More Convenient, Less Congested
Refrigerated grocery lockers in Somerville, MA

Introduction

The COVID-19 pandemic is bringing the deep inequities in our food system to the surface and changing the way Americans shop. SNAP recipients, at a high risk for food insecurity, cannot use their EBT cards to purchase groceries online in Massachusetts (and most other states in the country). The state government has requested a waiver from the USDA to allow SNAP users to purchase food online with their EBT cards. Online grocery delivery is crucial during this pandemic, and can continue to play an important role in increasing food security after this crisis. I have identified two logistical challenges to grocery delivery which refrigerated lockers could ameliorate:

❶ where to leave deliveries when customers are not home

❷ increasing congestion on city streets

This research will answer the following two questions:

❶ Which areas of Somerville are farthest from food retail?

❷ Which of these areas have vulnerable populations that are most in need of higher levels of food security that could result from refrigerated lockers for online grocery delivery?

Methods

❶ Construct street network for Somerville and surrounding towns

❷ Calculate the distance from each parcel in Somerville to the closest grocery store using the origin-destination matrix tool

❸ Calculate ½ mile service areas from each neighborhood market in, and bordering, Somerville using the service area tool

❹ Clip SNAP rates and population to the Somerville boundary

❺ Convert all data layers for analysis to raster data and reclassify to the same index (cutoffs for each index in legends of maps below)

❻ Implement a weighted overlay (weights on maps below) resulting in a suitability model where suitable locker locations are far from stores, more populous, and have a high percentage of residents who use SNAP

❼ Determine which convenience stores are in high priority areas

Results

The results indicate several neighborhoods that would be best suited for refrigerated grocery lockers: Interbelt, East Somerville, Winter Hill, and Magoun Square. There are ten convenience stores in the high priority areas in these neighborhoods to house the lockers.

One of these convenience stores is located in the only region deemed highest priority (score of 5). Building lockers in convenience stores brings more people into these stores which increases sales and makes use of existing infrastructure. Building lockers in these locations will allow grocery delivery to expand to SNAP users in Somerville in a way that limits congestion and allows customers to pick up their orders at times that are convenient for them, instead of having to change their schedules to be home during a specified delivery window.

Optimal Locker Locations

Legend
- Convenience Stores
- Priority Convenience Stores
- Top Priority Convenience Store
Priority Index
1 2 3 4 5

Distance to Grocery Store — Weight 40%

Legend
Distance to Store
- Less than 1/4 mile
- 1/4 to 1/2 mile
- 1/2 to 3/4 mile
- 3/4 to 1 mile
- More than 1 mile

Percent of Residents with SNAP — Weight 30%

Legend
Percent by Census Tract
- 0 to 4 %
- 4 to 7.5 %
- 7.5 to 14 %
- 14 to 17.6 %
- 17.6 to 21.6 %

Distance to Neighborhood Markets — Weight 20%

Legend
- 1/4 mile service area

Population — Weight 10%

Legend
Population (#) by Census Block Group
- Less than 600
- 600 to 880
- 880 to 1050
- 1050 to 1240
- More than 1240