NYC Food Desert Predictor

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What are food deserts?

Food desert are geographic areas where residents have low access to fresh, healthy and affordable foods. This can lead to higher disease rates and in times of crisis to greater food insecurity in crisis.

A recent report issued by CUNY Food Policy Institute NY Food 2020 report stated:

“Existing Food System Inequities Exacerbated COVID-19’s Impact in NYC”

Business Case

Food desert identification is imperative to improving food policy. Improved food policy could end food insecurity and encourage afflicted populations to choose diets rich in fresh and healthy foods.

This could limit diseases of modernity thus reducing the strain on the healthcare industry which would in turn make our city more resilient to crisis such as the COVID-19 pandemic.

Data

USDA ERS 2017 Study

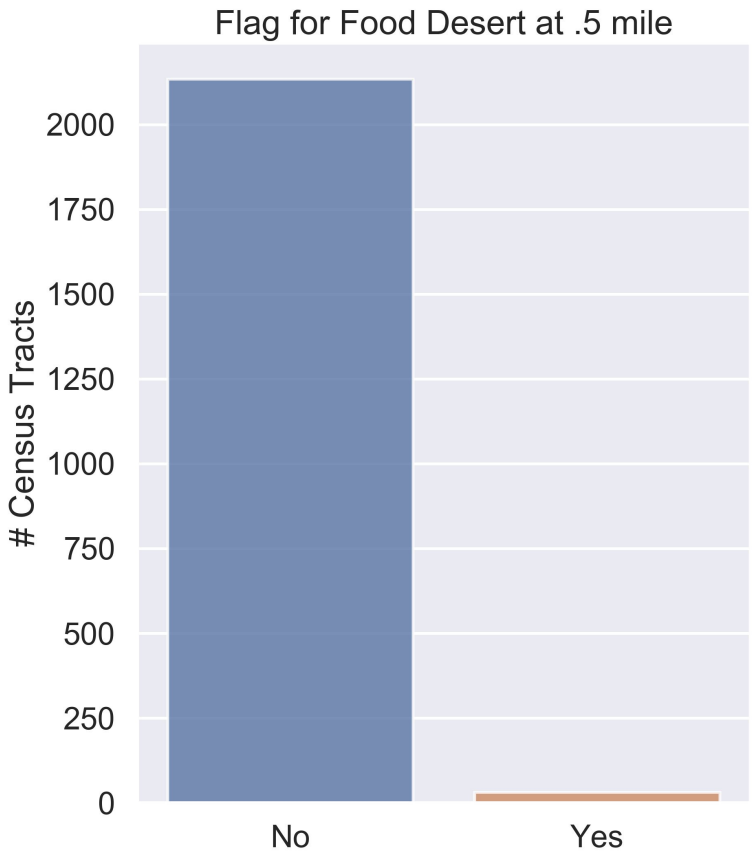
2010 Census Tract Shapefile

- 2165 rows
- 60 columns
- Race
- Income/Poverty
- SNAP (Supplemental Nutrition Assistance Program)
- Kids
- Seniors
- Vehicle Access

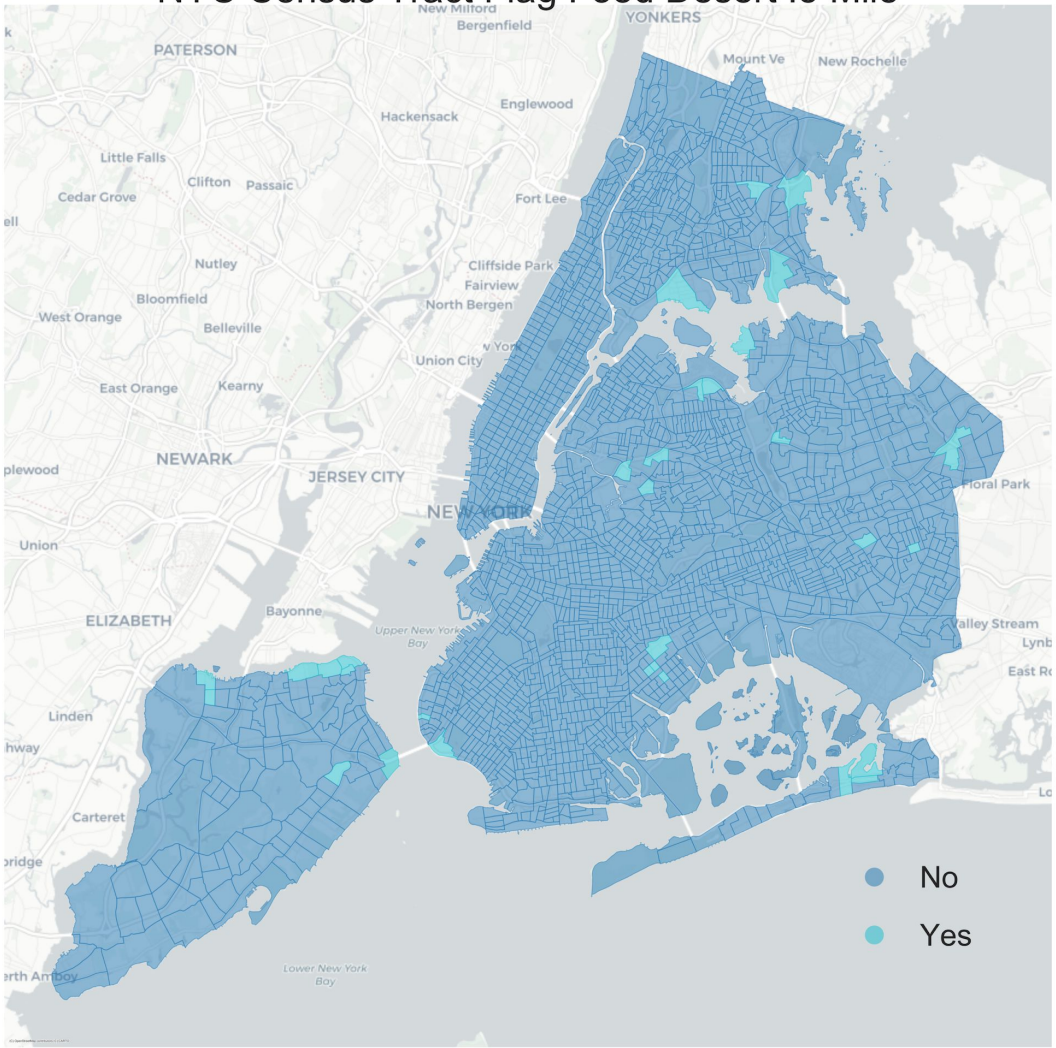
Target

Low-income low-access at .5 mile - A low-income tract with at least 500 people, or 33% of the population, living more than ½ mile from the nearest supermarket, supercenter, or large grocery store.

- 2109 Not Food Deserts
- 31 Yes Food Deserts
- 25 N/A (parks etc.)



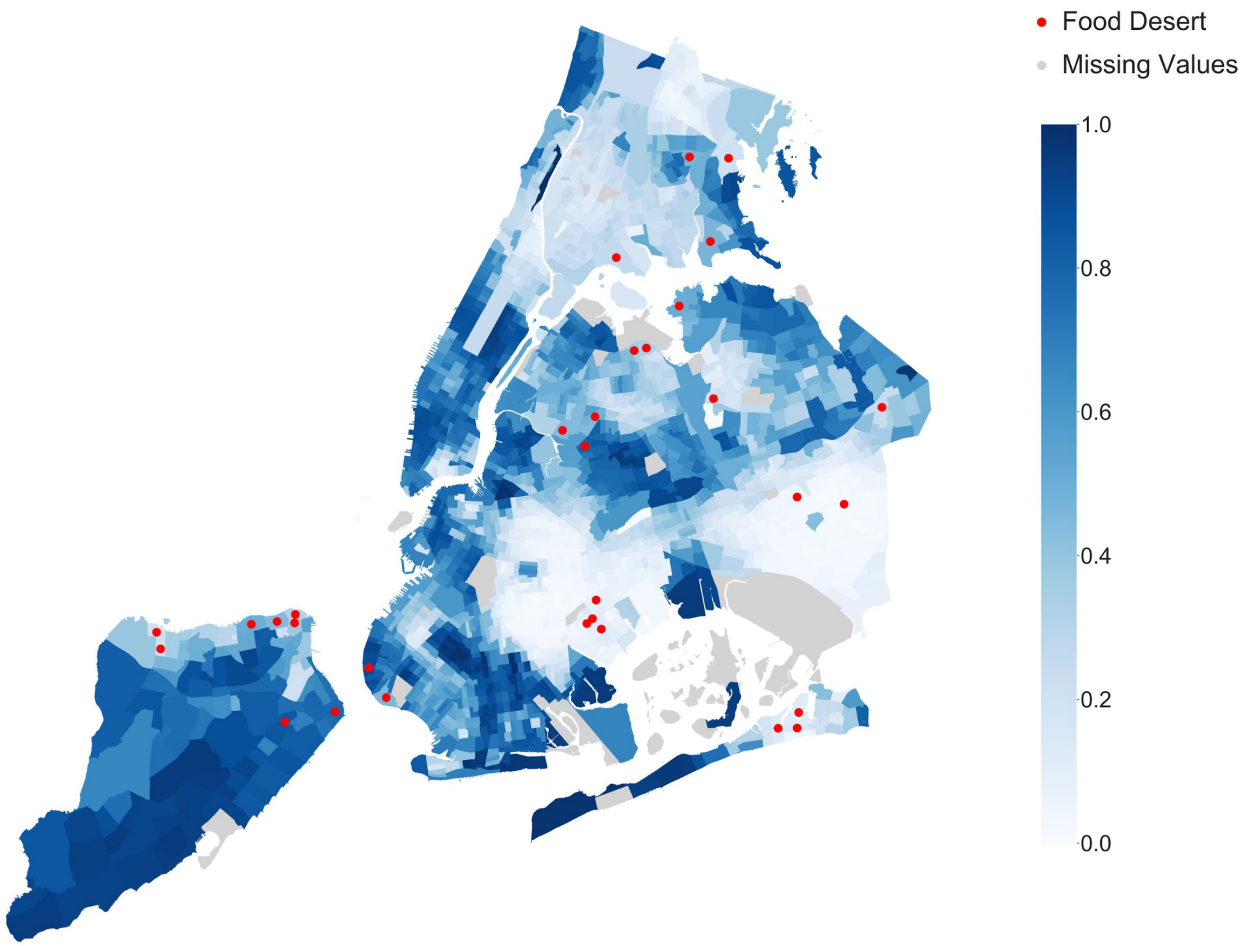
NYC Census Tract Flag Food Desert .5 Mile

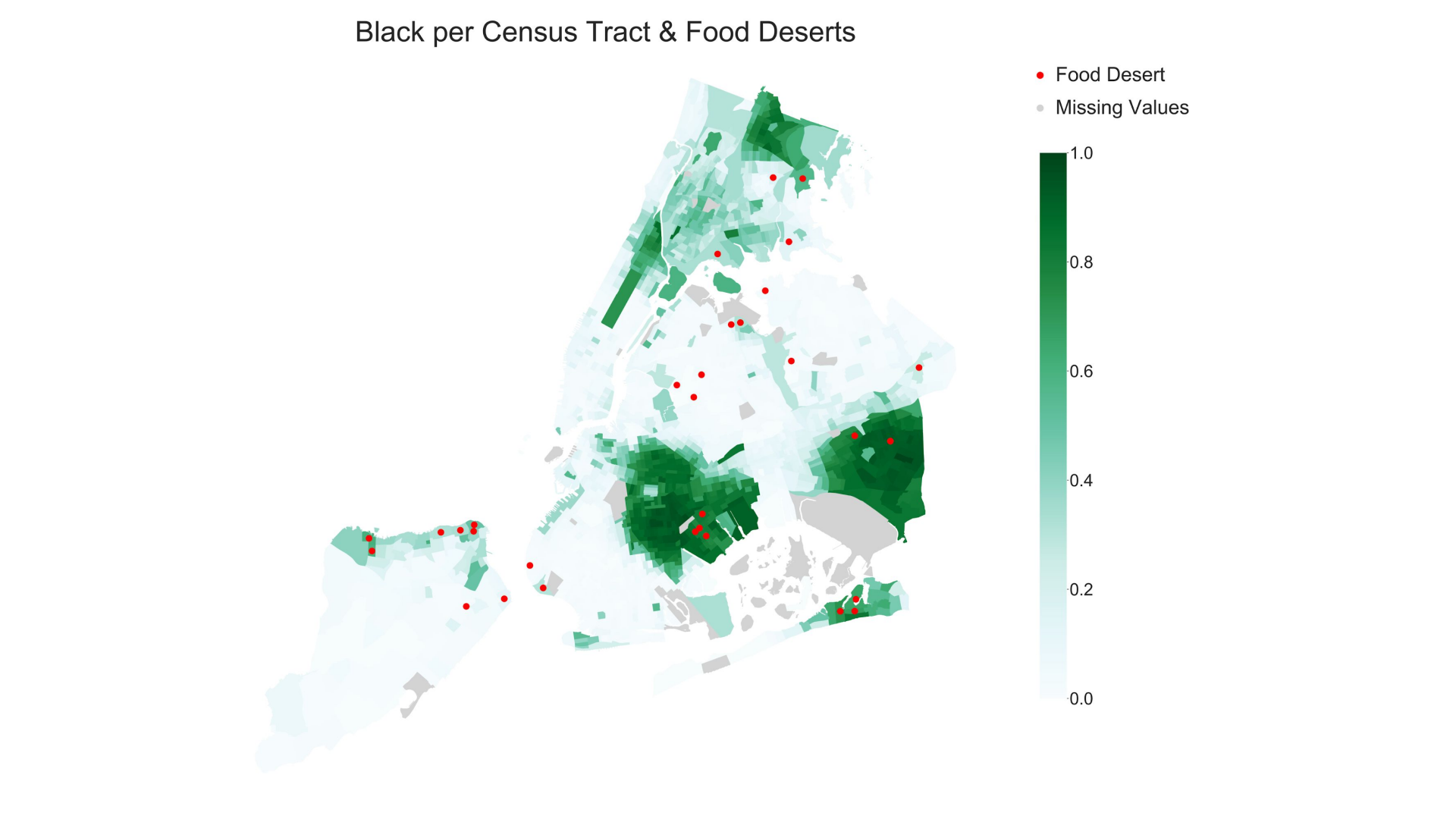


Methodology

Exploratory data analysis gave way to the following

- Outliers where were left untamed
- Geospatial analysis was utilized to visualize relationships
- Hard to interpret interactions such as Polynomials were avoided in favor of high interpretability
- Modeling was focused on Recall with a secondary metric of F1


White per Census Tract & Food Deserts
Food Desert
Missing Values
1.0
0.8
0.6
0.4
0.2
0.0


Black per Census Tract & Food Deserts
Food Desert
Missing Values
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0.8
0.6
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0.2
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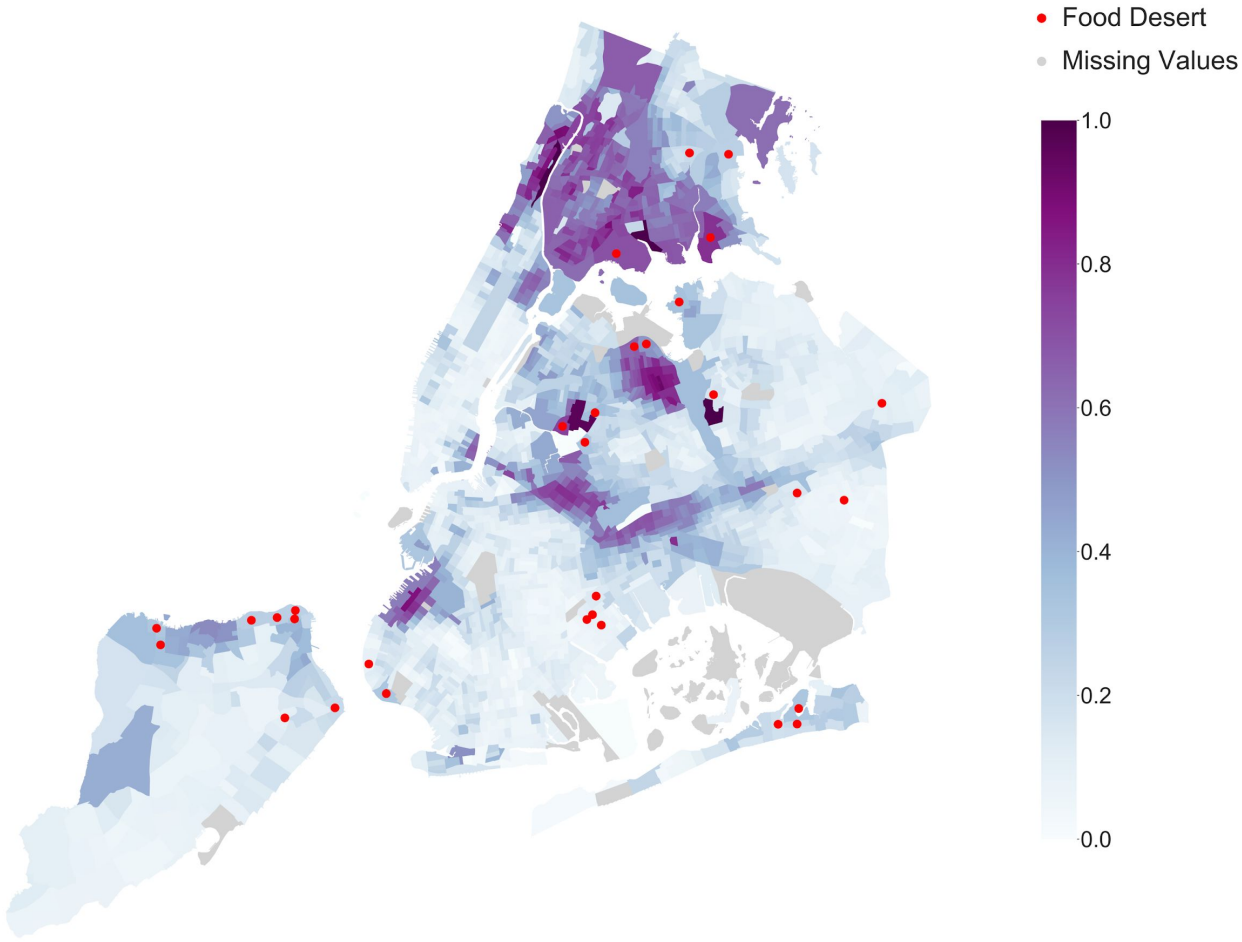
Latinx per Census Tract & Food Deserts
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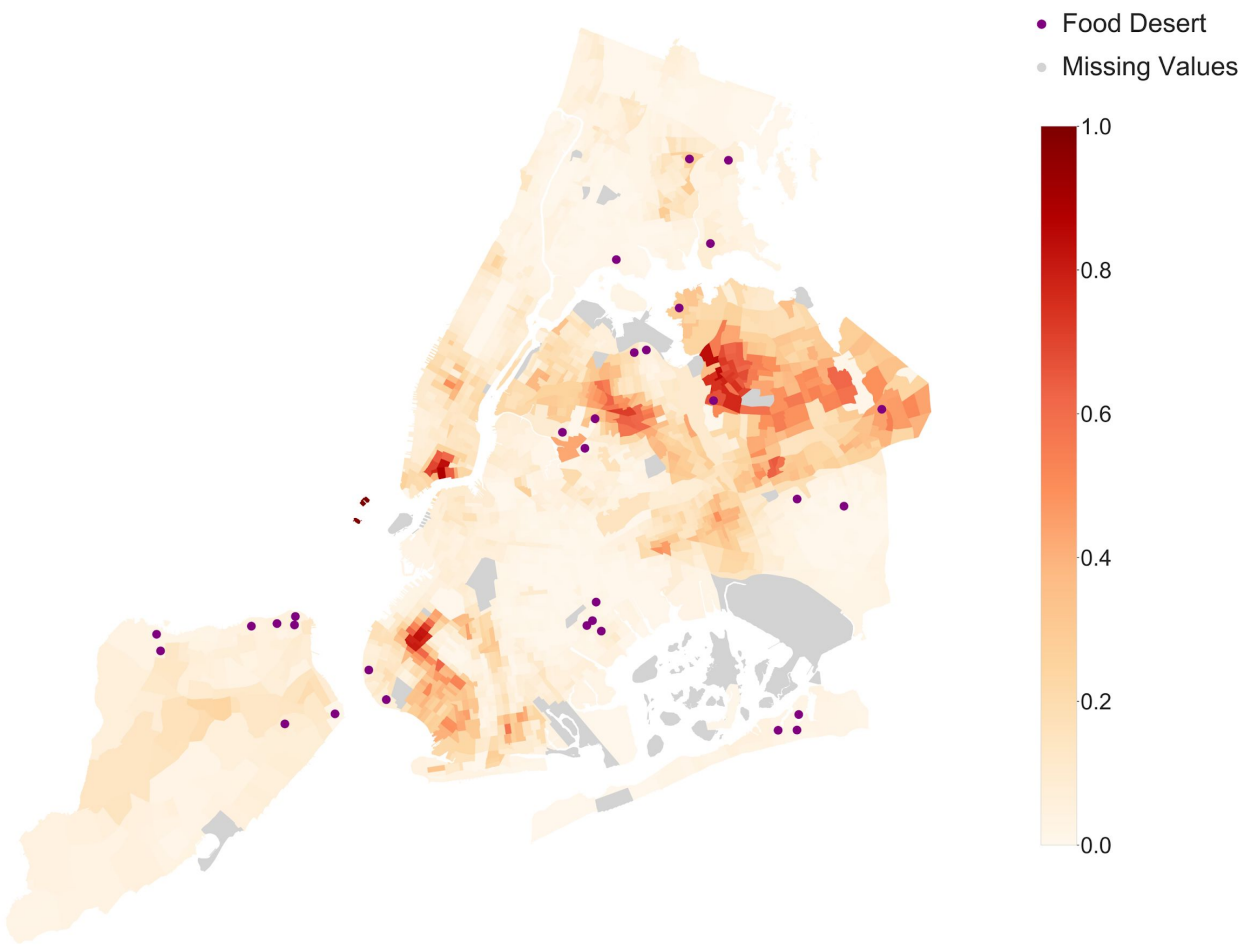
Asian per Census Tract & Food Deserts
Food Desert
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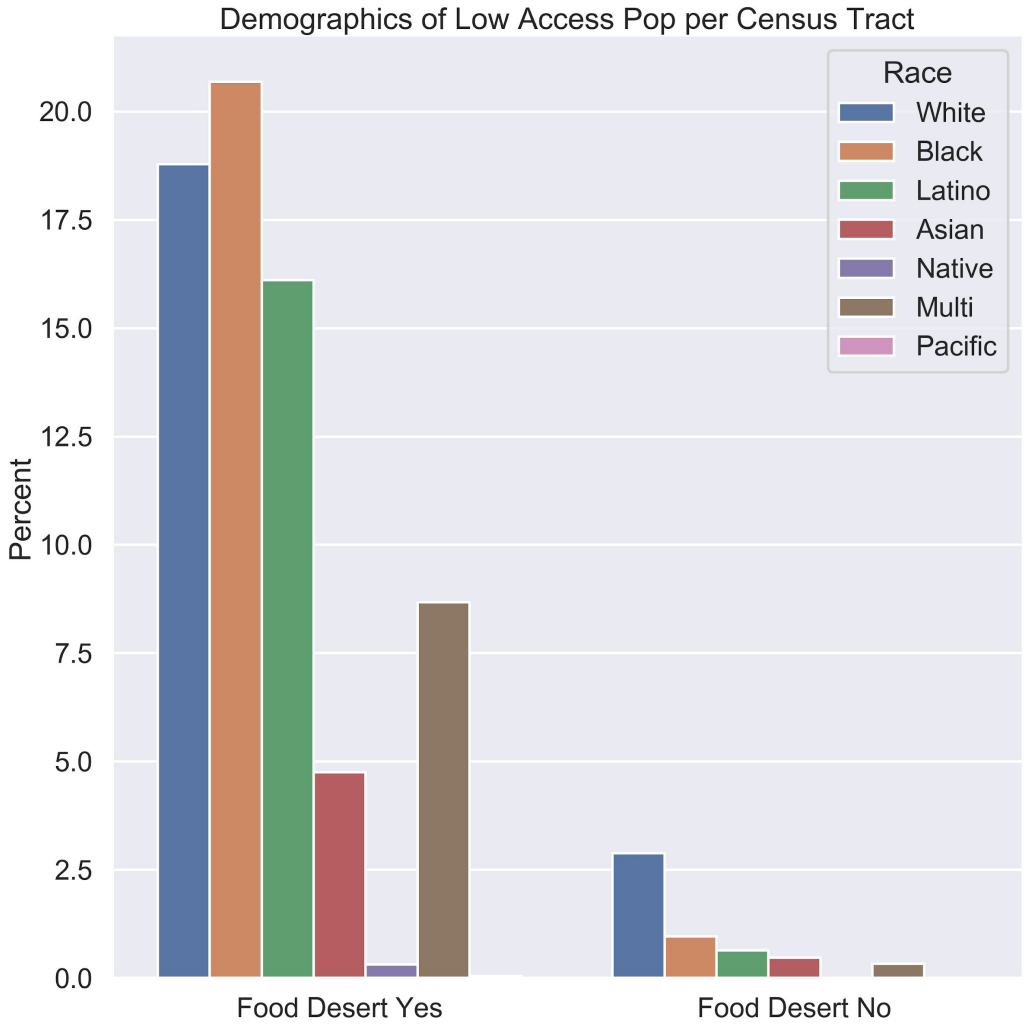
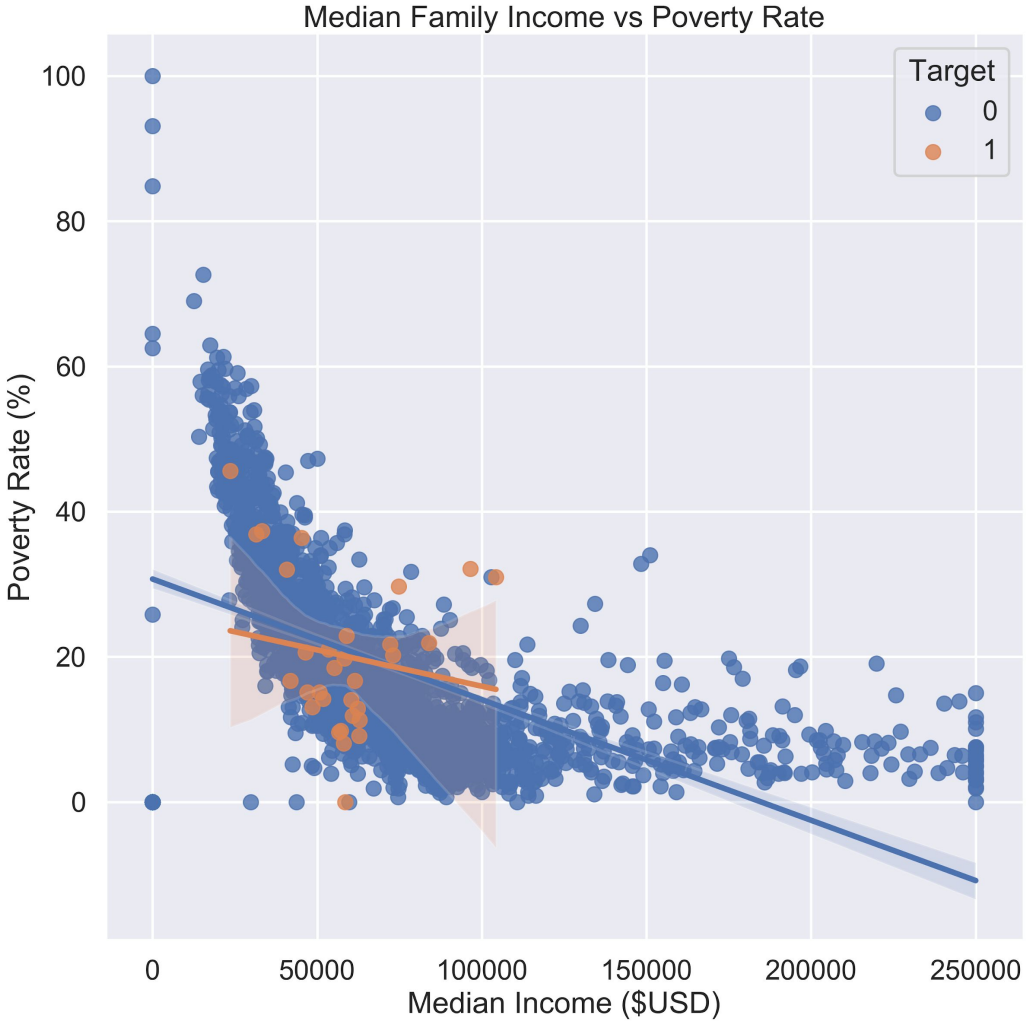
0.2
0.0



- Rates of black residents are highest in the positive class
- Rates of white residents are highest in the negative class
- Low-access white demographic has less of a chance of living in a food desert then a person of color.



- Multicollinearity heatmap test revealed negatively correlated as well
- Most negatively correlated features
- Positive class is in orange, negative blue
- As poverty rate goes up, Median income goes down

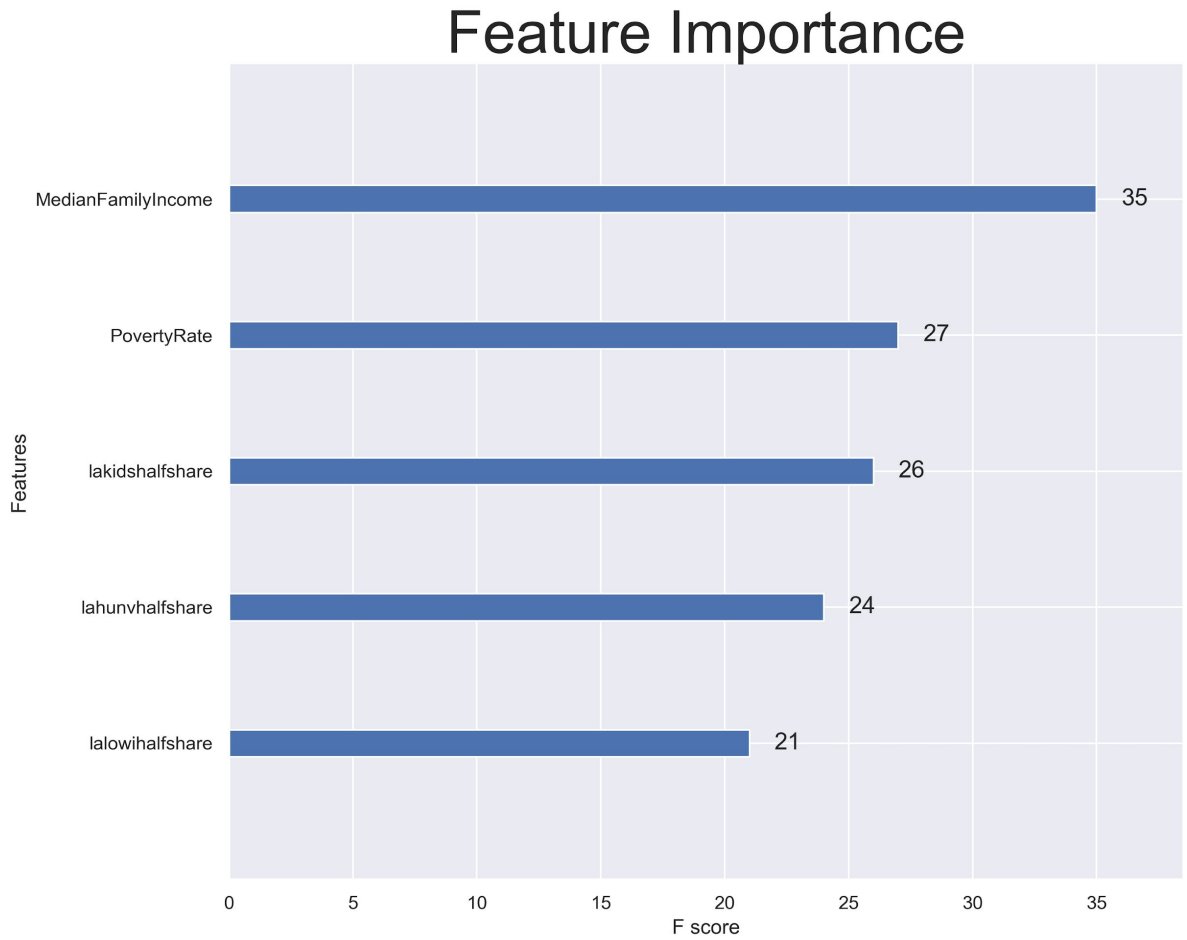
Modeling

Final Model

- XG Boost
  - Recall = .71
  - F1 = .66

Other Models

- Logistic Regression
  - Recall = 1
  - F1 =.5
- Decision Tree
  - Recall = .71
  - F1 = .52



- Median family income
- Poverty rate
- Low-access kids .5m share
- Low-access households no vehicle .5m share
- Low-access low-income .5m share

Findings

Final model results indicate feature importance such that:

- Median Family Income and Poverty Rate have the most weight
- Racial demographics do not have as much bearing as suspected
- Having kids with low-access and no vehicle are significant contributors to food deserts
- Overall low-access and low-income are the primary indicators of a food desert.

Recommendations/Next Steps

- These ‘wicked’ issues income and poverty are outside the scope of this study
- Low-access to fresh, healthy and affordable supermarkets because of proximity or lack of vehicle access, could be remedied by offering incentives for expansion within the afflicted Census Tracts

Next Steps

- **Food Retail Expansion for Supporting Health (FRESH)**
    - Offers tax incentives to food retailers expansion in certain areas,
- **Urban agriculture**
    - Good examples such as Red Hook Farms have community supported urban farms with weekly farm stands and extensive youth participation. In turn teaching kids how to grow their own foods.

Thank you!

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