Private and Public Food Assistance Use Dynamics in Upstate New York

Christopher B. Barrett[1,2,3,4], John Hoddinott[2,5,6], Zixia Huang[2], Kelsey Schreiber[2], Yuhe Zhang[2], and Jason Jianqiang Zhao[7]

[1]Corresponding author at cbb2@cornell.edu

[2] Charles H. Dyson School of Applied Economics and Management, Cornell University, Ithaca, NY 14853

[3] Jeb E. Brooks School of Public Policy, Cornell University, Ithaca, NY 14853

[4] Cornell Atkinson Center for Sustainability, Cornell University, Ithaca, NY 14853

[5] Division of Nutritional Sciences, Cornell University, Ithaca, NY 14853

[6] Department of Global Development, Cornell University, Ithaca, NY 14853

[7] Department of Global Value Chains and Trade, Lincoln University, Lincoln 7647, New Zealand

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Abstract

The United States' food assistance system relies heavily on private charitable food assistance from food banks and pantries to supplement public food assistance provided by governments. Do food assistance recipients use both private and public food assistance or do they rely mainly on just one source? Is dual use simultaneous or sequenced, for example, with pantries providing temporary relief only until a recipient enrolls in the Supplemental Nutrition Assistance Program (SNAP), the main public food assistance program? Existing research sheds relatively little light on such fundamental questions about the use of nutritional safety nets in the US. We use high frequency, matched administrative data covering all SNAP participants and most private food assistance recipients in a six-county region of upstate New York, 2018-21, to unpack such patterns. In this region, private and public food assistance operate largely as parallel systems. Less than 12% of food assistance recipient households ever used both private and public sources. SNAP serves 2.4 times as many households as the private food assistance network and is nearly 8 times more likely to be a gateway to food pantry use than food pantry use is to precede SNAP use, although that pattern shifted during and immediately following COVID lockdowns. These patterns suggest that at any moment in time, most food assistance recipients have chronic needs, best served through SNAP's integration into the commercial food retail network, while private food assistance's flexibility and accessibility make it especially helpful to the subpopulation that need temporary food assistance.

Significance Statement

United States residents' food assistance use patterns can inform safety net policies. Over a four-year span including the COVID lockdown period, nearly 40% of households across six counties of upstate New York received food assistance, most of them single adult households. Nearly 80% of food assistance recipient households received SNAP, roughly one-third received food from a private food bank or pantry, while few - less than one in eight - used both private and public food assistance. Observed use patterns suggest that food assistance recipients visit food pantries mainly to respond to transitory needs while others use SNAP to address chronic food insecurity through frequent benefit redemption. The two systems operate largely in parallel, serving slightly different clients with distinct needs.

Introduction

Relative to other high-income countries, food security and food assistance in the United States (US) are distinguished in three main ways. First, the US has a relatively high level of household food insecurity. FAO (2025) reports that the prevalence of moderate or severe food insecurity in the US was 10.3 percent in 2022-24, far higher than, for example, Italy (1.7 percent), Germany (4.1 percent), the United Kingdom (6.9 percent), or France (8.4 percent). In 2023, 13.5 percent (18.0 million) of U.S. households reported food insecurity at some point during the year (Rabbitt et al., 2024). Second, publicly funded social assistance is relatively low, merely 2.8 percent of GDP compared to an OECD average of 6.5 percent (Adema et al., 2023). Although the Supplemental Nutrition Assistance Program (SNAP), the principal federally-funded program for addressing food insecurity, aided 42.1 million people per month or 12.6 percent of U.S. residents (Jones, 2024) in 2023, SNAP benefits are relatively modest relative to the federal poverty line (FPL). The average monthly benefit of $177 per person—$332 for an average SNAP household size of 1.9 people (USDA, 2024)—was only 20 percent of the FPL per person for a comparable unit ($21,150 for a 2-person household). That was before passage of the One Big Beautiful Act (OBBA) cut SNAP eligibility sharply; families expecting to lose SNAP benefits are projected to lose an average of $146 per month following implementation of the OBBA (Wheaton et al., 2025). Third, the US has an especially large not-for-profit food bank and food pantry system, often referred to as Charitable Food Assistance (CFA) (Byrne and Just, 2022a). In 2023, more than 50 million Americans received CFA at some point, although the value of SNAP benefits is nine times larger than CFA in the US (Feeding America, 2024). Where all public food assistance benefits are means-tested – i.e., restricted to low-income households who satisfy other criteria as well – food banks and pantries rarely means test or apply any other eligibility criteria, making CFA more immediately and universally available to those seeking food assistance. Many households that use food pantries may not be eligible for SNAP, making CFA their primary source of food assistance.

Evidence of the extent to which food insecure households make use of both SNAP and CFA is limited in scope and ambiguous in findings. Musa et al. (2023) cite a statistic suggesting that 55% of individuals who accessed CFA through Feeding America (the largest network of food banks in the United States) also reported participating in SNAP. Kaiser and Cafer (2017) report a similar percentage in their sample of pantry users in Missouri interviewed between 2005 and 2013. Using data from the 2012 USDA National Household Food Acquisition and Purchase Survey, Fan et al. (2021) report that 45 percent of CFA clients were also SNAP recipients; most accessed CFA 10 days or later after SNAP benefits had been exhausted, suggesting that CFA was used to supplement SNAP assistance, a result consistent with Byrne and Just's (2021) finding that in northern Colorado, CFA usage increases cyclically within each month when SNAP benefits run out. An online survey of low-income households in Arkansas shows that 71 percent of CFA users also received SNAP benefits (Skinner, 2023). All of these results suggest that public and private food assistance complement each other.

By contrast, other studies suggest private and public food assistance may functionally substitute for one another. Among low-income households in Allegheny County, PA, who received food assistance, only 23 percent also accessed CFA (Daponte, 2000). Among recently enrolled SNAP beneficiaries, a telephone survey showed that only 17.4 percent also obtained food through CFA (Mabli and Worthington, 2017). When households lose access to a related, smaller federal food assistance program (the Special Supplemental Nutrition Program for Women, Infants, and Children, WIC), the likelihood that

they use CFA increases significantly (Si and Leonard, 2020). And when children's access to federally-funded, free school meals increased within a county by 10 percent, the physical volume of food distributed by food banks within that county falls by just over 1 percent (Ruffini et al., 2025).

While prior studies provide valuable insights into joint SNAP and CFA use, they suffer from important limitations. First, most use data from 2013 or earlier; it is unclear whether the patterns observed 12 to 25 years ago continue to hold. Second, sample sizes for some studies are small and phone or online surveys raise questions about how representative these households are of the SNAP population in those samples. Third, nearly all studies (Mabli and Worthington, 2017 being an exception) use short time periods – typically asking about participation in SNAP and CFA over the last month. Thus, it is not possible to tell if households are always accessing both forms of food assistance, or whether – for example – they access CFA only temporarily, perhaps while waiting to be enrolled in SNAP. Fourth, all rely on household self-reports of SNAP and CFA participation. Unfortunately, surveys under-report participation in SNAP with a quarter to half of true recipient households not recorded as such in their data (Meyer et al.,2022; Gregory and O'Connor 2026). It is not known the extent to which use of CFA is under-reported. But given the degree of stigma attached to CFA use (see for example, Kindle et al, 2019 or Byrne et al., 2023), it is reasonable to assume that self-reported survey data also under-report CFA usage.

We built a novel data set to address these limitations. Specifically, we probabilistically matched administrative case data from New York State on every SNAP participant's benefits receipt or redemption by residents in six upstate counties (Broome, Chemung, Schuyler, Steuben, Tioga and Tompkins) over the April 2017 – December 2021 period – a total of 97,132 participants – with administrative data from the Food Bank of the Southern Tier (FBST) – which accounts for the overwhelming majority of CFA distribution in those six counties – on each of 35,623 clients' 246,395 distinct visits to one (or more) of 128 member pantries that used the FreshTrak client administrative records system over the same period. The core sample analyzed runs from January 2018 through June 2021 to address suspected incomplete records in the initial and last months of the longer series. These administrative case data obviate concerns regarding measurement error and systematic survey underreporting by households, although some underreporting of CFA use necessarily remains due to missing administrative data from some food pantries. The four-plus year duration allows us to develop a finer understanding of the nuances of joint or separate use of SNAP and CFA and the sequencing of such use. The large sample size, covering both rural and urban areas, allows us to disaggregate use of both SNAP and CFA in numerous ways across a heterogeneous population. The sample period straddles a period when COVID-19 lockdowns created a sudden surge in food insecurity, thereby helping us to understand how the private and public food assistance systems responded. We can also track how policy changes that significantly expanded SNAP payments impacted food pantry use.

These unusual data permit us to shed light on central questions about private and public food assistance use dynamics. First, how commonly do food assistance recipients use SNAP and CFA jointly or in sequence, as complements or substitutes? Second, do those patterns differ, for example, between rural and urban residents, between younger and older adults or households with or without children, and between periods of relative stability versus shock? Third, might observed differences in CFA and SNAP use patterns reflect supply-side factors that distinguish the geography of public food assistance mediated through commercial food retailers from the CFA networks of non-profit organizations? Fourth, what happens to CFA use in the wake of SNAP policy changes? Existing data and studies do not provide many rigorous answers to these questions. While the assessments that follow are mostly descriptive,

understanding these patterns accurately provides valuable information for policymakers and establishes a foundation for future research to explore more deeply why these patterns hold and how best to serve food insecure subpopulations in the United States.

Although these findings might not be generalizable nationwide, especially to large metropolitan areas, they likely reflect other regions of the country as well. The Southern Tier of New York is the northernmost portion of the nation's Appalachia region, spanning a mix of small metropolitan centers and rural areas. Its population of roughly 540,000 is relatively low-income, predominantly non-Hispanic White, and older than the rest of the US. Its SNAP participation rate of 11-12 percent is essentially the national average in the U.S. Feeding America's Map the Meal Gap estimates place county-level food insecurity rates in the six study counties at 10.3–13.4 percent over the study period, broadly comparable to national rates (Ribar et al., 2025). The study region is thus a bit more economically disadvantaged and demographically homogeneous than the national average, but not an extreme outlier in its exposure to food assistance need nor in use patterns. This profile suggests our findings are most likely to generalize to other small-metropolitan and rural regions of the United States with similar income and food assistance use levels, although they may be less directly informative for large urban centers or for the poorest regions of the country.

Results

These data generate several important descriptive results that can usefully inform the study of and policies related to food assistance use. As detailed in the subsections that follow, these can be summarized as follows. SNAP use is far more widespread than food pantry use, with less overlap in use of private and public food assistance, and far more flux into and out of food assistance use than has been documented previously. Although food pantries are quicker and easier to access initially than SNAP, in our sample food pantry use rarely leads to SNAP participation. Both the limited overlap and the highly unbalanced pattern of sequential use may reflect pantry use by important subpopulations who are ineligible for SNAP – e.g., undocumented immigrants, many able-bodied adults without dependents, or full-time college students – or the administrative burdens of SNAP enrollment or distinct preferences among food assistance users. The clear takeaway is that the private and public food assistance systems serve two relatively distinct subpopulations with limited overlap between them. Each needs support.

Food assistance recipients and the food assistance landscape

The 2020 US Census reports 224,651 households resident in the six counties served by FBST. The administrative data indicate that at least 38% received food assistance at least once between January 2018 and June 2021 (Figure 1). Of those, nearly 80% received SNAP. SNAP participation over this four-year period is roughly 2.3 times the local and national average annual participation rate of 16.5% (21.6 million households in an average month in 2022, per Monkovic (2024) out of 131.2 million households nationwide, per Census). This underscores considerable flux over time among food assistance users. At least one-third of food assistance users received private food assistance from a food bank or pantry. Only 12.6% - just 4.5% of the total population – tapped both private and public food assistance over the four-year period. This is only slightly an artefact of disruptions to pantry operations caused by the Covid-19 pandemic. Pre-pandemic (January 2018 – March 2020), 10.2% of households accessing food assistance used both SNAP and food pantries; after the worst of the pandemic related disruptions (July 2020 – June 2021), 8.3% used both (SI Figure S1).

Food assistance recipients are more likely female and more rural than the population average (SI Table S1). Pantry users tend to be older while SNAP-only households are typically younger and smaller than the population as a whole. The median age of pantry-only users (48 years) is significantly higher than that of SNAP-only users (37 years). Among households under age 25 who visited a food pantry, more than half (58%) visited a college campus pantry. This suggests that college students make up a large share of young adults using food assistance. Perhaps the most striking difference between the broader population and the subpopulation of food assistance recipients is that more than half (54% vs. 31% in the broader population) of food assistance recipients were single adult households and far fewer were childless households with more than one adult (just 12%, and 9% of SNAP-only households vs. 43% in the broader population). Households with a resident child are somewhat overrepresented among food assistance recipients (33% vs. 26% in the broader population). Households led by single mothers account for 35% of households with children who received food assistance but only 25% of households with children in the broader population. Moreover, less than 13% of food assistance recipients who only use food pantries were single-mother-with-child households, as compared with 36% of SNAP-only households. The single-mothers-with-children subpopulation disproportionately uses SNAP for food assistance, with or without food pantry supplementation.

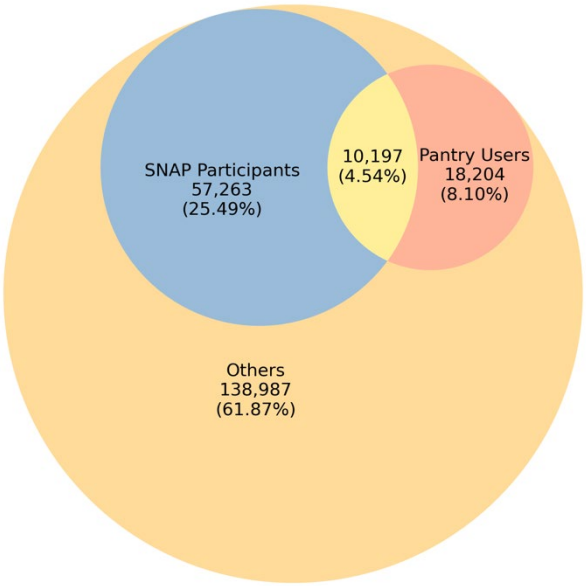


Figure 1: Of the 224,651 households in the six-county FBST service region (per the 2020 census), 67,460 (30.03%) participated in SNAP at some point over the 2018-21 period and at least 28,401 (12.64%) received provisions from a food bank or pantry at least once over that time. The frequency of food pantry use conditional on SNAP participation was 15.12%; the probability of SNAP participation conditional on food pantry use was 35.90%.

The geography of food assistance supply is complex. SNAP participants redeem public food assistance benefits within the commercial food retail network using an electronic benefit transfer (EBT) card that they use just like a personal credit or debit card at any outlet USDA authorizes to accept SNAP EBT cards. The six-county region had 632 retailers authorized to accept SNAP at some point during this period, of which 381 (60.3%) were authorized throughout the entire period. (SI Table S2 provides descriptive details on SNAP-authorized retailers in the region.) There is flux in the SNAP retailer network; 133

(21.0% of all retailers) began accepting SNAP and 134 (21.2%) were dropped from the SNAP-authorized retailer rolls at some point during the 2018-21 period. But nearly 80 percent of stores' SNAP authorizations last at least three years, and the mean duration is 19 years for supermarkets and 15 years for grocery stores. Most of the flux is in convenience stores and other smaller format retail outlets with limited food offerings. Virtually every community has at least one SNAP-authorized retailer present. No statistically significant relationship exists between the presence of a SNAP-authorized retailer and its census tract's socioeconomic characteristics beyond population (SI Table S3). And SNAP participants can redeem benefits for their choice among quite a wide array of SNAP-eligible products.

We represent the private food assistance landscape by the network of 128 FBST member pantries using the FreshTrak.[*] Just 25.8% of FBST pantries using FreshTrak are located in urban areas, statistically significantly fewer than in rural census tracts even controlling for unemployment rates and other relevant factors (SI Table S5). (SI Table S6 describes the food pantries in the six-county region.) This contrasts somewhat with prior findings that CFA is more available in urban areas (Hungerman, 2009). This may reflect, in part, FBST's active development of a network of mobile food pantries (MFPs) that offer scheduled service to communities, sending a specially outfitted truck to a designated parking lot where pre-registered clients collect their food from volunteers. MFPs are most heavily used by rural residents in this region. FBST food pantries and SNAP retailers are spatially interspersed. On average, an FBST pantry is located 3.5 miles from the nearest SNAP-authorized supermarket or superstore, 8 miles from the nearest SNAP-authorized grocery store, and less than 1 mile from the nearest SNAP-authorized convenience store (SI Table S7). The average FBST pantry has 4 SNAP-authorized supermarkets or superstores, 1 SNAP grocery store, and approximately 13 SNAP convenience stores within its local service areas (1-mile radius for urban pantries and 10-mile radius for rural pantries). (See SI Figure S2 for county-specific maps displaying the private and public food assistance network during the study period.)

While SNAP-authorized retailers generally follow similar operating schedules and remain open 70 or more hours each week, FBST pantries exhibit substantial variation in service hours. More than 64% of pantries have average monthly service hours of no more than one hour, while only about 10% are open for more than 16 hours per month. This variation largely reflects differences between pantry types. Most MFPs operate for just one hour per month, while brick-and-mortar pantries typically remain open considerably longer.

Apart from regular, predictable variation in the hours they are open for service, irregular closures are also an issue. FBST pantry closures were significant during the COVID-19 lockdown period, from March-August 2020. Among FBST-affiliated urban pantries serving one hour or less per month, 92% closed for at least one month. All rural pantries experienced some closures during the study period. MFP closures were largely administrative decisions by FBST to protect its primarily volunteer and vulnerable staff. FBST closed smaller MFPs in favor of operating a handful of larger MFPs. FBST also pivoted from a walk-up model to drive throughs, which resulted in a safer operation and higher throughput rates. Despite having higher capacity per MFP, food assistance access challenges were still acute for rural communities whose closest MFP closed (SI Figure S3). Thus limited CFA use – which fell significantly during the April-

[*] Our data are restricted to FBST partner pantries that used FreshTrak during the study period. As shown in SI Table S4, FBST pantries using FreshTrak account for most of those that provide groceries to households in the region. The study area includes, however, food pantries that do not partner with the FBST, although FBST is the most well-resourced and widespread partner of food pantries in the region.

June 2020 lockdown period (Figure S1) – may reflect supply-side restrictions on availability that left some demand unmet.

The variety of foods available from pantries is considerably less than SNAP participants can access through retail outlets. And low-income US households express negative perceptions of the quality of the food provided by pantries relative to that available in retail outlets (Byrne et al. 2023). Both comparatively fewer open hours and lower product quality perceptions may dampen demand for CFA relative to SNAP.

Little joint use of SNAP and food pantries

Because the SNAP and FBST administrative data include information on when households access food assistance, we can trace the use of each over time. More than three-quarters (77.4%) of food assistance recipients are first observed receiving SNAP (Figure 2), even though SNAP participation necessarily comes with a lag involving an application, screening for eligibility, and issuance of an EBT card, while most food pantries in the study region serve anyone who appears at the site and requests food. The vast majority of SNAP participant households (86.4%) do not subsequently make use of food pantries. Among households who are first observed using food pantries, 94% never received SNAP subsequently. (Note that the data do not distinguish between households eligible or not eligible for SNAP.) Nearly eight times as many households (9,041 vs. 1,156) enrolled in SNAP and then used a food pantry versus initially visited a pantry and then began SNAP participation. Of the 12% of recipients who use both private and public food assistance, 83% use both simultaneously (i.e., within the same month), supplementing SNAP benefits with groceries from food pantries. Few switch out of their initial food assistance source. These results are robust to the exclusion of individuals under the age of 25, many of whom are college students likely ineligible for SNAP, and when we exclude the COVID lockdown period, April – June 2020 (Figure S4).

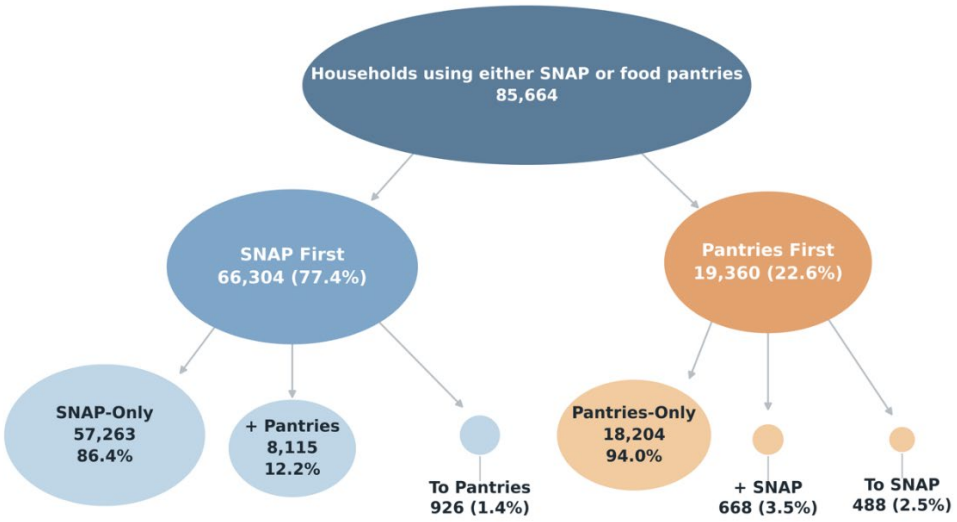


Figure 2: Of the 85,664 households in the six-county FBST service region that received any form of food assistance, 77% first used SNAP, of which just 14% subsequently also received food from a pantry. Among the 23% of food assistance recipients who first went to a food pantry, only 6% subsequently participated in SNAP.

Understanding limited overlap between SNAP and food pantry usage

The limited overlap between SNAP and food pantry use arises partly from differences in frequency of use. Over the 42 months for which we have reasonably complete data on food pantry use, 34.5% of food pantry clients only visit a pantry once and another 33.5% use pantries only 2-5 times (SI Table S8). Although few FBST pantries limit how many times per month a client can receive groceries, and the density of pantries enables clients to visit multiple pantries, only a modest share (17%) of clients visited FreshTrak-enrolled pantries at least a dozen times over the study period. Only 29.5% of FBST clients visited multiple pantries over the four years. Clients who were also SNAP participants were slightly more likely (34.5% vs. 26.7% of pantry-only clients) to do so. Among all pantry users, 15.9% visited more than one pantry within the same month, representing just over half (53.8%) of those who used multiple pantries. Individuals aged under 25 years were most likely (56.4%) to use a pantry once and individuals 60 and older were most likely (47.6%) to use pantries six times or more. Households without children more commonly made multiple visits to food pantries than did households with children. The limited extent and duration of food pantry use contrasts sharply with SNAP, for which the median benefit spell length is 8 months in the April 2017-December 2021 period. Allowing exits and reentries into the program (34.3% of participants had multiple SNAP spells during our study period), the median total time participant households spent on SNAP, across all their spells, was 21 months with an average of 192 benefit redemption transactions at participating retailers. Because SNAP enrollment certification lasts at least six months for all participants in New York State, benefits transfer automatically each month for at least that duration before a household must recertify. Food pantry access is effectively automatic and unlimited, however.

We adduce that the stark differences in use patterns reflect different functions of food pantries and of SNAP, serving largely distinct clienteles with varied need profiles. Specifically, food assistance recipients use food pantries mainly to respond occasionally to transitory needs whereas they use SNAP to address chronic or persistent food insecurity. Four pieces of evidence support this inference.

First, food pantry use exhibits seasonality, peaking in October and November and reaching lows in January and February, when winter weather in the region is typically worst (blue bars in SI Figure S5). In the six counties served by the FBST, this peak coincides with the end of summer seasonal work and increases in utility bills as the weather turns colder. Holiday food drives and special Thanksgiving distributions often expand pantries' offerings then, drawing added client visits. By contrast, SNAP use is steady across months, with over 97% of monthly benefits redeemed by the end of each month (USDA Food and Nutrition Service, 2012) but varies sharply within months, with most redemptions occurring by the 11th day of the month, with the modal disbursement on the 1st day (Figure 3). Food pantry use, by contrast, peaks in the middle of the month. That is when monthly or semi-monthly payments – e.g., Social Security, Supplemental Security Income, many pensions, some work paychecks – often begin to run out, as do SNAP benefits issued at the start of the month run out (for joint CFA-SNAP users). It is curious, however, that although virtually all SNAP participants routinely exhaust their benefits before the end of the month, most do not access food pantries that apply few if any eligibility restrictions.

Second, college-age clients – adults under 25 years of age – stand out as a group with limited SNAP access but significant pantry use. College students enrolled more than half-time are ineligible for SNAP unless they meet a specific exemption (USDA FNS, 2023). Students therefore naturally turn to on-campus and nearby pantries for short-term relief, if and when needed. More than half (58%) of pantry clients under age 25 visited a college-based site, and these sites account for 40% of all pantry visits by

clients under 25, suggesting that students comprise a large share of the young adults who receive food assistance. Many also visited other, off-campus pantries near a college or university. Young adult clients' pantry use is typically limited in duration; 56% of clients under 25 years of age make only a single pantry visit, and fewer than 9% made more than five visits over four years (SI Table S8). Food pantry use among individuals under age 25 exhibits more pronounced seasonality than overall pantry use (SI Figure S5). Use climbs over the course of the spring semester, beginning in February and peaking in April, before declining in May to annual lows in June and July. That pattern is consistent with students depleting savings and family support as the term progresses then leaving campus and taking on more paid work during the summer. Reduced campus-based pantry hours or closures during academic breaks reinforce these seasonal lows. Pantry use by young adults rises again in August as students return to campus and through early fall, with a steep increase in October likely reflecting heightened financial strain as students exhaust summer earnings. These patterns suggest that pantries primarily address temporary needs, including for subpopulations ineligible for SNAP.

Third, our data include the COVID-19 lockdown period. Food pantry traffic surged more than 120% month-on-month in March 2020 (Figure 4, blue line), consistent with spikes in food pantry use observed in other parts of the United States (Zack et al, 2021; Byrne and Just, 2022b). A more than 40% month-on-month increase in new food pantry clients in April 2020 had no corresponding spike in entry into SNAP (SI Figure S6). The spike in food pantry use coincided with a sharp increase in unemployment in the six counties served by the FBST, rising from 3.4% (Tompkins) - 6.4% (Schuyler) in February 2020 to between 11.4% (Tompkins) and 19.3% (Schuyler) in April 2020 (New York State Department of Labor, 2025), as well as temporary disruptions to school meals programs (Toossi, 2021). Many of those new users were one-time-only clients; more than 30% of clients in March and April 2020 did not return to a food pantry in the 12 months that followed (Figure S6). The subsequent reduction in pantry traffic coincided with the decline in unemployment, falling back to between 5.6% (Tompkins) and 7.5% (Broome) by August 2020 , and the first receipt of Federal Economic Impact Payments, and the introduction of Pandemic EBT school meals and Pandemic Unemployment Assistance benefits. By contrast, among those already on SNAP, the month-on-month increase in food pantry visits was single digits in percentage point terms, maxing out just under 10% in April 2020 (Figure 4, red line). SNAP benefits seem to have obviated participant households rushing to food pantries the way their non-SNAP participant neighbors did when faced with employment disruptions. Food pantries served as a shock absorber for households suddenly needing food assistance who were not on SNAP already, many of whom may not have been eligible for SNAP. Meanwhile, SNAP participation proved a reasonably effective buffer against adding to the surging demands on food pantries during the COVID lockdown shock.

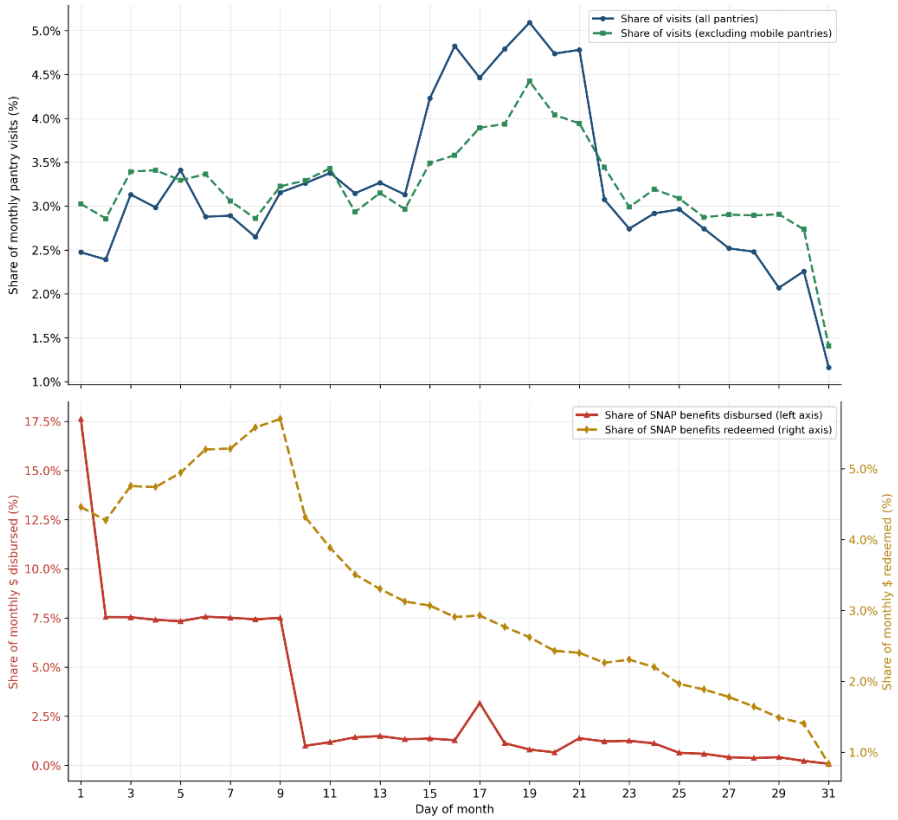


Figure 3. Within-month patterns in SNAP and food pantry use. Upper panel depicts share of visits to pantries by day of month (solid blue line is all pantries; dashed green line is fixed site (non-MFP) pantries). Bottom panel shows the distribution of SNAP benefit disbursements to participants (solid red line, left axis) and store redemptions (dashed yellow line, right axis) within month. The red line plots the share of monthly SNAP benefit dollars disbursed on each day. The gold line plots the share of monthly SNAP benefit dollars redeemed by day of month, which rises through the first third of the month before declining steadily as recipients' balances are exhausted. The x-axis indicates the day of the month. The spike in SNAP disbursement on day 17 reflects the early issuance of February 2019 SNAP benefits, on January 17, 2019, in response to the partial federal government shutdown.

Fourth, food pantry placement varies with economic conditions. When we study pantry-level variation across space and time, a census tract's unemployment rate is significantly, positively associated with the estimated probability that a food pantry is present within the tract (SI Table S5). This pattern holds for both MFPs and brick-and-mortar food pantries, which are often located in community-accessible public service buildings, such as local churches or fire stations. Food pantries are most likely to be situated in economically disadvantaged areas where needs are greatest. By contrast, a census tract's unemployment rate has no statistically significant correlation with the availability of SNAP retailers (SI Table S3). This reflects the fact that SNAP retailers exist in most communities, though the quantity and composition of them vary across communities (SI Table S3).

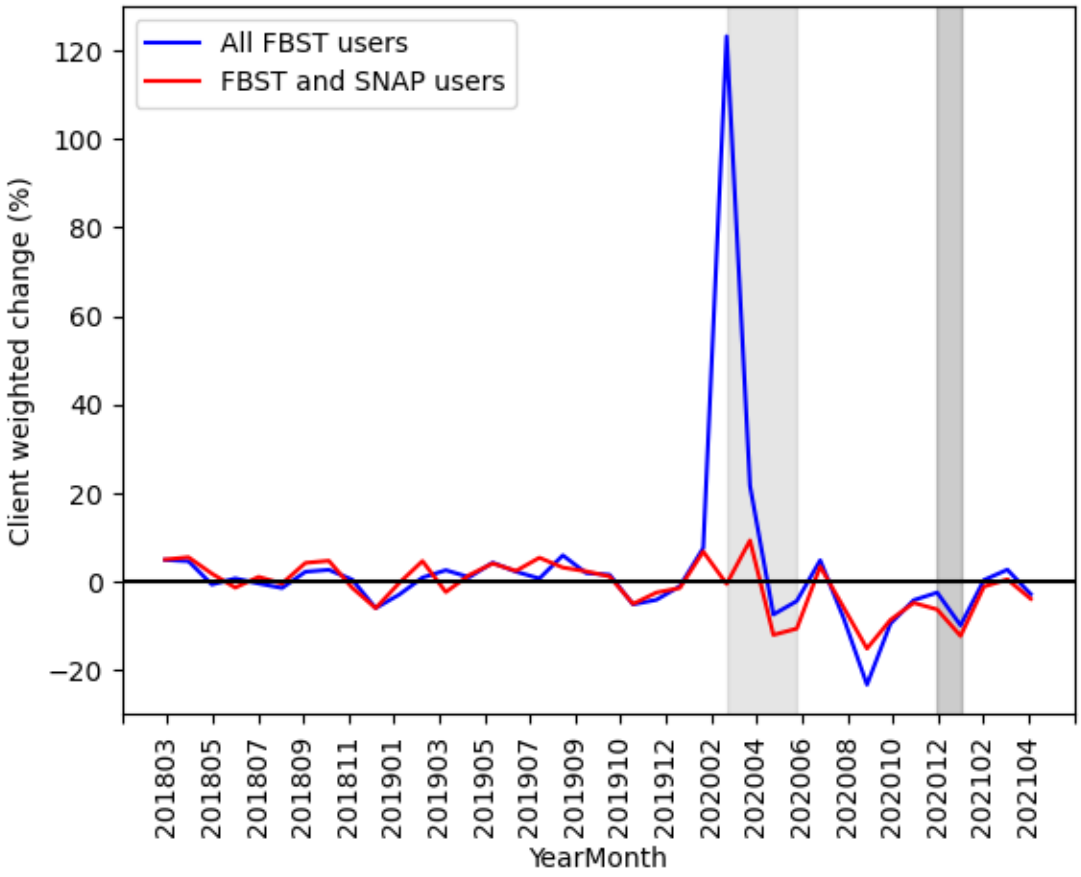


Figure 4. Month-on-month client-weighted change in food pantry use. Blue line depicts all FBST clients; red line shows the subset who were also SNAP participants as of March 1, 2020. The grey-shaded regions represent periods when expanded SNAP benefits were disbursed: March-June 2020 and December 2020-January 2021.

SNAP policy changes and pantry use

Although food pantries and SNAP seem to serve distinct functions and somewhat different clientele, changes in SNAP policies may impact pantry use, through at least two mechanisms.

First, client traffic in food pantries varies inversely with proximity to SNAP-authorized supermarkets (SI Table S9). On average, the entry of one more SNAP-authorized supermarket in the vicinity of a food pantry is associated with an almost 9.5 percent decrease in monthly food pantry visits. This relationship arises purely with brick-and-mortar, non-MFP pantries (SI Table S10). Since the density of SNAP-authorized retailers is lower in more sparsely populated rural communities, FBST's MFPs clearly fill a void. Indeed, roughly two-thirds (65%) of those food assistance recipients who use only food pantries are rural residents. Our results thus complement those of Ruffini et al. (2025) who find that food bank use falls more in counties with relatively low rates of students qualified for free meals, with no significant reduction in food bank use in high-poverty areas.

Second, changes in SNAP benefits are associated with changes in pantry use, for three reasons. First, SNAP benefits adjust as a household's composition or income changes – e.g., due to a change in employment or marital status – that households are obliged to report to the state authority (the Office of Temporary and Disability Assistance (OTDA) for New York residents). The resulting, endogenous changes to SNAP benefits generate a positive correlation with food pantry visits in so far as both benefits and visits respond inversely to household income. For example, as a household's earnings rise, its SNAP benefits decline as does its likelihood of visiting a food pantry. This is a largely-mechanical relationship dictated by SNAP eligibility and benefits rules and their association with food assistance-seeking behaviors.

The other two sources of variation in SNAP benefit levels observed in our data are, by contrast, plausibly exogenous to factors that might also impact pantry use. SNAP benefit levels adjust each October at the start of the new federal fiscal year to reflect an annual cost-of-living adjustment (COLA). Those adjustments are known in advance, so households might adjust food pantry use patterns in anticipation of upcoming COLA adjustments to SNAP benefits.

In addition, multiple temporary SNAP benefit expansions were introduced in response to the COVID pandemic. In March 2020, the Families First Coronavirus Response Act (FFCRA) raised each SNAP participant household's benefit to the maximum allotment for its size through emergency allotments. Following the Consolidated Appropriations Act of 2020, from January to September 2021, the maximum allotment itself was temporarily increased to 115 percent of the Fiscal Year 2021 level (after the October COLA). In April 2021, this emergency allotment policy was modified so that each household received either (i) a $95 monthly increase or (ii) an increase to the maximum allotment — whichever was larger — ensuring that households already at the maximum still received additional benefits.

Typically, it is difficult to disentangle the impact of SNAP benefits on food pantry use because food assistance recipients choose which source(s) to tap based on a host of unobserved factors – e.g., earnings, access to transportation – that likely affect both SNAP benefits and food pantry use simultaneously. But the 2020-21 nationwide policy changes provided plausibly exogenous increases in SNAP benefits for pre-existing SNAP participants, creating a natural experiment of sorts. We can effectively isolate that portion of participant-level SNAP benefits variation that occurred due to policy changes alone, that participants likely did not anticipate, and test its (potentially causal) association with food pantry use patterns.

We find a robust negative association between month-to-month changes in per-capita SNAP benefits and changes in pantry visits for households actively enrolled SNAP (SI Table S11, columns 1-2 and 4-5). In other words, when SNAP benefits rise, pantry use falls on average. When restricting to SNAP households that ever used a pantry – a minority of SNAP participants – the estimated coefficients grow five-fold in magnitude, indicating stronger substitution effects among active pantry users, although there is some loss of precision because the sample size shrinks by 92% (from 2.83 million to 0.23 million household-months), meaning the number of policy-period observations falls sharply. Leveraging the exogenous policy-driven component of the 2020–21 benefit increases, we also find heterogeneous responses to the exogenous increase in SNAP benefits by household characteristics (SI Table S12). In particular, households with children show the largest and statistically significant reductions in pantry use when SNAP benefits increase.

Discussion

Although food pantries are quicker and easier to access initially than SNAP, in our sample food pantries rarely provide an entry point to SNAP, even though New York State distributes food commodities made available through the Emergency Food Assistance Program (TEFAP) to food banks and pantries partly in proportion to SNAP enrollments, creating an incentive for food banks and pantries to enroll their clients in SNAP, if eligible. The private and public food assistance systems serve two relatively distinct subpopulations with limited overlap between them.

The food pantry network effectively serves the rural, older population, while also providing transitory support for young people, including through college campus pantries. Food pantry use is predominantly transitory. Some clients may seek food assistance between a job loss and their first paycheck after re-employment. Food pantries also serve populations who might not qualify for means-tested public assistance programs – including many college students – those who choose not to participate in public food assistance – often rural households with older heads – or who have unmet food needs even after accounting for public food assistance. In these six counties, the limited overlapping use of both SNAP and CFA suggests that FBST serves primarily the first two groups.

The food pantry system absorbed a massive spike in new client visits during the COVID-19 lockdown period. Pantry use had not settled back to pre-COVID levels by the end of our study period. Subsequently, emergency SNAP allotments ended in February 2023, leading to widespread anecdotal reports of significant rises in food pantry use.

SNAP is far larger than the food pantry network, serving roughly 2.4 times as many households and providing far more frequent service over a longer participation period. SNAP participants quickly exhaust their benefits, typically spending out most of their monthly allotment within the first ten days (Figure 3), even during the period of higher, emergency SNAP benefits. SNAP disproportionately serves single mothers with children, while childless households are especially unlikely to rely on SNAP. At only modest risk of oversimplification, SNAP seems to provide the main food assistance support for most of the chronically food insecure who receive food assistance, a population that represents the bulk of the food insecure at any moment in time in the United States (Lee et al., 2024).

Beyond its direct support to the chronically food insecure and despite limited overlap in SNAP and food pantry use, SNAP also buffers the food pantry system. SNAP participants did not appreciably seek increased food pantry support during COVID-19 lockdowns, leaving the pantries free to absorb an unprecedented surge in new client demand as unemployment rose sharply. SNAP's buffering effect on food pantry use appears as well in the impacts of expanded SNAP benefits on food pantry traffic. When policy changes increased SNAP benefits independent of changes in individual participants' own circumstances, SNAP beneficiaries reduced their food pantry use by a statistically significant, meaningful magnitude. That was especially true of families with children. Providing a stable, sufficient source of food assistance for low-income families with children and reducing the corresponding burdens shouldered by the CFA sector seems an underappreciated role of SNAP in the US, one not well documented previously.

Food assistance in the US, specifically exposure to SNAP, has been shown to generate significant gains in human capital, economic self-sufficiency, and life expectancy (Bailey et al., 2024). There would be great value in establishing whether private food assistance generates similar effects and whether private and public food assistance reinforce one another among the relatively modest subpopulation who taps both safety nets.

Materials and Methods

Data

We use administrative data on food pantry use from FBST and on SNAP use from OTDA. These administrative data do not suffer bias from self-reporting. Even carefully run surveys generate considerable measurement error in self-reporting of program participation. For example, Meyer et al. (2022) find that 23 percent of true SNAP recipient households do not report receipt in the Survey of Income and Program Participation (SIPP), 35 percent in the American Community Survey (ACS), and fully 50 percent in the Current Population Survey (CPS). Gregory and O'Connor (2026) report that 47 percent of CPS respondents fail to report SNAP participation while 2 percent report SNAP participation unmatched by SNAP disbursement records. A substantial number of true non-recipients are also recorded as recipients, especially in the SIPP. These Census Bureau data products are well-designed and widely used, thus the considerable (non-classical, i.e., non-random) measurement error in food assistance program participation serves as a caution against relying heavily on survey data. The administrative data set we built obviates these problems considerably.

FBST Administrative Data

A data use agreement (DUA) with FBST provided access to its FreshTrak administrative service records. The FreshTrak data collection system was gradually rolled out through the FBST pantry network to provide systematic, online entry of client and service information. Food pantry clients are registered through the FreshTrak system by trained volunteers, either over the phone prior to service delivery or in person at the time of service. In principle, all clients at a FreshTrak participating food pantry are registered in order to receive services and once a client is registered, visits to any FBST pantry using the FreshTrak system should be recorded and linked to their account. In practice, due to inconsistencies in entry, variation in volunteer knowledge and understanding, typos, and other human errors, repeat clients can be reregistered without linking them to their previous account. This leads to individual records being split across multiple, unlinked accounts, resulting in an incomplete picture of a client's pantry usage. We therefore deduplicated records using a probabilistic (Jaro-Winkler) matching algorithm (Jaro, 1989). There may also be a modest number of unrecorded clients served by these pantries.

For each client's service record, we observe a client's self-reported personal information including name, address, gender, and date of birth when they first registered. We also observe information on each participating service-providing pantry including pantry ID, name, location, geographic coordinates, and service date. We can link a client's records across pantries to create an individual-level profile of each client in the FreshTrak system. For each participating pantry, we see all clients it served while in the FreshTrak system. We probabilistically match clients' records based on name, address, birthdates, etc. to generate a client-specific record of each visit they made to any of the 128 participating pantries. We then consolidate individual client records at the household level, based on shared addresses. Cumulatively, we have 246,395 unique service records from April 2017 through June 2021, covering 35,623 distinct pantry clients (i.e., households) after de-duplication. These data offer an uncommon opportunity to study food pantry usage patterns across a full spatial network of pantries, covering a broad geography spanning both rural and urban areas. The data indicated each time a client visited any FreshTrak-participating pantry in the six-county region. For any period, when we observe a pantry, we see its complete client load.

Because not all food pantries participate in FBST's FreshTrak data platform, however, these data offer a necessarily incomplete profile of the full FBST client population. The share of food pantries using

FreshTrak in each county ranged between 26% and 73% in June 2022 per FBST (2022). There is also some possibility that SNAP participants resident in the FBST service area accessed food pantries outside of those six counties, which we cannot observe. FBST runs a network of mobile food pantries that service communities from a temporary location, delivering food on a truck and distributing it in a parking lot using volunteers. All mobile food pantries are in FreshTrak. The missing pantries are all fixed site, brick-and-mortar locations. FBST also collects basic location information for the 61 pantries operational but not using FreshTrak during our study period. The core patterns described in the paper hold if we drop earlier periods or the county with the lowest FreshTrak coverage.

NYS OTDA Data

New York State (NYS) OTDA supervises and administers programs, including SNAP, that offer support to families in need. Eligible families receive monthly benefit distributions that can be redeemed at authorized retailers. Eligibility is determined by several factors, including family size, gross income, and household makeup. The amount of benefits each family receives is set by the USDA and based on the Thrifty Food Plan, an annual determination of the minimum amount a family of a given composition needs to sustain a nutritionally balanced diet. SNAP benefits are usually distributed at the beginning of the month through an electronic benefit transfer (EBT) card, similar to a debit card. Participants can redeem benefits to buy food and eligible items at authorized retail stores.

For much of the period covered by this study, SNAP eligibility was a function of household gross income, with adjustments for household size, whether income was earned or not earned, the presence of an individual aged 60 or older, whether there was a disabled household member or a household with dependent care expenses. Able bodied adults without dependents must meet a work requirement. Under certain conditions, college students in school at least half time can also be eligible for SNAP. Initial applications can be made online, by mail or in-person. Once material is submitted, OTDA staff review the application, interview the applicant, and then make a determination regarding eligibility. Most recipients need to re-certify every 12 months; re-certification requires submission of documentation and an interview (see https://otda.ny.gov/programs/snap/). However, if household circumstances change – for example as a result of an increase in earned income, the participant must report the change shortly after the end of the month in which it occurs. During the Covid-19 pandemic, in-person interviews were suspended as were the work requirements and the need to report immediately changes in household income. These changes reduced the costs of SNAP participation by eligible households and may have encouraged greater enrollment.

Under a DUA with NYS OTDA, we access SNAP administrative case data for the six-county region from April 2017 through December 2021. The data cover 97,132 individual SNAP participants across 76,581 households and include each recipient's personal information – name, date of birth, gender, educational attainment, marital status, citizenship, reported income, household composition – all (688,402) valid addresses during benefit periods, along with the day and amount of each monthly benefit distribution and SNAP redemption transaction. We consolidate individual case records to the household level. We estimate household spell lengths on SNAP using the Kaplan-Meier median using the method of O'Connor et al. (2026), following prior practices established by Bane and Ellwood (1986) and Gottschalk and Moffitt (1994).

We then use a two-layer probabilistic matching algorithm the FBST and NYS OTDA SNAP administrative data sets at the household level. We use first name, last name, date of birth, address and zip code as

matching variables. There are a total of 35,623 FBST observations to search against 76,581 SNAP household units, which yields approximately 2.5 billion potential record pairs before ZIP-code blocking. To save on computational time we limit matching to observations within the same zip code. For each pair, numeric variables have to match exactly while similarity for string variables is calculated using the Jaro-Winkler metric (Winkler, 1990). In the first layer, we use two separate weighting schemes to minimize the chance of missed matches due to weight sensitivity. Any match with a score of 0.85 (i.e., 85 percent, where 1.00 is a perfect match) or greater in both weighting schemes is confirmed as a match; any match with a score less than 0.6 in both weighting schemes is considered a non-match. In the second layer, the remaining matches are reevaluated using higher weights on last name and address, the two variables more likely to be unique. If the resulting score is higher than 0.85 and the first name score is greater than 0.65 (considered the minimum score for common nickname matches), it is considered a match. Thresholds for matching were determined based on natural divisions upon inspection. This yielded 85,664 distinct food assistance recipient households: 57,263 receiving only SNAP, 18,204 that only visited food pantries, and 10,197 that used both food pantries and SNAP (Figure 1). We then update the OTDA and FBST datasets using a newly generated household ID to match records and remove personally identifiable information to generate de-identified data before statistical analysis.

Historical SNAP Retailer Locator

We establish the network of SNAP outlets using the USDA Food and Nutrition Service (FNS)' Historical SNAP Retailer Locator Data, which covers all US retailers authorized to participate in SNAP at any point since 1990. The basic unit of observation is an authorization record. Each record reports a unique store ID, the store name and type, address, geographic coordinates as well as the starting and ending authorization dates. Most retailers have one authorization record, but some retailers were authorized multiple times due to leaving the program and subsequently reentering. There are 646 authorization records in the six-county FBST service area whose authorization periods overlap with our study time frame. We obtain retailers' 2010 census tract code using the Census Geocoder API.

FNS classifies SNAP retailers into 17 types (USDA 2025). We reclassify these types into four categories. *Supermarkets* are primarily engaged in the retail sale of an extensive variety of groceries and other store merchandise. This store typically has ten or more checkout lanes with registers, bar code scanners, and conveyor belts. *Grocery stores* mainly stock food items and carry all four staple food categories. It includes small, medium, and large grocery stores. *Convenience stores* are self-service stores that are typically open long hours and provide limited grocery options. Corner stores and gas station marts are the main formats under this category. A large variety of products at convenience stores are not SNAP-eligible, such as hot coffee, alcohol, and tobacco products. Convenience stores typically provide fewer healthy food options than grocery stores. *Other stores* encompass all other retailer types not specified above, including combination stores primarily selling general merchandise (e.g., drug stores, dollar stores, and general stores), farmers' markets and specialty food stores like butcher shops or green grocers. They may provide health food items to households but are usually limited in hours of operation and food variety.

American Community Survey

The American Community Survey (ACS) is an annual survey that provides community information on a broad range of topics about social, economic, demographic, and housing characteristics of the US population. We accessed ACS five-year estimates on population size, unemployment rate, and senior population share for all census tracts within the six-county service areas in 2020 at the census tract

level. Five-year period estimates represent data collected over a period of five years with the advantage of increased statistical reliability for less populated areas and small subpopulations. These community features are used to examine the location choices of food assistance amenities and to control for local food assistance environments in econometric analysis.

Urban and Rural Classification

Urban areas defined by the Census Bureau do not follow the geographical boundaries of other statistical units such as ZIP or FIPS codes. But the most recent Census provides a crosswalk between urban areas and census blocks, allowing us to construct the share of urban blocks within a tract as a proxy for urbanization level (United States Census Bureau 2023). We map the 2020 urban and rural classification back to 2018, our baseline period, using the delineation of the 2010 Census. The boundaries of census tracts may change between consecutive decennial censuses, so we compare census tracts that appear in either the 2010 Census or the 2020 Census, but not both. The tracts that appear only in one round of census overlay well spatially (see SI Figure S7) and only differ in the last two digit suffix of census tract FIPS code. Therefore, we merge spatially overlapped census tracts across the two decennial years (2010 and 2020) to classify census blocks as urban or not.

Econometric methods

We use a two-way fixed effects specification and the ordinary least squares estimator to study the association between the presence of SNAP authorized retailers and food pantry traffic. We regress the monthly visit count of each pantry on the count of nearby SNAP retailers and a set of socioeconomic characteristics. The model is specified below as:

$$y_{ict} = \beta_0 + \sum_{j=1}^{4} \beta_j \cdot count_{ict}^{j} + X_{ct} + \theta_i + \gamma_t + \epsilon_{ict}$$

where y_{ict} is the logarithm transformation of monthly visit count of pantry *i* in census tract *c* during year-month *t* and $count_{ict}^{j}$ is the count of SNAP authorized retailers of type *j* for food pantries *i* in census tract *c* during year-month *t.* To account for the differences in accessibility to food assistance resources between urban and rural areas, we use 1-mile radius for urban pantries and 10-mile radius for rural pantries when counting nearby SNAP retailers. X_{ct} is a vector of socioeconomic features for census tract *c* in year-month *t.* We also include pantry fixed effect $\theta_i$and year-month fixed effect γ_t to help control for pantry-specific and year-month specific factors that may affect food pantry's traffic. $\epsilon_{ict}$is the error term. Standard errors are clustered at the city level.

To study how household food pantry use varies with SNAP benefit changes, we estimate a sequence of first-difference models. We begin with a baseline model,

$$\Delta FP_{it} = \alpha + \beta_1 \Delta SB_{i,t-1} + \mu_t + \varepsilon_{it}$$

whereΔFP_{it}denotes the change in food pantry visits for household i in month t relative to month $t-1$, and $\Delta SB_{i,t-1}$ is the per capita change in SNAP benefits from the previous month. The term $\mu_t$is a fixed effect that absorbs month-specific shocks common across households and food pantries, such as stimulus payments or eviction moratoria. A lagged specification ensures correct temporal ordering: changes in pantry use early in the month may precede SNAP adjustments that typically occur later, and

benefit increases have effects that persist into the following period. We then isolate policy-driven shocks by adding to the regression,

$$\Delta FP_{it} = \alpha' + \beta_1' \Delta SB_{i,t-1} + \beta_2' 1\big(SE_{i,t-1} = 1\big) \cdot \Delta SB_{i,t-1} + \mu_t' + \varepsilon_{it}'$$

where $1\big(SE_{i,t-1} = 1\big)$ is an indicator for SNAP benefit changes driven solely by SNAP policy change. This separates policy-driven adjustments from changes in household circumstances that could jointly affect SNAP benefits and pantry visits. In these regressions, we cluster standard errors at the household level. We then test for heterogeneous responses by interacting SNAP benefit changes with household characteristics,

$$\begin{aligned}\Delta FP_{it} = \alpha'' + \beta_1'' \Delta SB_{i,t-1} + \beta_2'' 1\big(SE_{i,t-1} = 1\big) \cdot \Delta SB_{i,t-1} + \beta_3 Urban_i \cdot \Delta SB_{i,t-1} + \\ \beta_4 Urban_i \cdot 1\big(SE_{i,t-1} = 1\big) \cdot \Delta SB_{i,t-1} + \beta_5 Child_i \cdot \Delta SB_{i,t-1} + \beta_6 Child_i \cdot 1\big(SE_{i,t-1} = 1\big) \cdot \\ \Delta SB_{i,t-1} + \quad \beta_7 Female_i \cdot \Delta SB_{i,t-1} + \beta_8 Female_i \cdot 1\big(SE_{i,t-1} = 1\big) \cdot \Delta SB_{i,t-1} + \mu_t'' + \varepsilon_{it}''\end{aligned}$$

Specifically, $Urban_i$ is a dummy equal to one for households located in urban ZIP codes, $Child_i$ equals one if children are present in the household, and $Female_i$ equals one if the household head is female.

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Supplementary Information for

Private and Public Food Assistance Use Dynamics in Upstate New York

Christopher B. Barrett[1,2,3,4], John Hoddinott[2,5,6], Zixia Huang[2], Kelsey Schreiber[2], Yuhe Zhang[2], and Jason Jianqiang Zhao[7]

[1]Corresponding author at cbb2@cornell.edu

[2] Charles H. Dyson School of Applied Economics and Management, Cornell University, Ithaca, NY 14853

[3] Jeb E. Brooks School of Public Policy, Cornell University, Ithaca, NY 14853

[4] Cornell Atkinson Center for Sustainability, Cornell University, Ithaca, NY 14853

[5] Division of Nutritional Sciences, Cornell University, Ithaca, NY 14853

[6] Department of Global Development, Cornell University, Ithaca, NY 14853

[7] Department of Global Value Chains and Trade, Lincoln University, Lincoln 7647, New Zealand

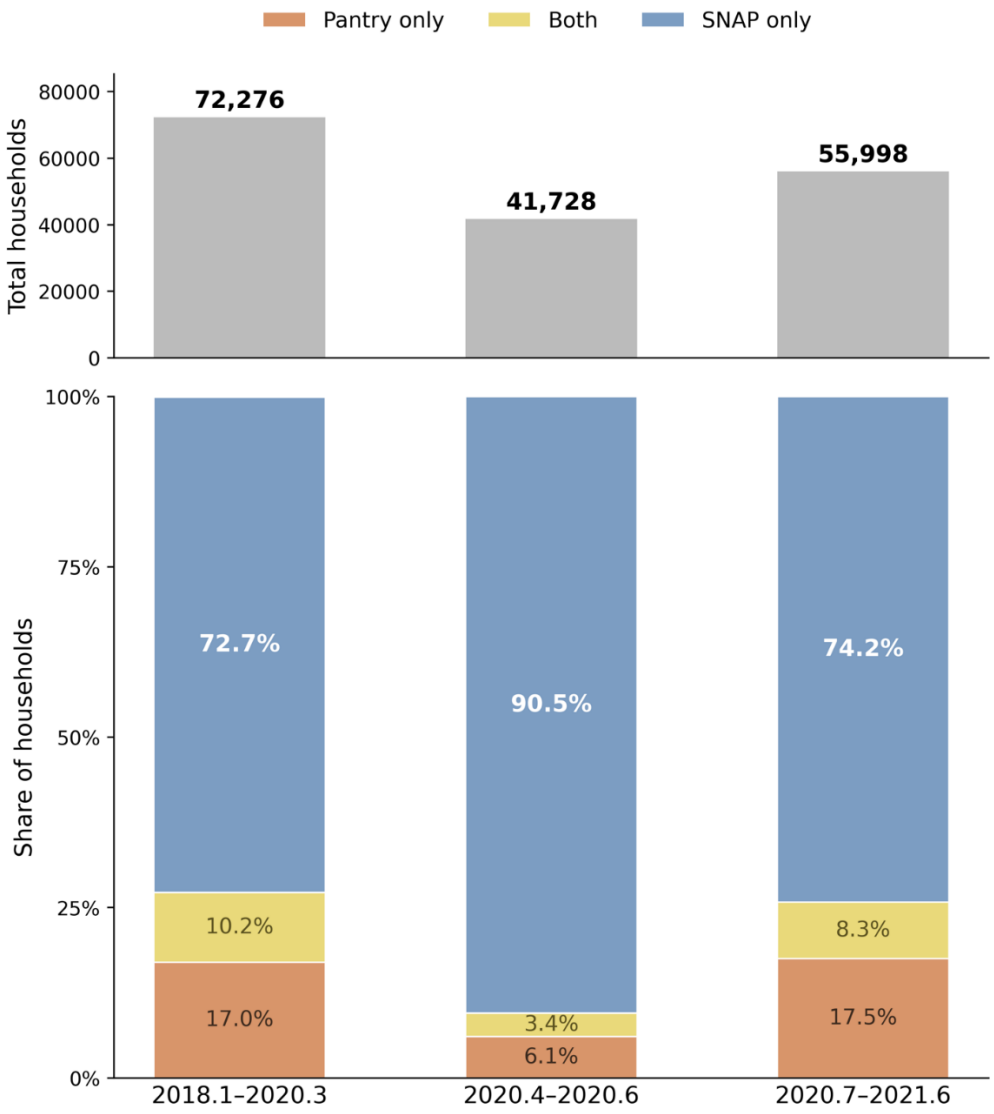


Figure S1: Food assistance users during the pre-COVID (left column), COVID lockdown (central column), and subsequent (right column) periods. Top panel shows the number of households using food assistance during that period. Bottom panel shows the distribution of those households between only using SNAP (blue), only using food pantries (red), and using both (yellow), with percentages for each displayed.

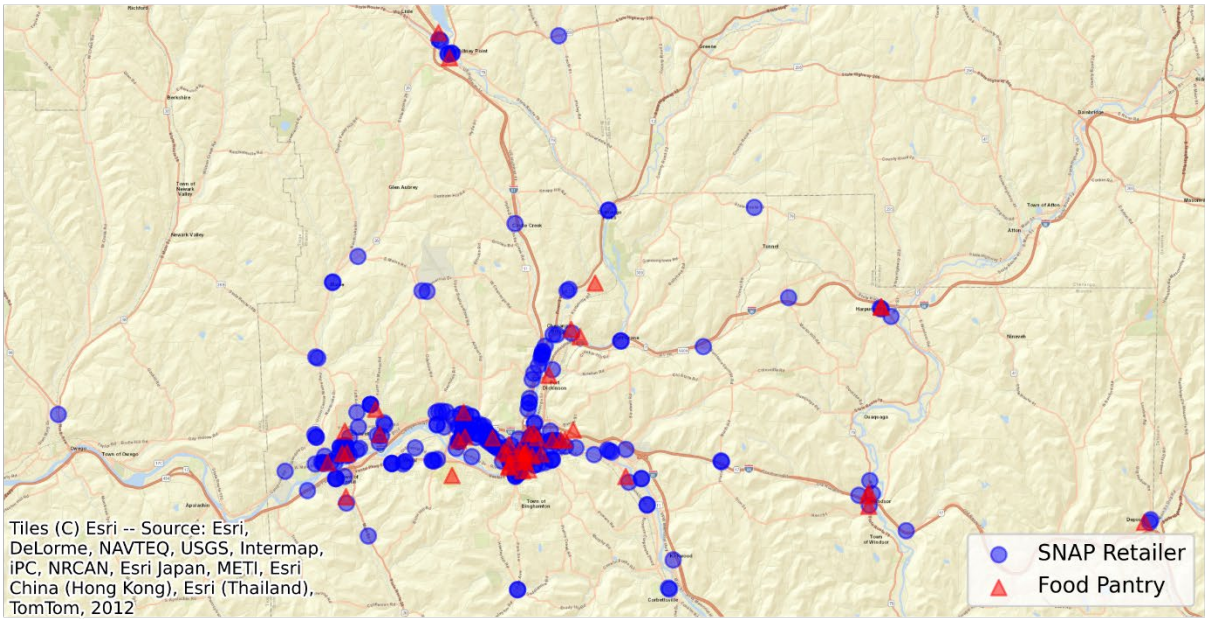


Figure S2a Food Assistance Program Outlets in Broome County. Blue dots are locations of SNAP retailers and red triangles are locations of food pantries. Basemap comes from World Street Map by Esri. CRS uses EPSG:4326.

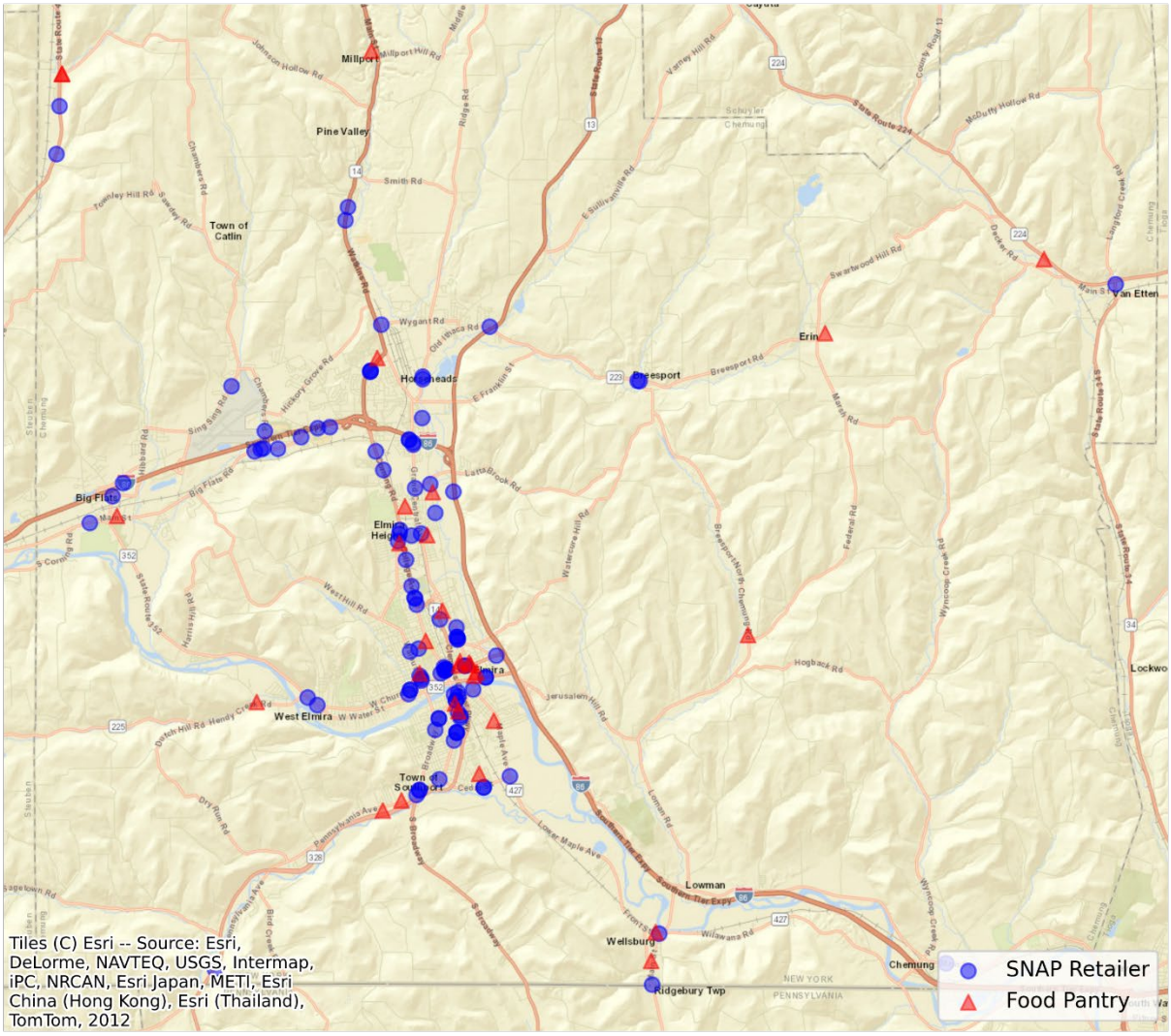


Figure S2b Food Assistance Program Outlets in Chemung County. Blue dots are locations of SNAP retailers and red triangles are locations of food pantries. Basemap comes from World Street Map by Esri. CRS uses EPSG:4326.

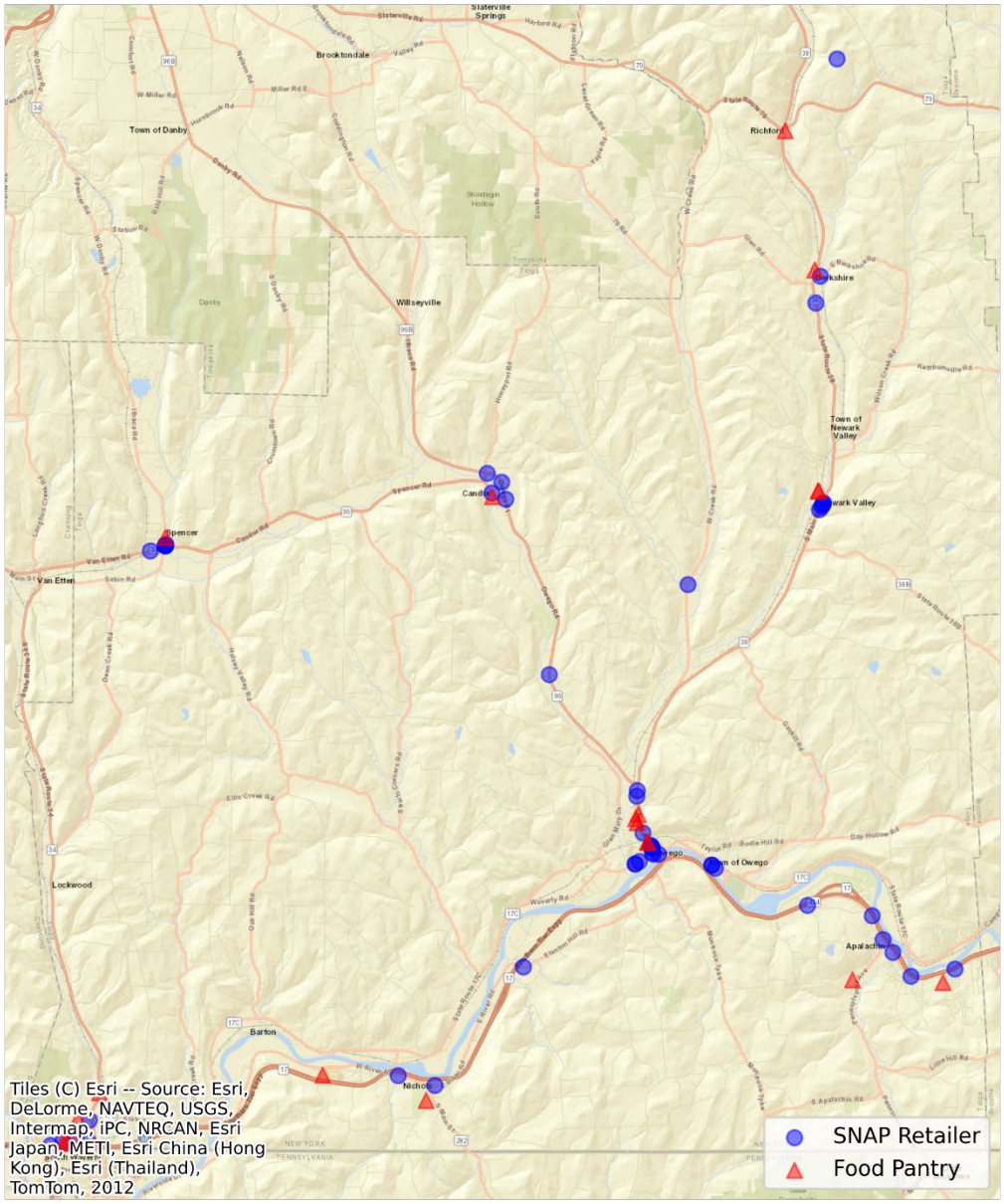


Figure S2c Food Assistance Program Outlets in Tioga County. Blue dots are locations of SNAP retailers and red triangles are locations of food pantries. Basemap comes from World Street Map by Esri. CRS uses EPSG:4326.

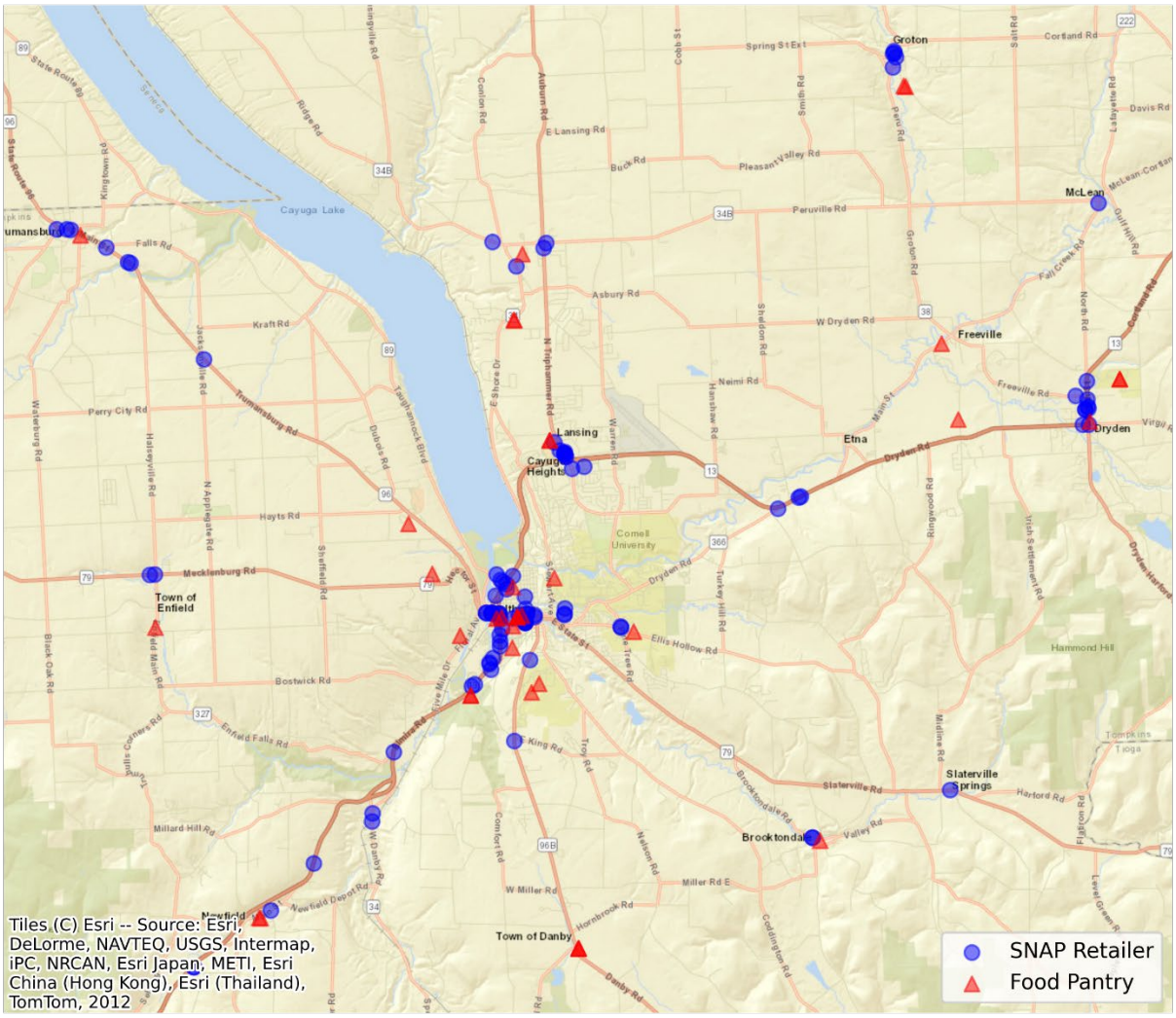


Figure S2d Food Assistance Program Outlets in Tompkins County. Blue dots are locations of SNAP retailers and red triangles are locations of food pantries. Basemap comes from World Street Map by Esri. CRS uses EPSG:4326.

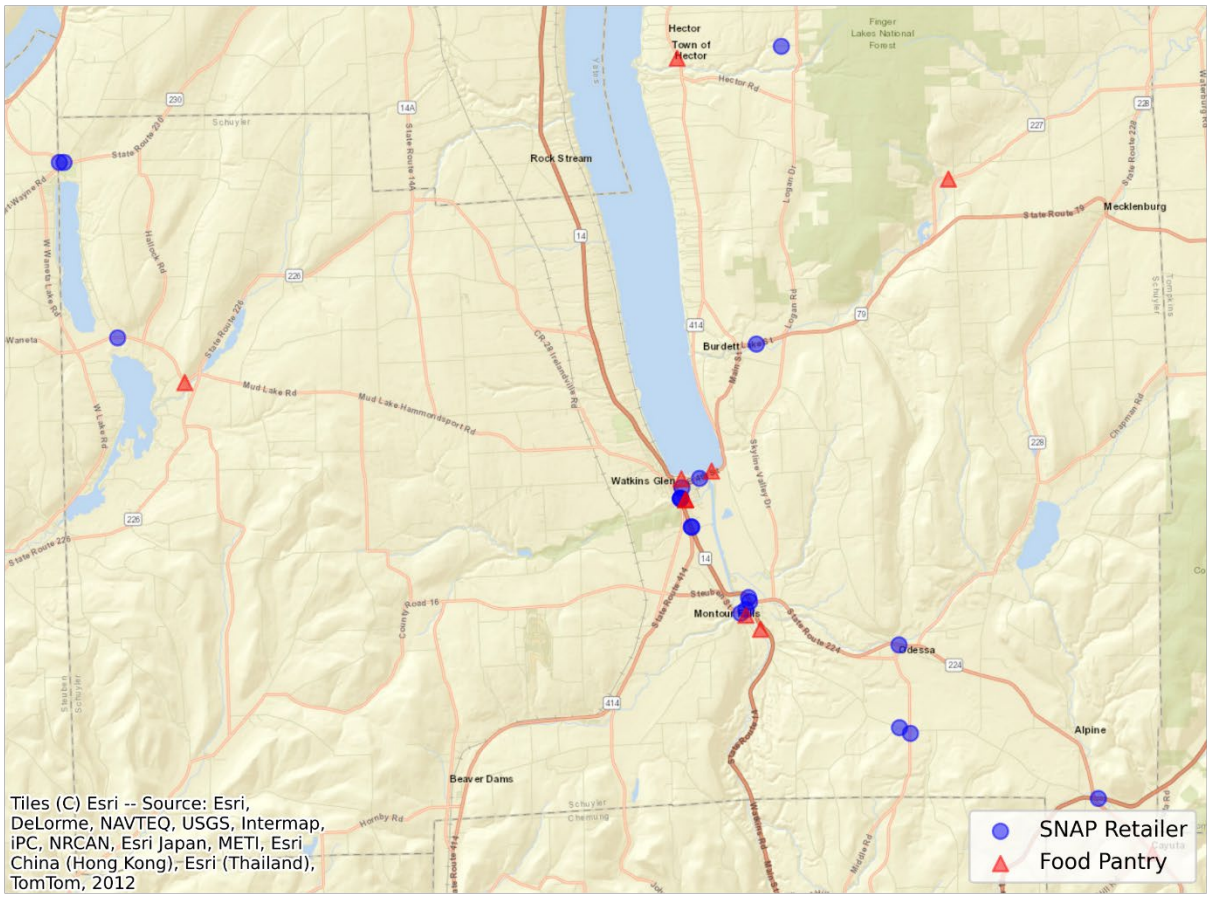


Figure S2e Food Assistance Program Outlets in Schuyler County. Blue dots are locations of SNAP retailers and red triangles are locations of food pantries. Basemap comes from World Street Map by Esri. CRS uses EPSG:4326.

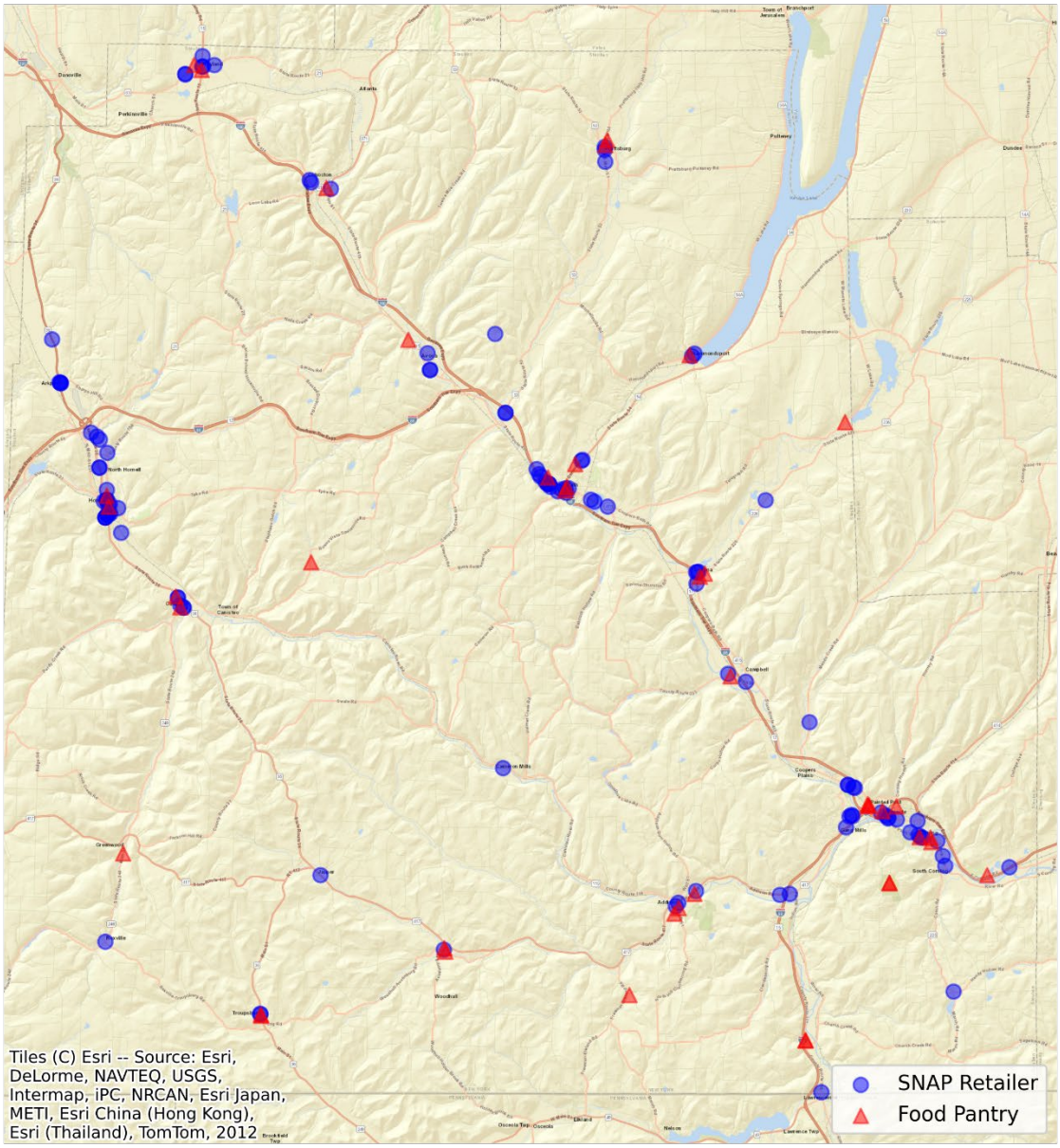


Figure S2f Food Assistance Program Outlets in Steuben County. Blue dots are locations of SNAP retailers and red triangles are locations of food pantries. Basemap comes from World Street Map by Esri. CRS uses EPSG:4326.

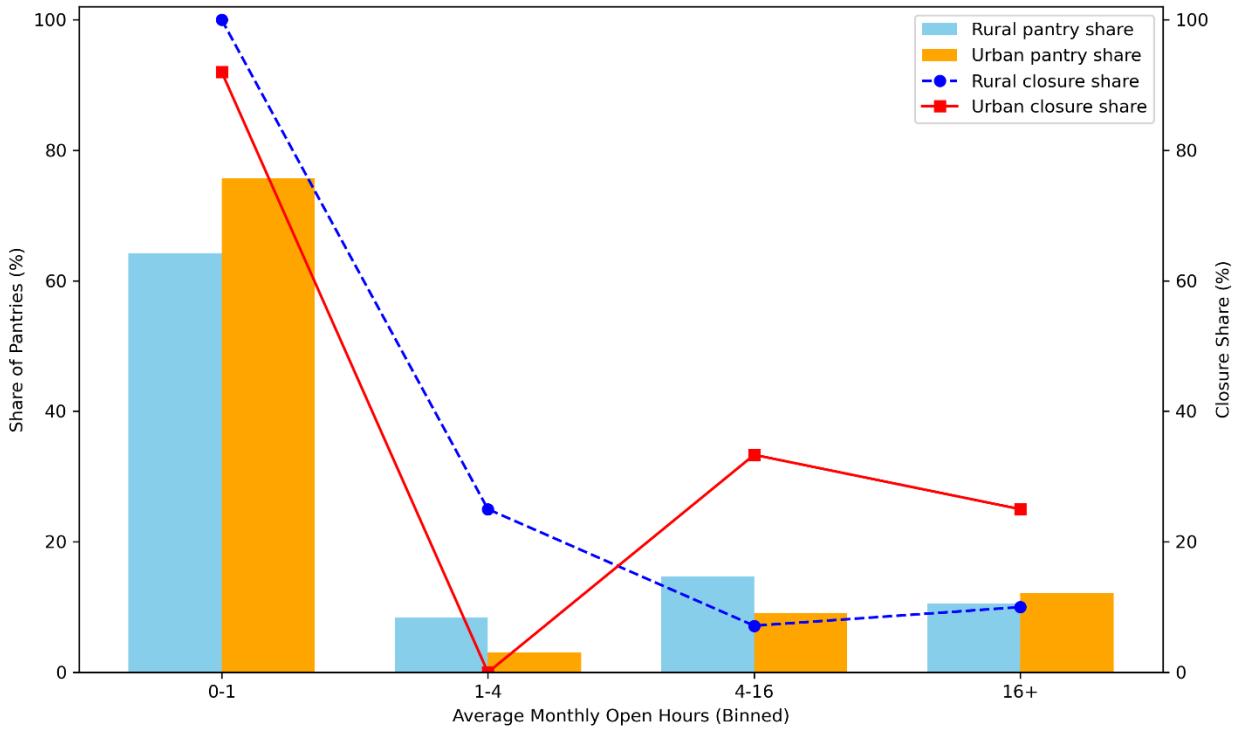
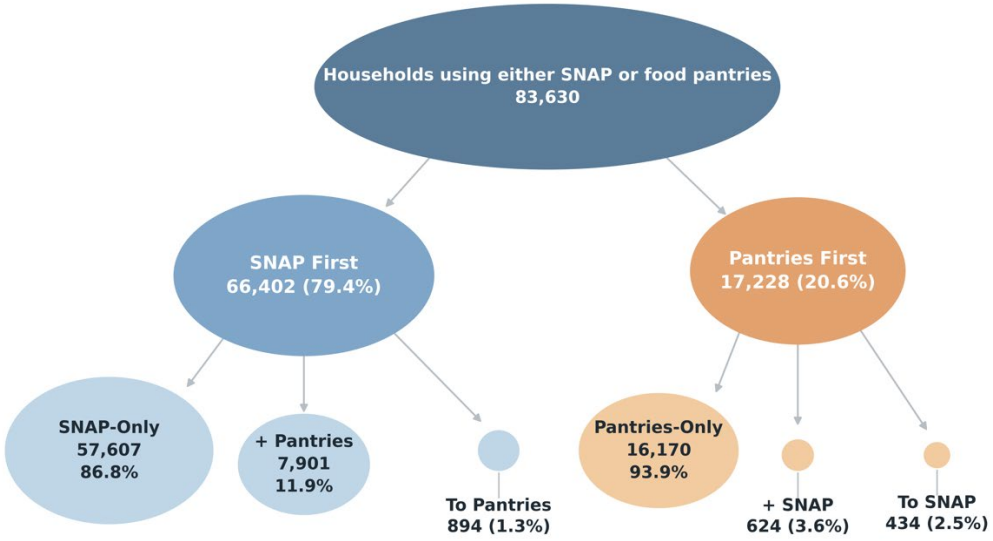


Figure S3. Percentage of Food Pantry Average Monthly Open Hours (solid rectangles, read against left vertical axis) and of Food Pantries That Closed at Least Temporarily (lines, red against right vertical axis) by Urban (orange rectangle and red line) and Rural (blue rectangle and line) Areas.



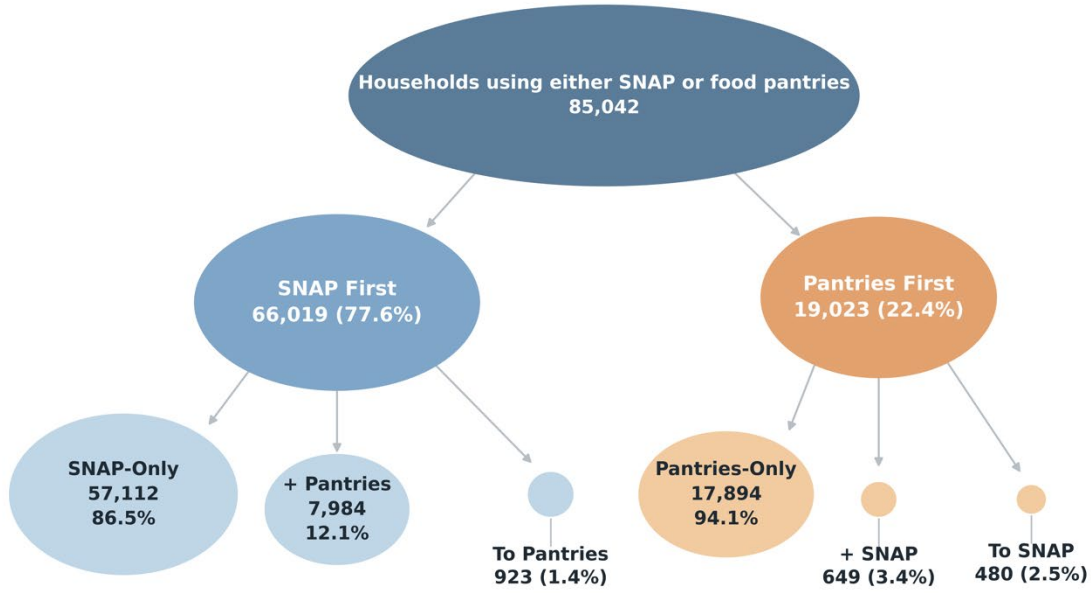


Figure S4. Transitions Between SNAP and Food Pantry Use: Restricted Sample. Transitions between pantry use and SNAP participation excluding individuals under age 25 so as to remove likely college pantry users, who are unlikely to be SNAP-eligible (upper panel) and excluding April–June 2020, the early pandemic months with the most complete lockdowns.

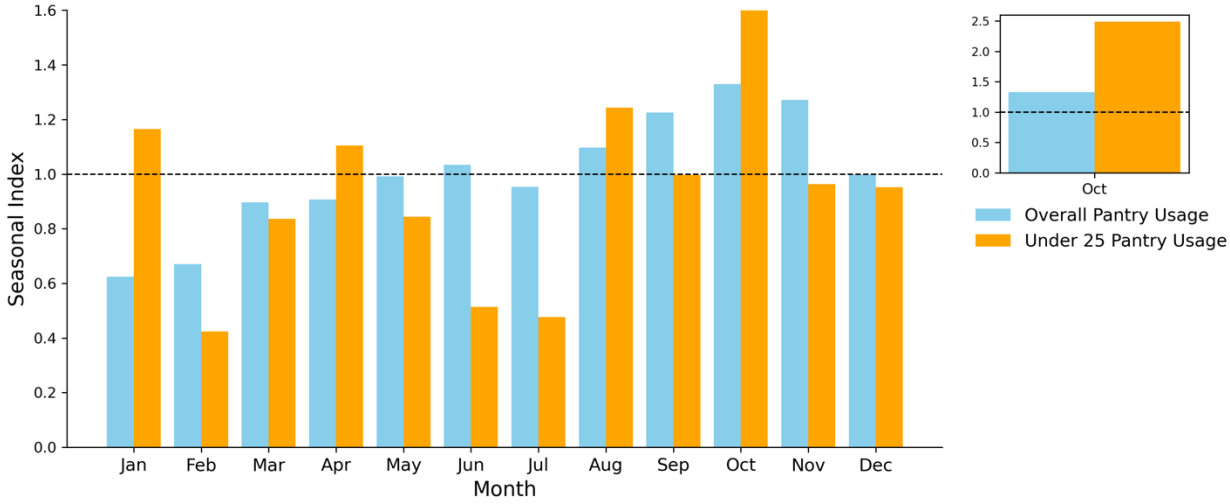


Figure S5: Seasonality of Overall Food Pantry Use and Pantry Visits by Clients Age <25 Years. Values above 1.0 indicate months with higher-than-average pantry use relative to the annual mean. The Seasonal Index normalizes pantry-level monthly usage and averages across active pantries (see Methods for details).

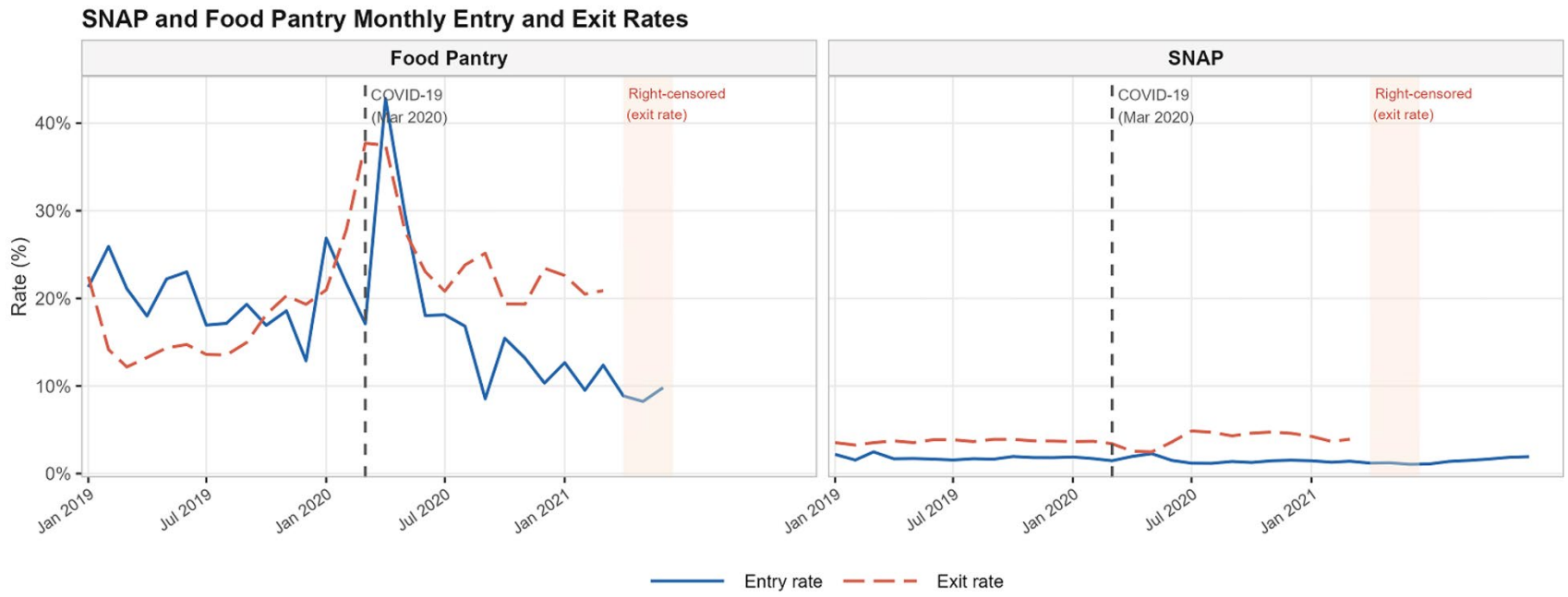


Figure S6. Month-on-month entry (blue solid line) and exit (red dashed line) rates for food pantries (left panel) and SNAP (right panel). Entry is defined as no use in the prior 12 months; exit is similarly defined as no use in the subsequent 12 months. The shaded region in the right tail of each panel reflects the right censoring of the exit rate. The entry rate plots similarly start in January 2019, 12 months into the data series.

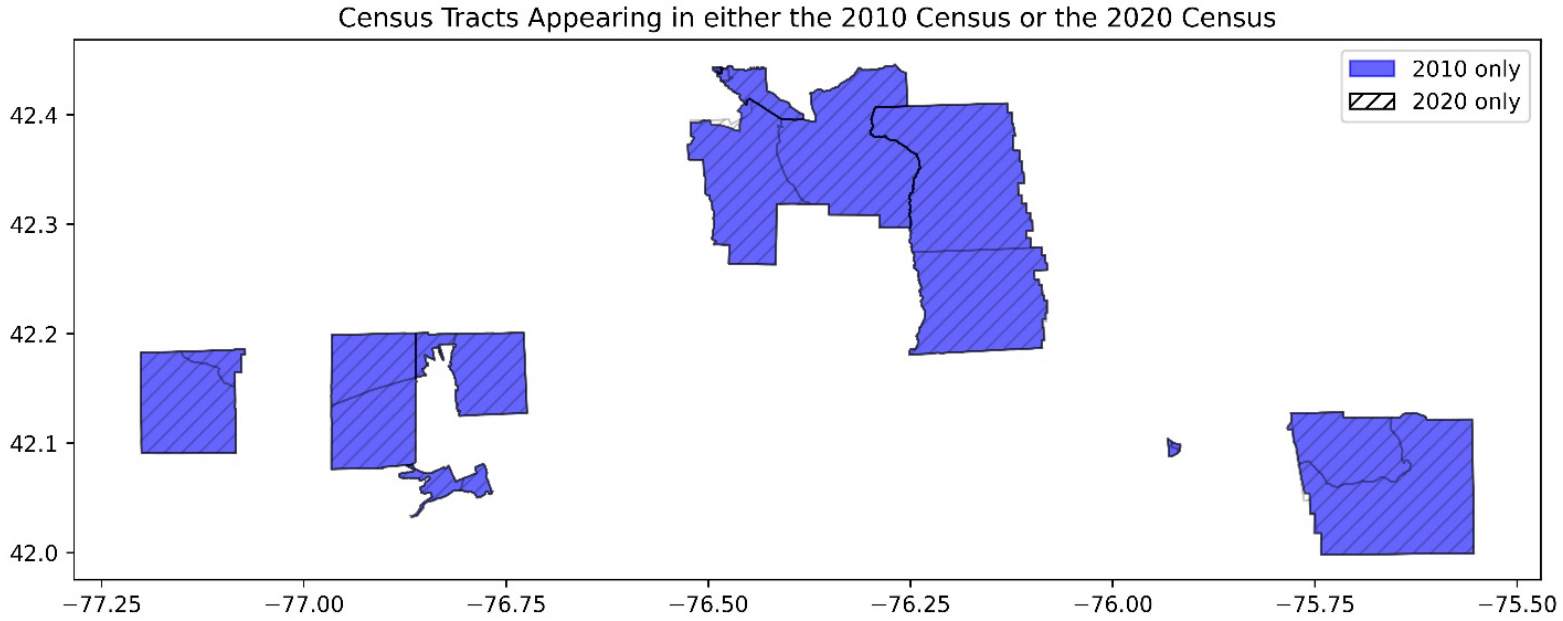


Figure S7 Spatial Locations of Tracts Appearing in either the 2010 Census or the 2020 Census

	(1) ACS for NY state, excluding NYC	(2) ACS for 6 counties	(3) Total Sample	(4) Only Pantry	(5) Only SNAP	(6) Dual Users	(7) All SNAP Users
Median Age (years)	40.9	39.7	41.0	48.0	37.0	50.0	39.0
Mean Household Size (persons)	2.6	2.3	2.3	2.5	2.1	1.9	2.1
Female headed (%)	50.5	50.2	57.4	65.1	53.6	66.0	55.5
Urban/Rural Mean(Urban=1,Rural=0)	77.8	59.2	49.3	43.4	50.4	53.2	50.9
Elderly Share (age$\geqslant$60) (%)	24.8	25.4	21.6	34.0	16.6	27.0	18.2
Single-Male Households (%)	12.4	15.2	27.4	15.6	30.4	25.9	29.7
Single-Female Households (%)	15.9	16.9	26.4	22.1	25.6	36.7	27.3
Households with more than one person but no children (%)	45.5	44.9	12.5	31.05	8.73	9.1	8.8
Households with more than one person and with at least one child (%)	26.3	22.9	33.7	31.3	35.3	28.3	34.3
Single-Mother Share of Households with Children (%)	16.6	19.0	32.5	12.7	35.8	37.9	36.1
Number of observations	4,279,493	224,651	85,664	18,204	57,263	10,197	67,460

Table S1. Household descriptive statistics comparing the American Community Survey (ACS) data from from all New York state counties excluding New York City (column 1) versus the six-county study area (column 2), the total sample (SNAP and FBST pantries combined, column 3), the sub-sample that only used food pantries (column 4), the sub-sample that only used SNAP (column 5), the sub-sample that used both food pantries and SNAP (column 6), and all SNAP users (column 7), defined as the union of columns 5 and 6. ACS data reflect data from the 2020 ACS 5-Year Estimates ; sample data cover January 2018–June 2021. Household composition statistics exclude households with missing or unknown household composition information. Approximately 26.1% of only pantry users, 2.1% of only SNAP users, and 1.3% of dual users have missing or unknown household composition information.

Type	Count	Duration of SNAP retailer authorization (days)			Mean Duration (years)
		Mean	Std	Median	
Supermarket	79	7100	5004	5662	19.4
Grocery Store	40	5448	6968	2542	14.9
Convenience Store	335	3500	3761	2719	9.6
Others	192	4605	3159	4660	12.6

Table S2. **Descriptive statistics on the duration of retailer SNAP authorization records.** The unit of observation is a SNAP retailer authorization record. A retailer may have multiple authorization records. All columns are measured in days except for the last column measured in years. Source: USDA SNAP Retailer Locator Historical Data.

	(1) Any	(2) Supermarket	(3) Grocery	(4) Convenience
Urban Block Share (%)	0.001	-0.000	-0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Population Size (k)	36.786**	32.642	-7.387	35.254
	(18.155)	(28.483)	(22.750)	(23.750)
Senior Population Share (%)	0.003	0.009	0.001	0.003
	(0.004)	(0.007)	(0.005)	(0.006)
Unemployment Rate (%)	0.001	0.009	0.027***	0.011
	(0.007)	(0.011)	(0.009)	(0.009)
Constant	0.670***	-0.006	0.015	0.536***
	(0.138)	(0.216)	(0.173)	(0.181)
R^2	0.042	0.020	0.079	0.023
N	144	144	144	144

Table S3. Ordinary Least Squares regression estimates for presence of a SNAP-authorized retailer in a census tract, 2018-21. Regression coefficient estimates are reported above parenthetical standard errors, with ***, **, * indicating p-values <0.01, 0.05, and 0.10, respectively. Column (1) shows for all SNAP-authorized retailers, while columns (2)-(4) show results for retailers that are supermarkets, grocery stores (but not supermarkets), and convenience stores, respectively.

Food pantries

Between April 2017 and December 2021, at least 401 food assistance agencies and programs operated at some point within the six-county study region, based on data provided by FBST. Of these, at least 189 were FBST member pantries and services, 128 (67.7%) of which participated in FreshTrak and have client service records available for our study period; those 128 represent our study sample. Of the remaining 61 FBST members, 60 did not participate in FreshTrak, while one participated in FreshTrak but had no client service records available. The FreshTrak sample covers more than half (55%) of the CFA providers in the six-county region that offered groceries to households, the service most directly comparable to SNAP, which pays for household groceries. That reflects FreshTrak coverage of 30% of fixed site pantries and 84% of mobile food pantry (MFP) programs. Most of the CFA providers absent from our sample prepare and serve meals to individuals (75) or provide food to individual children through school backpack services, school-based food centers, or Kids Farmers Market program (85). Table S4 below illustrates the relationship among these groups.

	FreshTrak data	No data	Share
Groceries	126	105	55%
Fixed site to households	37	88	30%
MFPs to households	89	17	84%
To children	0	85	0%
Meals	0	75	0%
Other	2	8	20%
Total	128	273	32%

Table S4. Food Assistance Agencies and Programs operating between April 2017 and December 2021. Source: Food Bank of the Southern Tier. The FBST administrative account is included in the "Other" category. Those with FreshTrak data are our study sample.

	(1) Any	(2) MFP	(3) Non-MFP
Urban Block Share (%)	-0.001	-0.002**	-0.003***
	(0.001)	(0.001)	(0.001)
Population Size (k)	34.572	65.615**	49.847*
	(27.393)	(28.577)	(28.727)
Senior Population Share (%)	0.002	0.008	0.003
	(0.007)	(0.007)	(0.007)
Unemployment Rate (%)	0.032***	0.035***	0.031***
	(0.011)	(0.011)	(0.011)
Constant	0.354*	-0.121	0.177
	(0.208)	(0.217)	(0.218)
R^2	0.074	0.097	0.100
N	144	144	144

Table S5. Ordinary Least Squares regression estimates for presence of a food pantry in a census tract, 2018-21. Regression coefficient estimates are reported above parenthetical standard errors, with ***, **, * indicating p-values <0.01, 0.05, and 0.10, respectively. Column (1) shows for all food pantries, column (2) reports on the presence of mobile food pantries (MFP), while column (3) shows results for non-MFPs.

We next examine the operational characteristics of FBST member pantries. On average, these agencies were open 18.25 hours per month and active in FreshTrak for 35 of the 48 months over the period January 2018 – December 2021. During the April–June 2020 COVID-19 lockdown period, agencies were closed for an average of 1.25 months. The large gap between mean and median monthly operating hours (18.25 versus 2.00) reflects substantial heterogeneity in operating intensity across agencies, particularly between fixed site pantries and MFPs. Operational characteristics vary substantially across agency types. Fixed site food pantries operate considerably more hours per month, were active for more months of the study period than MFPs. MFPs also experienced longer closures during the COVID-19 lockdown period.

FreshTrak and non-FreshTrak sites differ in their observed operational characteristics. Relative to non-FreshTrak CFA sites, FreshTrak agencies have fewer monthly operating hours (12.49 versus 30.35), longer closures during the COVID-19 lockdown period (1.64 versus 0.43 months), and fewer active months during the study period (32.6 versus 40.6). These differences largely reflect compositional differences. FreshTrak includes nearly all (84% of) member MFPs but a substantially smaller (30%) share of fixed site pantries. The latter generally operate more hours and are active for more months. Among FreshTrak agencies, the average agency records approximately 93 household visits per month (median=71).

Agency Type	Count	Avg. hours open/month	Months closed during COVID	Months of coverage	Avg. visits/month
All	189	18.25 / 2.00	1.25 / 0.00	35.21 / 42.00	93.1 / 70.5
Fixed Site Pantry	98	32.60 / 12.00	0.36 / 0.00	42.03 / 48.00	128.2 / 106.5
MFP	89	0.97 / 1.00	2.26 / 3.00	27.40 / 26.00	69.2 / 66.7
Other	2	84.00 / 84.00	0.00 / 0.00	48.00 / 48.00	509.7 / 509.7
Non-FreshTrak	61	30.35 / 10.50	0.43 / 0.00	40.62 / 48.00	N/A
FreshTrak	128	12.49 / 1.00	1.64 / 3.00	32.62 / 35.50	93.1 / 70.5

Table S6. Summary Statistics on FBST Member Agency Operational Characteristics by Type, January 2018 – December 2021. Each cell reports the mean and median (mean/median). Agency types are not mutually exclusive. The COVID-19 lockdown period is defined as April–June 2020. The FBST administrative account is included in the "Other" category.

Variable	mean	sd	min	max
Min. Dist.: SNAP Supermarket (miles)	3.52	4.14	0.07	19.15
Min. Dist.: SNAP Grocery Store	7.92	7.34	0.01	24.97
Min. Dist.: SNAP Convenience Store	0.94	1.08	0.04	10.08
Min. Dist.: SNAP Other Store	1.52	1.99	0.00	10.50
# SNAP Supermarket Stores	4.10	4.65	0.00	14.00
# SNAP Grocery Stores	1.12	1.64	0.00	12.00
# SNAP Convenience Stores	12.83	12.88	0.00	65.00
# SNAP Other Stores	8.72	9.27	0.00	32.00
Unemployment Rate (%)	7.26	4.66	0.00	28.10
Senior Population Share (%)	19.14	4.98	0.10	35.42
Population Size (thousands)	3.98	1.54	0.83	8.31
Observations		2315		

Table S7. Descriptive statistics on food pantries' local food environment. Columns show the mean, standard deviation (sd), minimum and maximum for each variable. Minimum distance (Min. Dist.) is measured in miles. The count of SNAP stores of different types (e.g., # SNAP Supermarket Stores) is the count of SNAP authorized stores of the given type within a 1-mile radius for urban pantries or a 10-mile radius for rural pantries. Unemployment rate, senior population share, and population size are at the census tract-level and accessed from the ACS.

Visit Frequency	Overall	Age < 25	Age 25-59	Age ≥ 60	With Child	No Child
1 visit	34.5%	56.4%	39.6%	21.2%	35.6%	24.7%
2-5 visits	33.5%	35.4%	34.6%	31.3%	34.8%	32.1%
6-11 visits	14.5%	6.0%	13.1%	18.8%	14.2%	17.6%
>= 12 visits	17.4%	2.2%	12.6%	28.7%	15.3%	25.5%
Sample size	28,401	2,383	16,038	9,980	6,981	5,004

Table S8: Pantry Visit Distribution by Age and Household Composition. With-child households are defined as multi-person households with at least one child, while no-child households are defined as multi-person households with no children. Households with missing or unknown household composition information are excluded from the household-composition subgroup calculations. Each household is assigned to the age group in which most of its visits occured (80 different households had visits that crossed age group boundaries).

	(1) ln(visit)	(2) ln(visit)	(3) ln(visit)
# SNAP Supermarket Stores	0.037***	0.016**	-0.095**
	(0.011)	(0.011)	(0.040)
# SNAP Grocery Stores	-0.060***	-0.047***	-0.059
	(0.018)	(0.018)	(0.049)
# SNAP Convenience Stores	0.047***	0.041***	0.037
	(0.009)	(0.009)	(0.024)
# SNAP Other Stores	-0.097***	-0.080***	0.048
	(0.011)	(0.011)	(0.032)
Unemployment Rate (%)		-0.017***	-0.018
		(0.005)	(0.032)
Senior Population Share (%)		-0.034***	0.003
		(0.004)	(0.032)
Population Size (thousands)		0.014	-0.204
		(0.014)	(0.217)
R^2	0.057	0.094	0.675
N	2315	2315	2315
FE	No	No	Pantry and Month-Year

Table S9. Two-way fixed effects regression estimates for (the logarithm of) monthly visits of a food pantry, 2018-21. Regression coefficient estimates are reported above parenthetical standard errors, with ***, **, * indicating p-values <0.01, 0.05, and 0.10, respectively. The count of SNAP stores of different types (e.g., # SNAP Supermarket Stores) is the count of SNAP authorized stores of the given type within 1-mile for urban pantries and 10-miles for rural pantries. Column (1) shows basic Ordinary Least Squares estimates without control variables, column (2) reports estimates with census tract-level control variables for unemployment rate, senior population share and population size, while column (3) shows results for estimates with two-way fixed effects for pantries and year-month. Standard errors for Column (3) are clustered at the city-level.

	(1)	(2)
	MFP	Brick-and-mortar
# SNAP Supermarket Stores	0.053	-0.318***
	(0.070)	(0.103)
# SNAP Grocery Stores	-0.091*	0.344
	(0.053)	(0.246)
# SNAP Convenience Stores	0.003	0.107*
	(0.032)	(0.055)
# SNAP Other Stores	0.029	0.126
	(0.033)	(0.130)
Unemployment Rate (%)	-0.001	-0.072
	(0.008)	(0.159)
Senior Population Share (%)	-0.020	0.027
	(0.018)	(0.095)
Population Size (thousands)	-0.582**	0.945
	(0.246)	(0.816)
R^2	0.666	0.701
N	1627	688
FE	Pantry and Month-Year	Pantry and Month-Year

Table S10. Two-way fixed effects regression estimates for (the logarithm of) monthly visits of a food pantry by pantry type, 2018-21. Regression coefficient estimates are reported above parenthetical standard errors, with ***, **, * indicating p-values <0.01, 0.05, and 0.10, respectively. The count of SNAP stores of different types (e.g., # SNAP Supermarket Stores) is the count of SNAP authorized stores of the given type within a 1-mile radius for urban pantries or a 10-mile radius for rural pantries. Column (1) shows for mobile food pantries (MFP), while column (2) shows results for non-MFPs. Both columns add fixed effects for pantry and year-month. Standard errors are clustered at the city-level.

	All SNAP households			SNAP households with Pantry use		
	(1)	(2)	(3)	(4)	(5)	(6)
Change in SNAP benefits per capita (Δ SNAP)	-0.012***	-0.013***	-0.004	-0.062***	-0.069***	-0.030
	(0.002)	(0.002)	(0.004)	(0.020)	(0.020)	(0.040)
Δ SNAP × Policy-driven increase		0.011	-0.024		0.035	-0.117
		(0.008)	(0.015)		(0.048)	(0.097)
Δ SNAP × Household has child			0.003			-0.053
			(0.006)			(0.050)
Δ SNAP × Female-headed household			-0.011**			-0.026
			(0.005)			(0.040)
Δ SNAP × Urban household			-0.007			-0.017
			(0.005)			(0.038)
Δ SNAP × Policy × Has child			-0.034*			-0.180*
			(0.020)			(0.105)
Δ SNAP × Policy × Female head			0.028			0.115
			(0.018)			(0.094)
Δ SNAP × Policy × Urban			0.054***			0.226***
			(0.016)			(0.085)
Constant	0.001***	0.001***	0.001***	0.007***	0.007***	0.007***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Month FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,834,573	2,834,573	2,834,573	230,449	230,449	230,449
Clusters (households)	66,075	66,075	66,075	8,723	8,723	8,723
R^2 (adj.)	0.001	0.001	0.001	0.005	0.005	0.005
Root MSE	0.183	0.183	0.183	0.477	0.477	0.477

Table S11: Estimated change in household pantry visits for households actively enrolled in SNAP (column 1-3) and for the subsample of SNAP households that ever used a pantry (column 4-6). Standard errors clustered at the household level are shown in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Δ SNAP denotes the monthly change in SNAP benefits per capita, measured as the difference in household SNAP benefits from the previous month (in $1,000) divided by household size. The policy-driven SNAP increase is a binary indicator equal to 1 in months when federal policy changed SNAP benefits. The emergency allotments, temporary 15% increase, and $95 minimum increase led to across-the-board SNAP benefit increases between April 2020 and June 2021. Additionally, during these months, the average per capita SNAP benefit increase was approximately $82.50.

Group	Period	All SNAP households	SNAP households with pantry use
Urban	No policy period	-0.0116***	-0.0465
		(0.0039)	(0.0362)
	Policy period	0.0184	0.0619
		(0.0143)	(0.0822)
Child	No policy period	-0.0015	-0.0827
		(0.0061)	(0.0607)
	Policy period	-0.0593***	-0.3804***
		(0.0225)	(0.1201)
Female	No policy period	-0.0149***	-0.0555
		(0.0052)	(0.0352)
	Policy period	-0.0107	-0.0573
		(0.0173)	(0.0783)
Observations		2,834,573	230,449
Clusters (households)		66,075	8,723

Table S12: Joint Effects of SNAP Benefit Changes on Pantry Visits: Heterogeneity by Household Characteristics. Coefficients shown on first line with standard errors clustered at the household level in parentheses below. Stars indicate significance: * p<0.10, ** p<0.05, *** p<0.01. Policy period effects are the sum of ΔSNAP, ΔSNAP × Policy, ΔSNAP × Group, and ΔSNAP × Group × Policy.

Computation of Pantry Seasonality Index

We use a two-step approach to estimate the seasonality of food pantry use. First, we remove the cross-sectional scale effect by normalizing each pantry's usage relative to its own mean. Then we correct for time series variation in pantry participation by averaging across active pantries only. We remove observations in 2020 due to the impact of COVID-19 to avoid the influence of this unusual, external shock. Observations from 2021 are also removed because they only cover half a year and show a systematic upward trend, making it inconsistent with the full-year distributions of 2018 and 2019. Additionally, we dropped pantry-month records where the pantry was not open for the entire month.

Step 1: Compute Pantry-Level Seasonal Index (Removing Scale Effect)

For each pantry i , we first aggregate monthly visits from all users under age 25 over the sample period (2018–2019). We then compute the pantry's average monthly visits:

$$\bar{x_i} = \left(\frac{1}{M}\right) \sum_{m=1}^{M} x_{i,m}$$

where $x_{i,m}$ is the number of visits to pantry i in month m , and M is the number of months observed. Next, we construct a pantry-level seasonal index by dividing monthly visits by the pantry's average:

$$S_{i,m} = \frac{x_{i,m}}{\bar{x_i}}$$

This normalization removes scale differences across pantries, so that each pantry's fluctuations are measured relative to its own mean usage level.

Step 2: Compute Monthly Average Seasonal Index (Removing Participation Effect)

We then aggregate the normalized seasonal indices across pantries to obtain a system-wide seasonal index. To account for variation in pantry participation and to ensure that larger pantries contribute proportionally more, we weight each pantry's index by its total number of visits during the sample period:

$$w_i = \frac{Total\ Services_i}{\sum_j Total\ Services_j}$$

The monthly seasonal index is then computed as:

$$S_m = \sum_i w_i S_{i,m}$$

This weighted aggregation ensures that pantries with greater service volumes exert proportionally larger influence on the seasonal pattern, while still being normalized to remove scale differences.