FOOD DESERTS IN NORFOLK, VA

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1. Introduction

1.1 Norfolk, VA

This report is designed to explore the neighborhoods of Norfolk, VA to see if any of them qualify as food deserts. Norfolk is a port city in southeast Virginia. It is the second most populous city, and the fourth most densely populated, in the state.

1.2 What is a food desert?

The USDA defines a food desert as a low-income census tract where a substantial number or share of residents has low access to a supermarket or large grocery store.

Only census tracts listed on the Treasury Department's New Markets Tax Credit (NMTC) qualify as low-income.

Low access to a supermarket or large grocery store is defined in urban areas as a radius of more than one mile, and in rural areas as more than 10 miles. All of Norfolk is considered urban.

If at least 33% or 500 people, whichever is less, in the NMTC tract have low access it is considered a food desert.

1.3 Who is interested in the information?

Understanding the under-served communities within an area is of interest to both government planners and business leaders alike. To government planners because it helps them to identify the areas that need assistance and growth, and to business leaders because it helps them identify areas for expansion.

2. DATA

2.1 Data Sources

I collected data from a few different locations for this project.

In order to analyze the census tracts for Norfolk, I obviously needed to know what the boundaries of those census tracts are. This information was available from hrgo.org which is a geospatial exchange for Hampton Roads. Hampton Roads is the geographical region which includes Norfolk.

As mentioned in the previous section, in order to be a food desert the census tract must also be considered a low-income area. Low income census tracts are defined by the Treasury Department, and data is available for download form cdifund.gov.

It is also necessary to determine how far each address is from the nearest grocery store. Data.norfolk.gov has geographical information for all residential addresses in the city.

Finally, grocery store locations were retrieved using the foursquare API.

2.2   Data Cleaning and Feature Selection

Data for the census tracts was provided in shape files. These needed to be translated to geojson files. This was done using the online tool ogre2ogre.

The data retrieved from the treasury department had a lot of extraneous data. One field "Metro/Non-Metro" could be important in food desert research in other cities. Rural areas have different criteria than those that are urban, however since all of Norfolk is considered urban, this field was not necessary. All fields except the actual tract identifier were stripped from this data.

This was this combined with the tract geojson information in order to get the polygon definitions for the Treasury-defined low-income tracts.

Then a new column was created called "Local CT" for local census tract. In the federal data, the full census tract number has data for state and city. The locally produced data, only uses the part of the number that defines the specific area in the city. This made it easier to combine federal and local data.

The new data looked like this:

2010 Census Tract	Type	Local CT	Coordinates
51710004200	Polygon	42	[[[-76.27269200103963, 36.85258500074999], [-7...
51710004700	Polygon	47	[[[-76.2731200011328, 36.85150800125312], [-76...
51710004400	Polygon	44	[[[-76.2535640016033, 36.86002200104431], [-76...
51710004900	Polygon	49	[[[-76.29898300059763, 36.85473200050688], [-7...
51710004002	Polygon	40.02	[[[-76.29895000118125, 36.85478900082314], [-7...

2010 Census Tract	Type	Local CT	Coordinates
51710002600	Polygon	26	[[[-76.29346700098569, 36.88614800123863], [-7...
51710980300	Polygon	03	[[[-76.1960990011138, 36.91140100072901], [-76...
51710006604	Polygon	66.04	[[[-76.20035100149677, 36.92685600061475], [-7...
51710002900	Polygon	29	[[[-76.27503800107615, 36.88139700062664], [-7...

The foursquare data presented a bit of an issue. Using both the search and explore apis, the data kept returning stores in surrounding cities, and not giving a full list of supermarkets in Norfolk. The solution to this ended up being using Google Maps to locate the city center and the average radius of the city around that center. Norfolk is a fairly regularly shaped city so this worked out. I'm not sure how easy this would be to do in a different city.

Even this method ended up leaving a few supermarkes lying in surrounding cities. These were stripped from the data.

This step also required researching the 30 venues individually because a few specialty and convenience stores were miscategorized as supermarkets. These were also removed from the data.

The residential address information was stripped down. There were almost 9000 addresses listed in the data. Most were not needed. This will be discussed more thoroughly in the Methodology section below.

3. METHODOLOGY
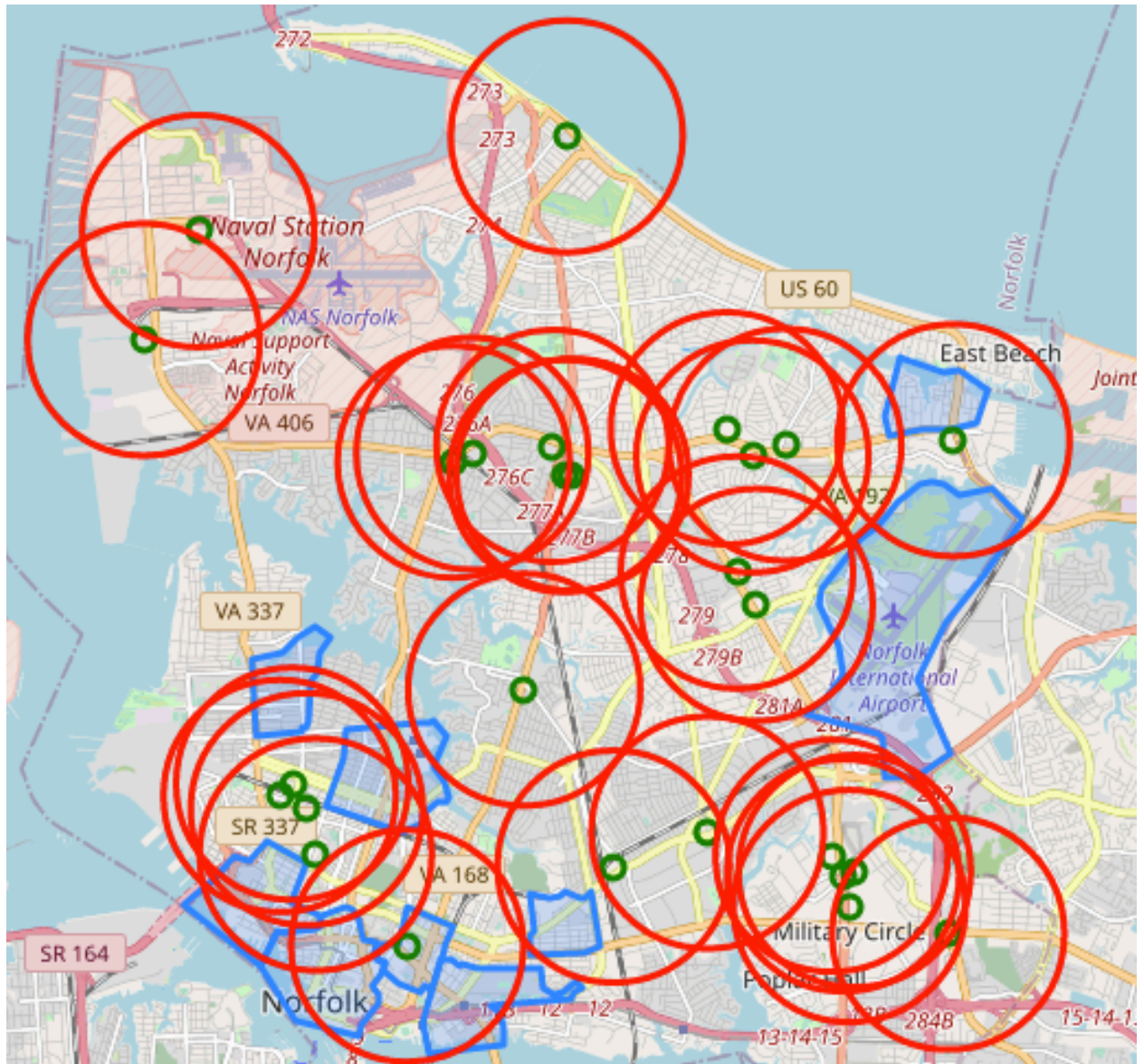
This step was helped tremendously by map visualizations.

3.1 Mapping the Tracts

Norfolk has 9 census tracts defined as 'low-income.' This is the map of those census tracts:
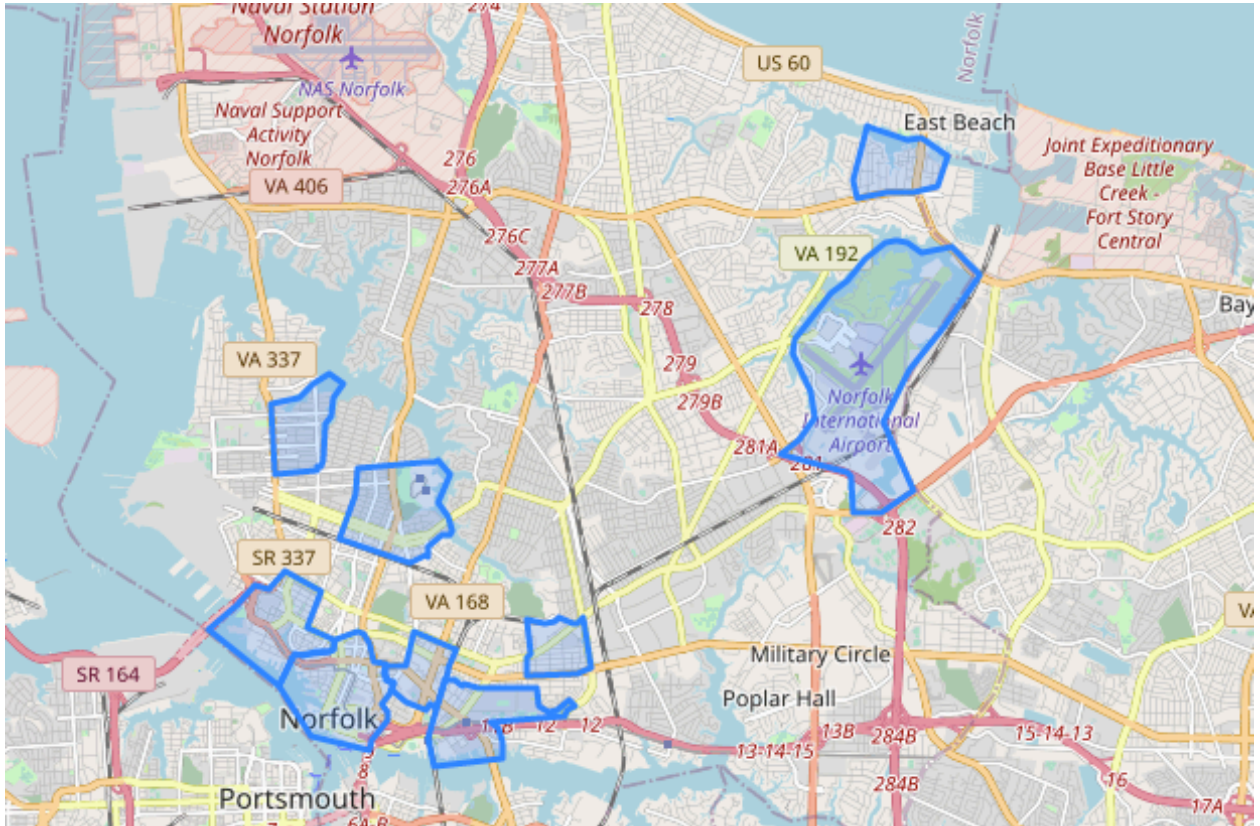
3.2 Mapping the Grocery Stores

The data was still a pretty large set, so instead of tracking all of the addresses to the grocery stores, I mapped the grocery stores with their radii:

As we can see from this visualization, only 4 tracts have areas that fall outside of the 1 mile radius of supermarkets. One of these is strictly the airport and surrounding businesses. There are no addresses in it, so that limits it to 3 tracts that need further exploration.

3.3 Tracking Addresses

At this point the only thing left is to see how many addresses in each of the three remaining tracts lie outside of the 1-mile radius.

I created a new column in the newly stripped-down address data, called "Grocery Store Distance." This was then populated with distance to the closest grocery store.

4. RESULTS

A new data frame was created to house the final data:

Tract Name	Tract Number	Total Residences	No. Outside Radius	Percentage
BRAMBLETON (SOUTH), NSU	47	494	19	3.846154
NORTH COLLEY	26	894	206	23.042506
PARK PLACE (EAST)	29	1710	154	9.005848

5. DISCUSSION

The above data represents the number and percentage of residences that fall outside of the 1 mile radius from the nearest supermarket or large grocery store. Unfortunately, this does not reveal the number of residents that live outside that area.

Based on residences alone, none of the census tracts could be technically called food deserts. However, to reiterate the criteria for a food desert, 33% or 500 people must live outside of a 1-mile radius in order to qualify.

North Colley would need an average of 2.4 people living in each residence, and Park Place (East) would need an average of 3.2 people per residence in order to qualify.

6. CONCLUSION

Norfolk, VA, on the whole, is doing fairly well in regards to ensuring access of its 246,000 residences to a supermarket or large grocery store.

However, even so, there is still potential for growth. More attention should be given to the areas of North Colley and Park Place (East). The populations in these areas could benefit from a new grocery store.