

ArcGIS Project Report: Food Accessibility for Low-Income Households in Mecklenburg County

1. Title Page

Project Title: *Mapping Food Access Disparities in Mecklenburg County Using ArcGIS*

Author: Vivek Sai Chinna Burada

Tools Used: ArcGIS Pro, ArcPy, U.S. Census Data, TIGER/Line Data, Local Land Use Shapefiles

Date: [Insert Date]

2. Executive Summary

Goal: To identify and map areas where **low-income households** lack access to grocery stores within a **10-minute walking distance** in Mecklenburg County.

Outcome: Using ArcGIS Pro and ArcPy, you generated layered spatial analyses to highlight food deserts at the **block group** and **household-type** level.

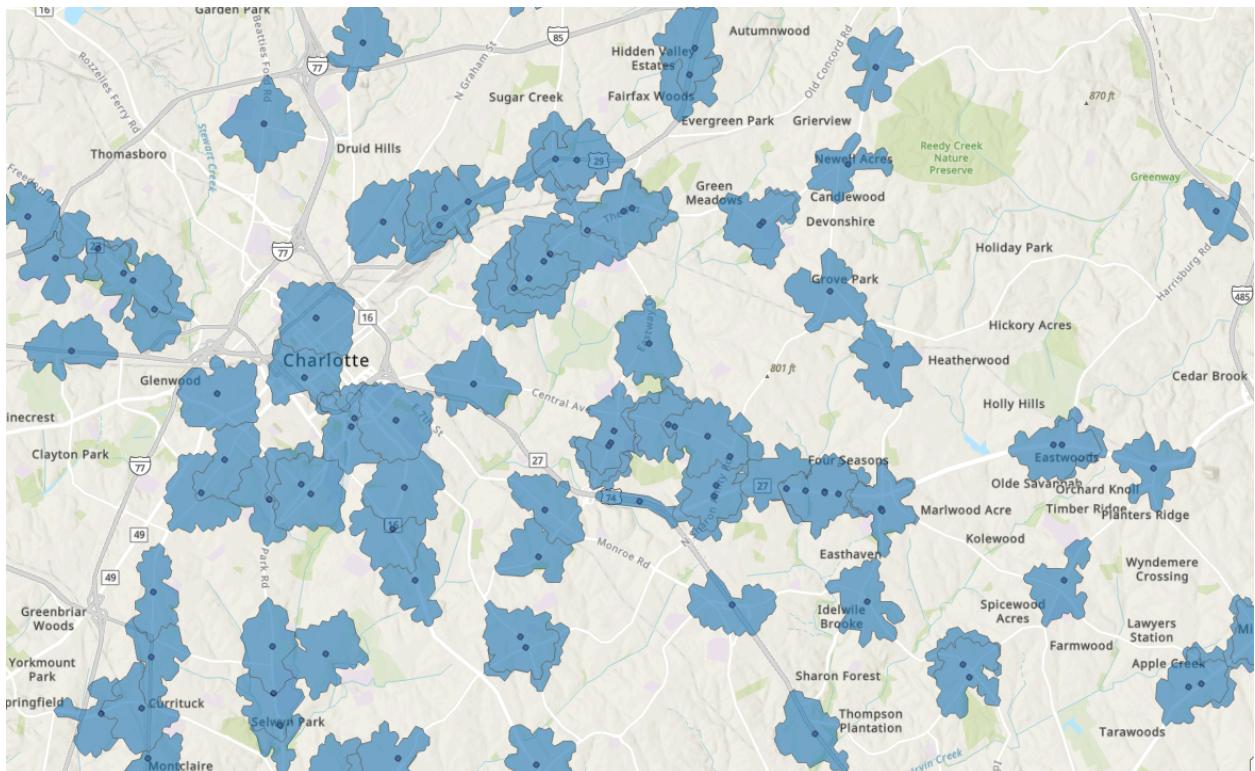
3. Data Sources

- **Grocery Store Locations:** Shapefile for Mecklenburg County
- **TIGER/Line Shapefiles:** Block Group geometries with GE0ID
- **Census Income Data:** Household income by block group from ACS
- **Land Use Data:** Household types (single-family, multi-family, townhomes, etc.)

4. Methodology

4.1 Grocery Access Buffer Layer

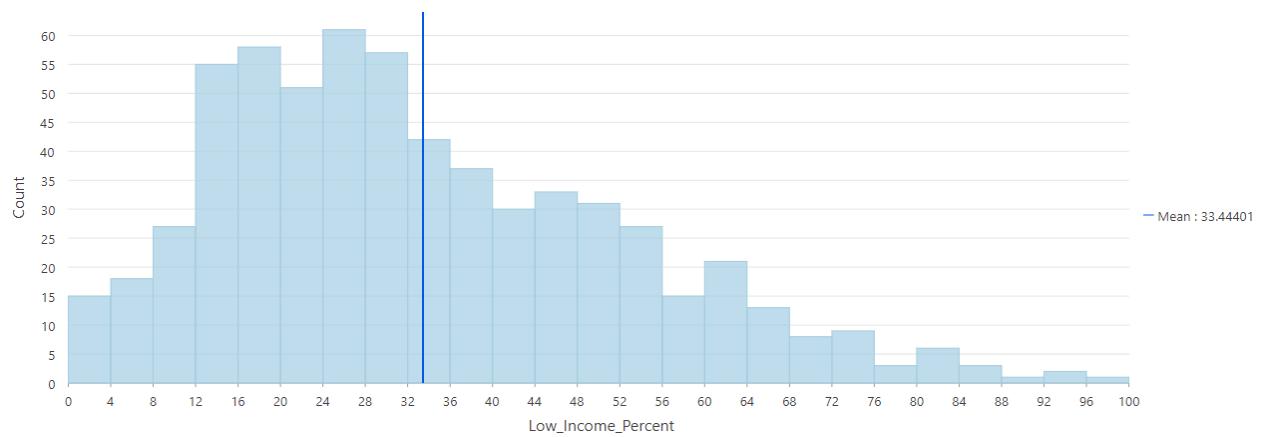
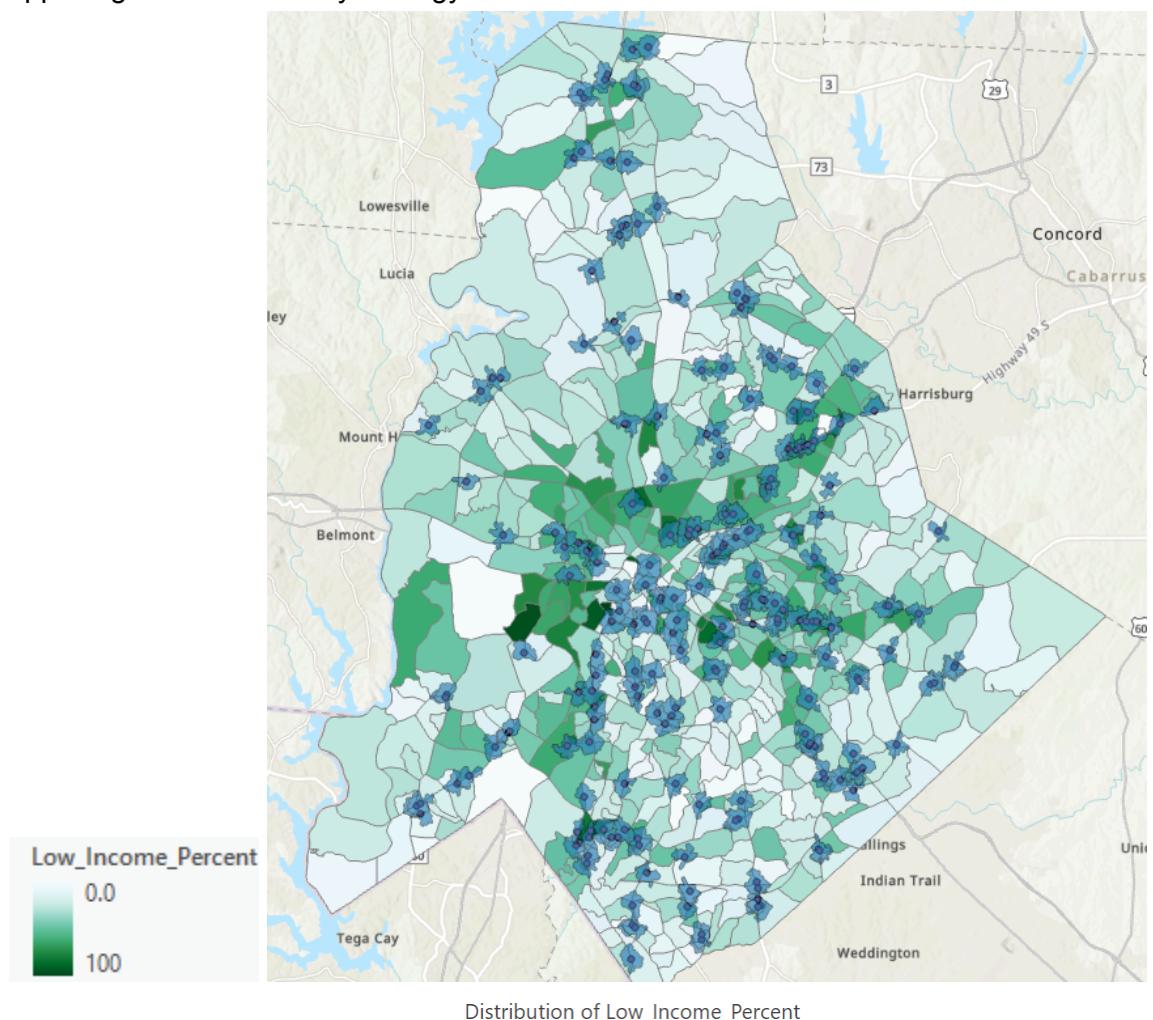
- Created **10-minute walking distance buffers** around all grocery store points using ArcPy.
- Generated a **service area layer** to simulate real-world pedestrian access.



4.2 Income Normalization Layer

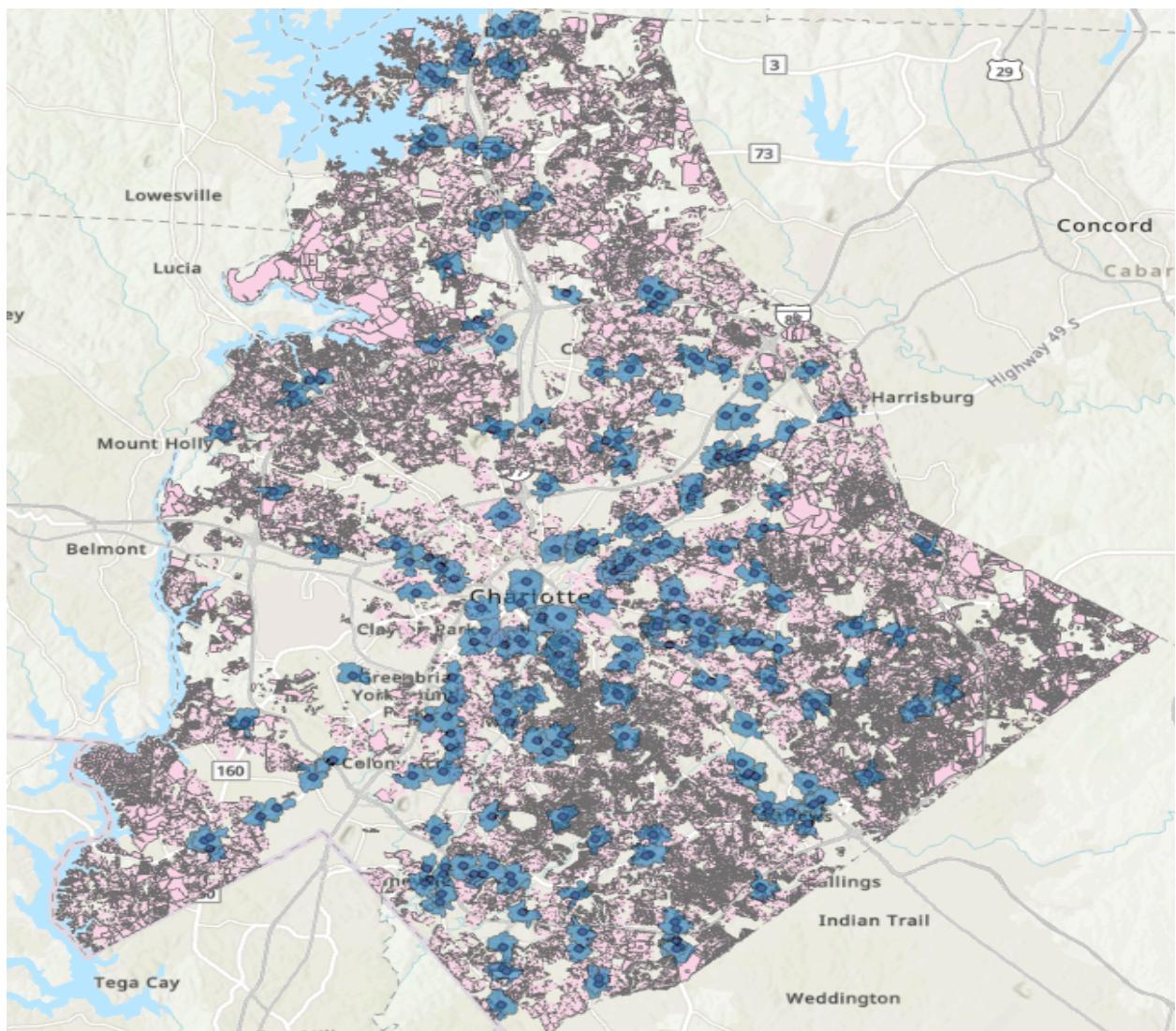
- Joined **TIGER/Line Block Groups** with **Income Data** using GEOID.
- Used ArcPy to classify income into 3 tiers:
 - **Low Income** (< \$50,000)
 - **Middle Income** (\$50,000–\$120,000)
 - **High Income** (> \$120,000)

- Applied graduated color symbology based on % of low-income households.



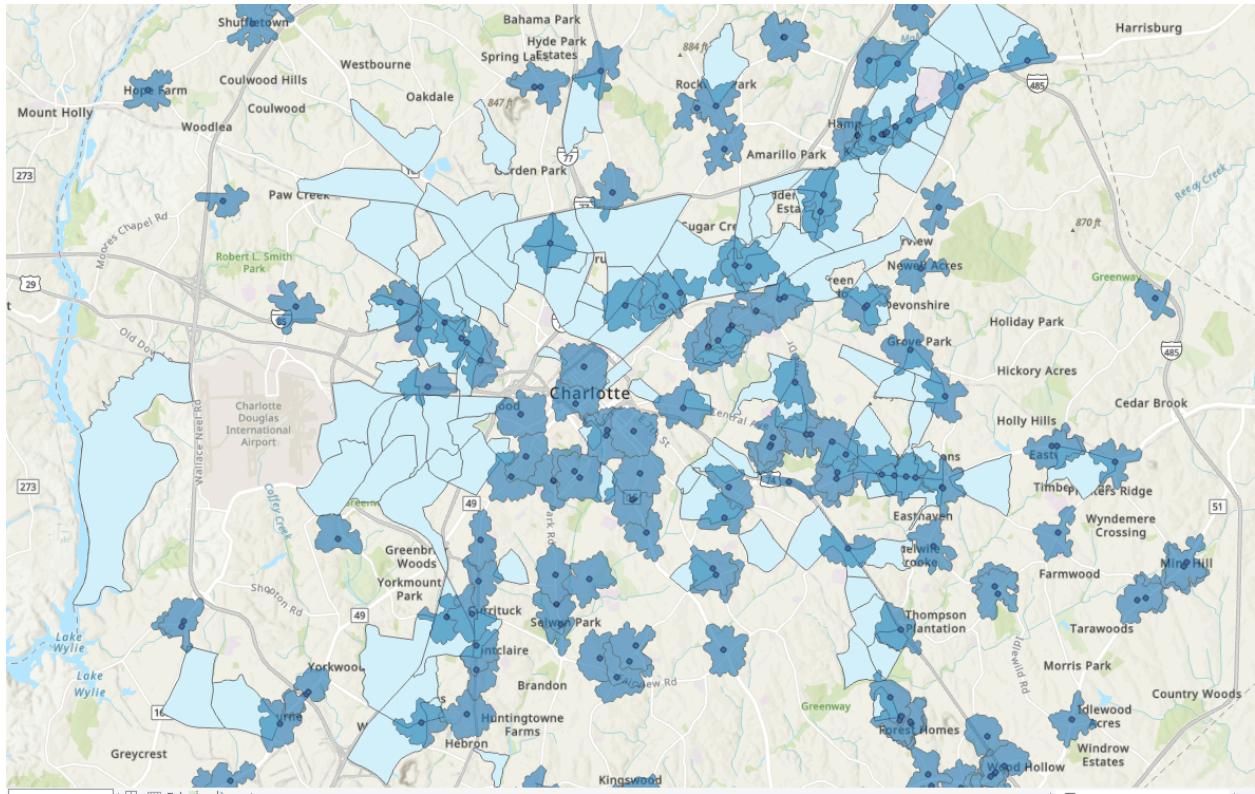
4.3 Filtered Land Use Layer

- Filtered land use shapefile to only retain:
 - "Single Family"
 - "Multi Family"
 - "Town Homes"
- Excluded commercial, industrial, and vacant land uses.



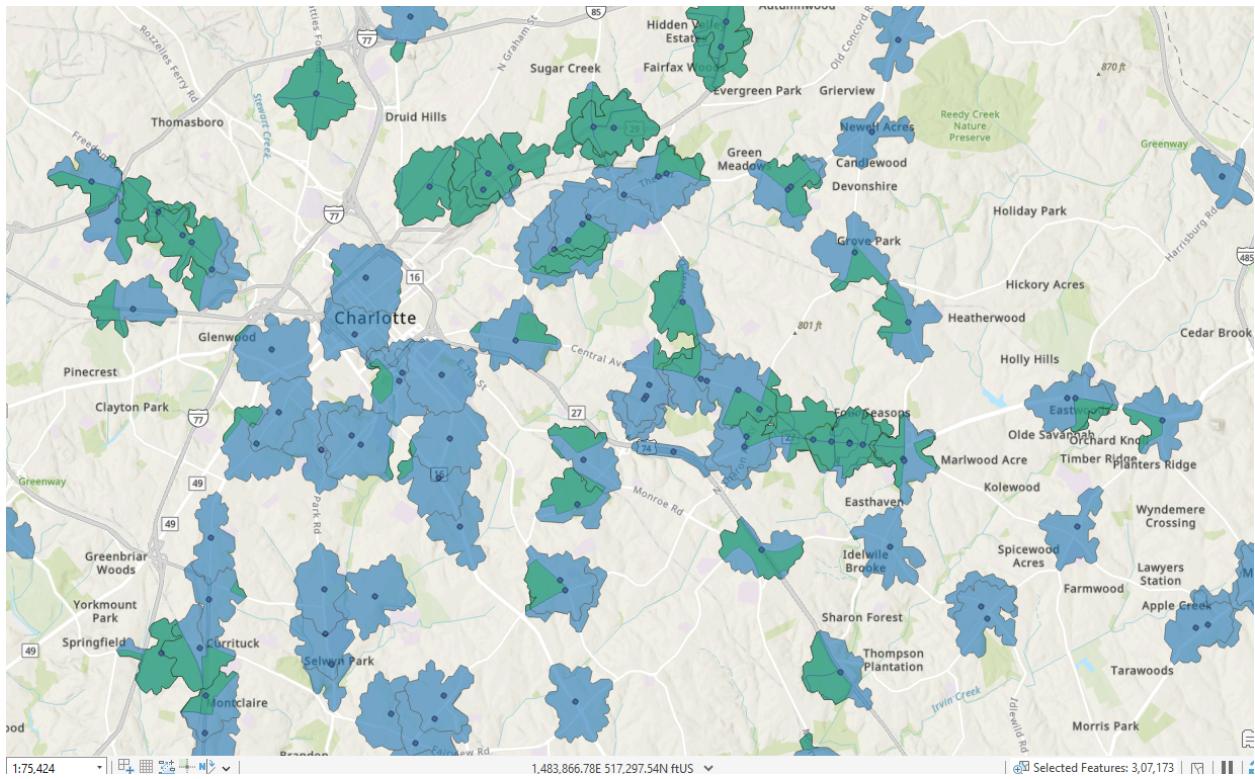
4.4 Low-Income Household Area Extraction

- Intersected the **filtered land use** with **low-income block groups**
- Result: A focused layer showing **low-income households** of supported types.



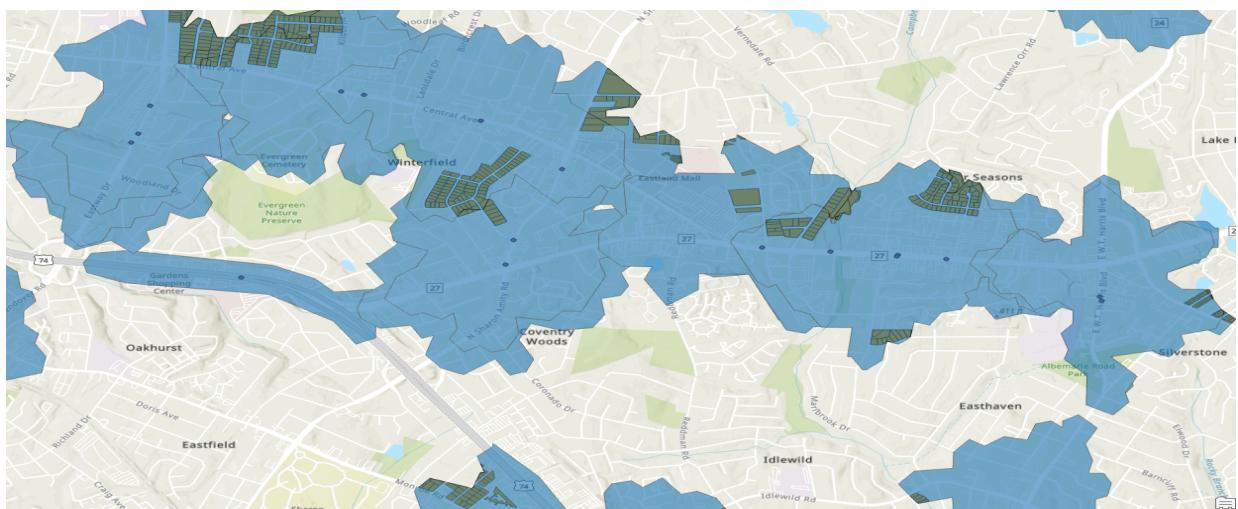
4.5 Micro-Level Grocery Access Analysis

- Used **Pairwise Intersect** to combine:
 - Layer 4 (low-income residential areas)
 - Layer 1 (10-minute grocery buffer)
- Result: Areas where **low-income homes have walkable grocery access**



4.6 Final Layer: Precision Overlay

- Further intersected Layer 5 with **original land use geometry** to:
 - Identify exactly **which parcels** among low-income households are grocery accessible



5. Tools & Techniques

- ArcPy scripting for:
 - Data joins
 - Income normalization
 - Attribute filtering
 - Field calculations
 - Automated export workflows
- Symbology for intuitive choropleth mapping
- Spatial analysis: buffer zones, pairwise intersects
- Tools used: ArcGIS Pro, ArcPy scripting environment, MakeFeatureLayer, SelectLayerByAttribute, CopyFeatures, AddField, UpdateCursor, SearchCursor, PairwiseIntersect, Buffer.mn

6. Findings

- Several **low-income block groups** had **no coverage** from grocery stores within 10-minute walk.
- **Single-family low-income homes** are disproportionately outside service areas.
- **Multi-family zones** are more likely to have access due to urban clustering.

7. Conclusions

- This project visualizes clear **food access inequities** in Charlotte/Mecklenburg County.
- Spatial layers help **target specific neighborhoods** for policy intervention (e.g., mobile groceries, zoning changes).

