market accessibility may relate to customers' routines as well as distance.

Suggestions for Improvement

When asked about possible improvements to DUFB, Customers 1 and 2 did not identify any. Customer 2 indicated that the location and schedule met their needs, stating "No, just the Friday, that's okay." Customer 1 also responded that they did not see a need to use the program

more often. Customer 3 discussed the possibility of processing payments electronically instead of using tokens, but expressed concerns about security, ultimately stating "I think it's fine the way it is. There's nothing to improve really." The customer also suggested that increasing the incentive amount could encourage more participation. Overall, the customers' suggestions varied across different settings. The Orchard Knob customers did not identify improvements, while the Main Street Market customer discussed the drawbacks of electronic transactions and the benefits of a larger incentive.

Integration of GIS and Qualitative Findings

The GIS analysis and qualitative interviews provide complementary perspectives on the local implementation of DUFB. While GIS analysis identified spatial patterns surrounding locations, SNAP participation, and transportation access, the interviews provided insight into how retailers and customers experience program implementation. To examine how these findings relate to one another, Table 4.3 was developed to connect GIS results with qualitative themes.

Table 4.3. Comparison of GIS and Qualitative Findings

GIS Findings	Retailer Qualitative Themes	Customer Qualitative Themes
Geographic distribution: Of the 19 participating DUFB locations, 11 were located in census tracts where 17.2 to 47.7% of individuals received SNAP. 10 census tracts in the highest SNAP participation category had no retailer within the tract, and three did not intersect	**Geographic accessibility and food deserts:** Retailers described locating markets in communities with limited access to grocery stores and fresh food. One retailer described a neighborhood where a Dollar General was the only food retailer within walking distance.	**Awareness and participation; Food access and affordability:** The Orchard Knob customers described the convenience of having a market within their apartment complex.

with the half-mile or one-mile retailer boundaries.		
Public transportation: 16 of the 19 participating locations were within one-half mile of a bus stop, and 12 were within one-quarter mile. Three locations were more than one mile from the nearest bus stop. Bus routes operated during each market's operating hours.	**Geographic accessibility and food deserts; Community partners:** Retailers discussed transportation challenges, how mobile markets aided transportation issues, and how partnerships helped customers access markets.	**Potential barriers and convenience:** One Orchard Knob customer explained the ease of walking across the parking lot to attend the market instead of walking or driving to a store.
Operating schedules: Mobile markets generally operated during a two-hour window once per week, while farmers' markets and farm stores offered varying schedules and hours.	**Program continuity and implementation:** Retailers discussed staffing, organizational capacity, and operational factors affecting operating schedules.	**Suggestions for improvement:** Both Orchard Knob customers indicated that the schedule met their needs.

Chapter 5 - Conclusion

Double Up Food Bucks (DUFB) is a nutrition incentive program intended to make fresh food more affordable for households receiving Supplemental Nutrition Assistance Program (SNAP) benefits. However, the presence of participating retailers does not establish whether households can access or use this program. This study examined the local implementation of DUFB in Chattanooga and Hamilton County, Tennessee by exploring the geographic distribution of participating locations, their proximity to public transportation, and the experiences of customers and retailers. The findings indicate that DUFB locations are present in most census tracts with relatively high-level SNAP participation. Three census tracts in the highest SNAP participation category did not intersect with the half-mile or one-mile retailer buffers. At the same time, most participating locations were near public transportation, and mobile markets were used to bring the program to residential communities. These findings show the value of examining multiple aspects of location and implementation rather than relying on proximity.

The findings also address differences in awareness and access across locations. Interviews suggested that familiarity with a participating market does not necessarily mean familiarity with DUFB itself. Some customers had experience with the program's benefits without recognizing the program by name. Differences in retailer operations, market schedules, and outreach opportunities may influence how individuals encounter and understand the program. Additionally, interviews highlighted several factors that may influence SNAP participants' ability to access and use DUFB, including affordability, transportation, program awareness, outreach, retailer operational capacity, and community partnerships. Mobile markets and partnershi8ps with community organizations provided opportunities to bring participating locations into residential communities, but challenges

related to operating schedules, outreach, and program awareness may affect whether individuals are able to take advantage of these opportunities.

Taken together, these findings suggest that understanding local access to nutrition incentive programs requires attention to geographic distribution and the ways programs are implemented within the community. GIS analysis can help identify potential gaps in coverage, while interviews provide context about how program operations and outreach may shape customer experiences. Future research could build on this study by including a larger and more diverse group of DUFB customers, examining awareness and participation across a larger pool of markets, and exploring how transportation, operating hours, and outreach affect program use. Continued attention to these local factors may help program administrators identify opportunities to improve access and communicate more effectively with eligible households.

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Appendix A – Interview Questions

DUFB Retailers

1. What motivated your store to participate in Double Up Food Bucks?
2. How long is your store in operation and since when did you start participating in DUFB?
3. What factors have influenced locating this store in its current location? Were there any recent changes in location or services provided?
4. What benefits have you observed from participating in DUFB?
5. What challenges or barriers has your store/market experienced while implementing the program?
6. How do customers typically learn about DUFB at your location?
7. Are there any changes that would make participation easier for your store or customers?

DUFB Customers

1. How did you first learn about the DUFB program?
2. What factors influence where you choose to shop for groceries?
3. What makes it easier or harder for you to utilize DUFB?
4. How accessible are participating stores from your home or transportation routes? Which mode of transportation (walk, bus, bike, or car) do you use and how long does it take you to come to this store?
5. What improvements would help you use the program more often?