

Michael W. Biehl

Analysis for HCAAA

### A GIS Analysis of the Elderly Population in Harris County

As instructed from my superiors, I have researched, organized, and have produced a series of GIS-assisted maps for the HCAAA to get a better comprehension of where and how Harris County's elderly demographic is geographically spread. The purpose of each of these maps is to help accurately visualize areas this organization should focus on, a means to more efficient and effective rationing of resources meant for these populations. As the US Gulf Coast states braces itself for a projected increase in Category 4+ storms due to recent changes in climate, it is of superior importance for this organization to precisely recognize where our target demographic will be if and when such an event occurs. Beyond this extreme scenario however, the maps are also useful for a more sustainable supply chain of resources to communities in everyday business activities. The displays allow project managers to see a potential ranking for areas in regards to need.

The first map I created for this project was a simple dot density map to visualize the geographic spread of the Harris County population. Each dot in the map represents about 50 people, as expected we can see a large concentration of dots around downtown Houston. Despite this map telling nothing about our objective of locating elderly citizens, it does act as strong base for insight generation once viewers have gone over the other maps. The percentages and rates in the areas on those maps would be effectively meaningless since they would have zero context about how many people a percentage represents. Using this map as a cross-reference helps us solidify our frame of reference, as well as avoid any

costly errors like sending supplies to a county with a seemingly high rate, but may have a population so minimal that they don't need the vast resources it superficially implies.

The second map in this series starts with a broad scope of our objective titled "Elderly Population of Harris County". Via the HCAAA's own definition of elderly being persons 60 years or older, the data here is displayed in coherence with that definition. The choropleth map is designed to show which Harris County census tracts have higher rates or collective concentrations of elderly American citizens. For this analysis I simply had to divide the population of elderly in each tract by its respective total population. Cartographically, areas with higher rates are marked with deeper shades of green whereas the lower rated counties have lighter ones. As we can now see, it appears that Southwest Harris County has the largest concentration and rates of elderly Americans; the inset map on the left-hand side gives a large-scale view of this. Several tracts in the area exceed 25% with some even breaching 45%. Being that this is close to downtown Houston, we also know that the populations in this area are large in general, meaning this should be the primary target for our operations in the area if our goal is to assist the most elderly citizens as a whole with no control for sub-demographics.

For the next two choropleth maps, I am going to be referring and studying them in conjunction with one another because they both rely on the same ACS datasets on poverty. That said, the research done to define elderly is not in line with HCAAA's standard; in the ACS's methodology, the ages of men and women were determined in 10 years spans beginning at 55-64 and 65-74. What this means is that in order for me to measure this data, I had to either include Americans aged 55-59 who would be outside of the HCAAA's definition, or exclude Americans aged 60-64 but be able to state that rest of the ages

included are in line with the HCAAA. I decided to go with the latter, my reason being is that analyzing people outside of the guidelines could potentially result in resources going towards people not meant to receive them; whereas by excluding ages 60-64, we actually get a more in depth view of specifically vulnerable communities since the baseline for age is older.

Moving on to the maps themselves, they are titled “Rate of Elderly in Poverty within Harris County” and “Areas of Harris County with Highest Rate of Elderly Black Americans in Poverty”. The first map designed is to show how poverty rates of the elder in general, the second is designed to specifically show the poverty rates of elderly black Americans. Just like the 1<sup>st</sup> map, the areas with higher rates are marked by deeper colors of each map’s chosen color scheme. The purpose of the first map is to show where the HCAAA’s resources specifically meant for poverty relief should be allocated towards, in this case it appears to be the eastern half of downtown Houston, where multiple rates exceed the 5% range. What’s important to note here is that when you cross-reference these tracts with the ones from the “Elderly Population of Harris County” map, we can see that many of these tracts’ elderly population rates are above 15%. Considering this part of Houston has a dense general population already, this area should be of high priority when it comes to efforts geared towards the elderly in poverty. In conjunction, the map displaying specifically where black elderly Americans live is also important in context. When discussing the potential for future natural disasters to occur in context to how they have been handled in the past, namely New Orleans after Katrina and Puerto Rico after Maria, its should be of utmost importance to consider the potential for our efforts to have unintentional discriminatory results. This map was made and designed to try and impede that possibility.

What it displays in the census tracts of Houston is the levels of elderly black Americans living in poverty. With this visualization at our disposal, we can now see what areas to specifically account for during live-action relief efforts to limit any errors due to subconscious implicit bias. The visualization itself shows a similarity in geographic spread when compared to the first poverty map in that higher rates are primarily found along the east and south side of downtown Houston. A close-up of this area can be seen under the legend, showing that multiple tracts have poverty rates exceeding 5% in densely populated areas.

The fourth and final map generated is titled “Areas of Harris County with Highest Rates of Elderly Households on Food Stamps”. The data for this map is similar to first one in that the minimum age included is 60 and not 65 like the previous two. Unlike the previous three maps however, this map is a study of “Households” that have elderly citizens that use food stamps as opposed to individuals. We once again find in the visualization that the primary areas of importance are in east and south Houston, with multiple tracts having levels of 10% or more, with a handful breaking even 20%. Although indicative of the impact poverty stricken areas have on other parts of life such as food accessibility, it can be seen as a positive for the HCAAA in that our resources won’t have to be spread too thin and that higher level of quality and service can be offered to each of the elders under this jurisdiction.

### **Methodology and Cartography**

Since each of the latter 4 thematic maps I generated were indeed choropleths, my methodology for how I went about creating them were pretty much identical aside from the use of different datasets of course. In general the first step was to locate the data table

with the relevant information I wanted for a map, then came the tedious part of trying to find the particular columns I needed in order to generate the percentages. The tedious part being that sometimes ages would be divided by gender and of course by age group, one slip up could have greatly skewed the end results. Once calculating the percentage fields for the table and exporting it to be its own file, all that was left was to join the data to the Harris County tracts layer and visualize it.

Cartographically speaking, I wanted to have consistency in layout so as to make viewers transition from map to map easier. That said they have the same landscape view, dark canvas base-map, identical north arrow designs and scale bars, as well as descriptive layouts: the title being first, then the legend below that, next an inset map focusing on areas of importance, and lastly the map description and personal info. As for color schemes, I chose colors that specifically worked with the dark canvas background in a way that made them obvious to any viewer that this is the area to focus on. The reason I differentiated color among the 5 maps in general was so that it would be easier for viewers to return to a particular map of interest, instead of thinking “Okay which map had showed elderly black Americans in poverty”; he could just say, “okay bring up the purple one again.”

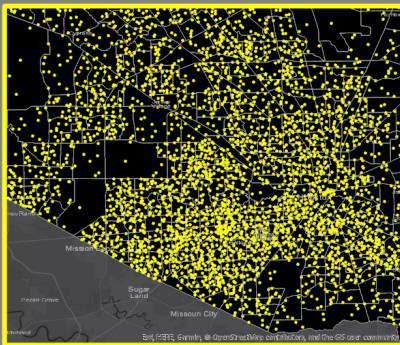
I hope these visualizations will be put to good use in the future and that elderly Harris County residents can benefit as a result.

## Geographic Spread of the Harris County Population

### Legend

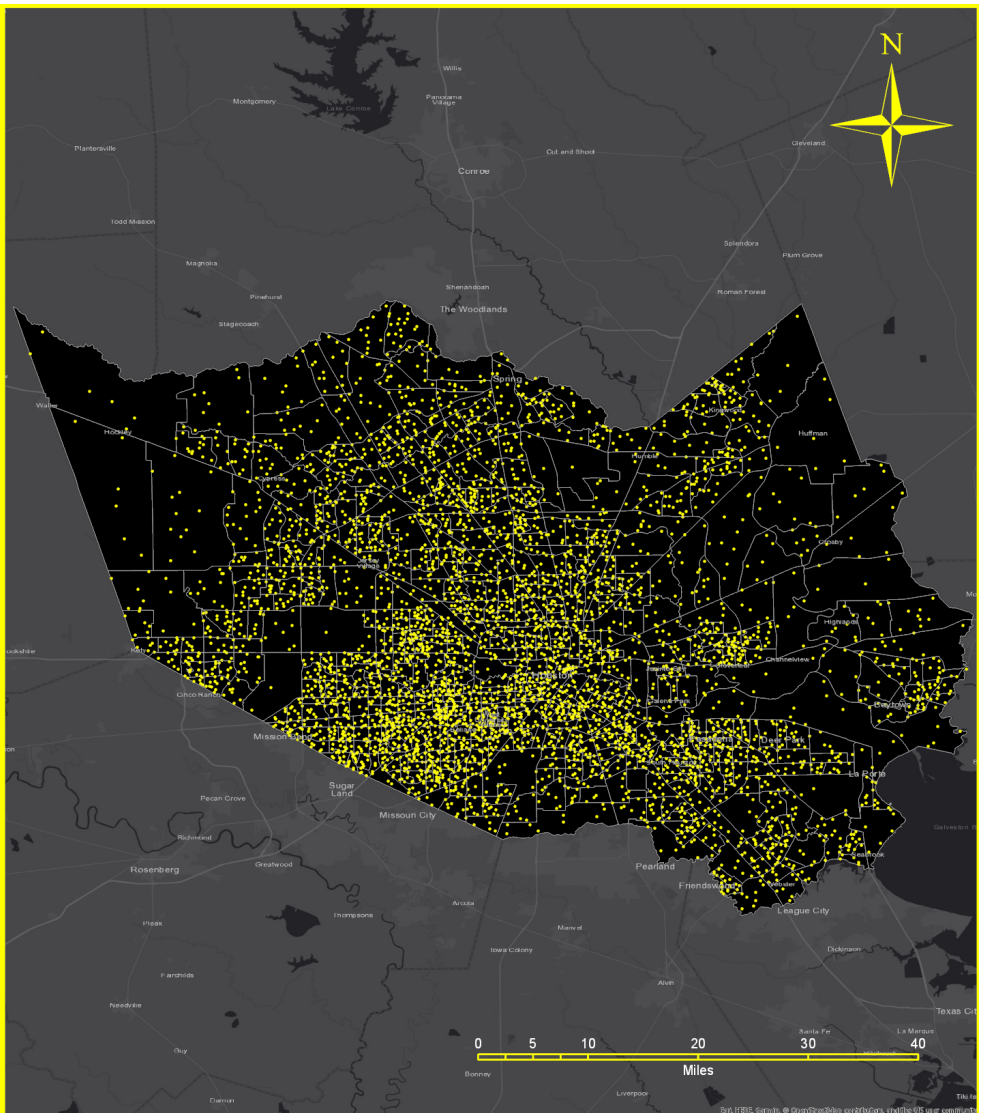
1 Dot = 50 People

● Harris County Residents



This map displays the geographic spread of the Harris County population. This map is meant to be a foundational cross-reference source to give the other maps deeper context regarding their respective percentages. Geographic and demographic data are from the 2016 ACS and was obtained from the US Census Bureau.

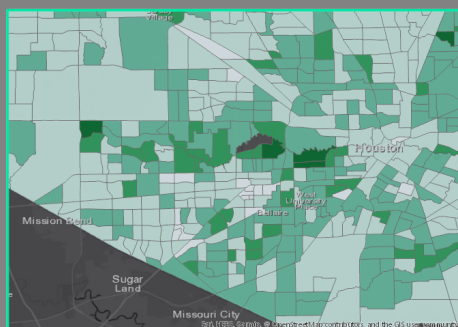
Cartographer: Michael W Biehl  
Date Created: October 25, 2017



## Elderly Population of Harris County

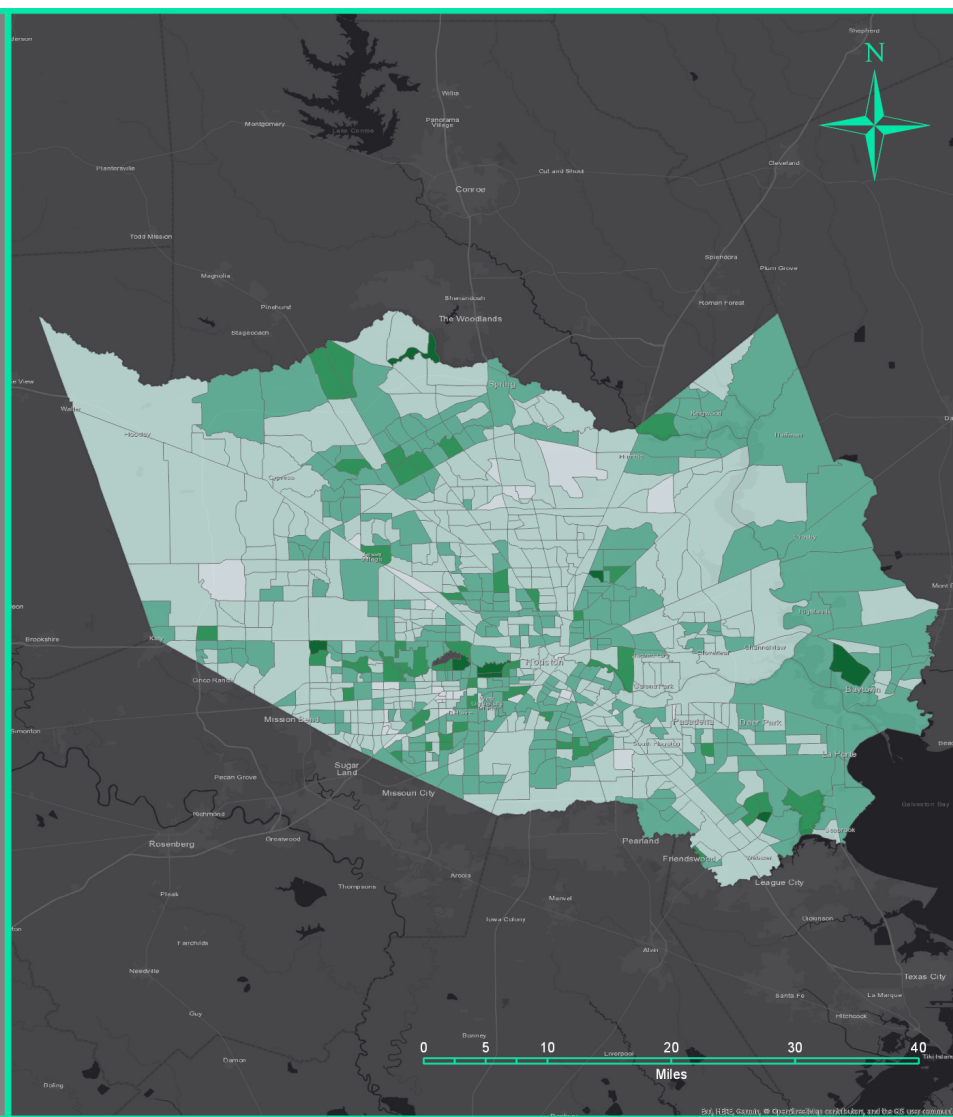
### Elderly Population Percentage

- $\leq 5\%$
- $\leq 15\%$
- $\leq 25\%$
- $\leq 35\%$
- $\leq 45\%$



This map shows the geographic spread of elderly citizens residing in Harris County, Texas. For this analysis, an elderly person is aged 60 years or older. Geographic and demographic data are from the 2016 ACS, and was obtained from the US Census Bureau.

Cartographer: Michael W. Biehl  
October 18th, 2018

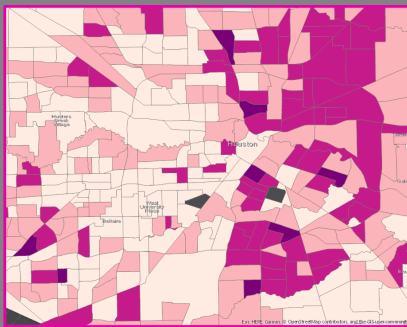


Map © 2018 County of Harris, Texas, and the US Census Bureau

## Rate of Elderly in Poverty within Harris County

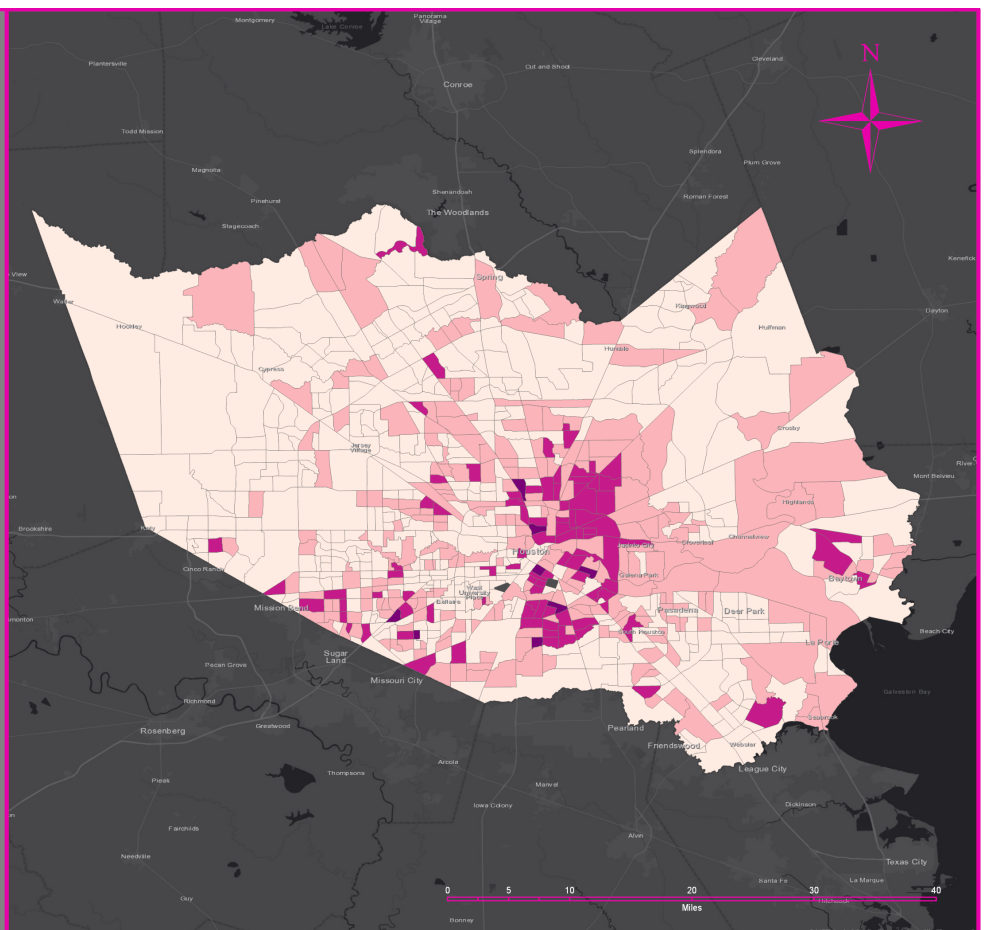
Percentage of Elderly in Poverty

- ≤ 1.0%
- ≤ 2.5%
- ≤ 5.0%
- ≤ 10%



This map shows census tracts in Harris County with the highest rates of elderly citizens in poverty. For this analysis, persons aged 65 and upwards were included in the "elderly" category. Geographic and demographic data are from the 2016 ACS and was obtained from the US Census Bureau.

Cartographer: Michael W Biehl

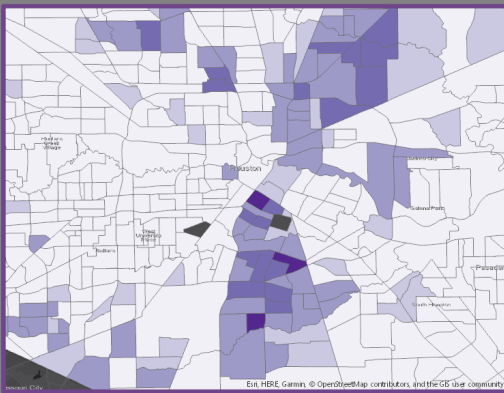




## Areas of Harris County with Highest Rate of Elderly Black Americans in Poverty

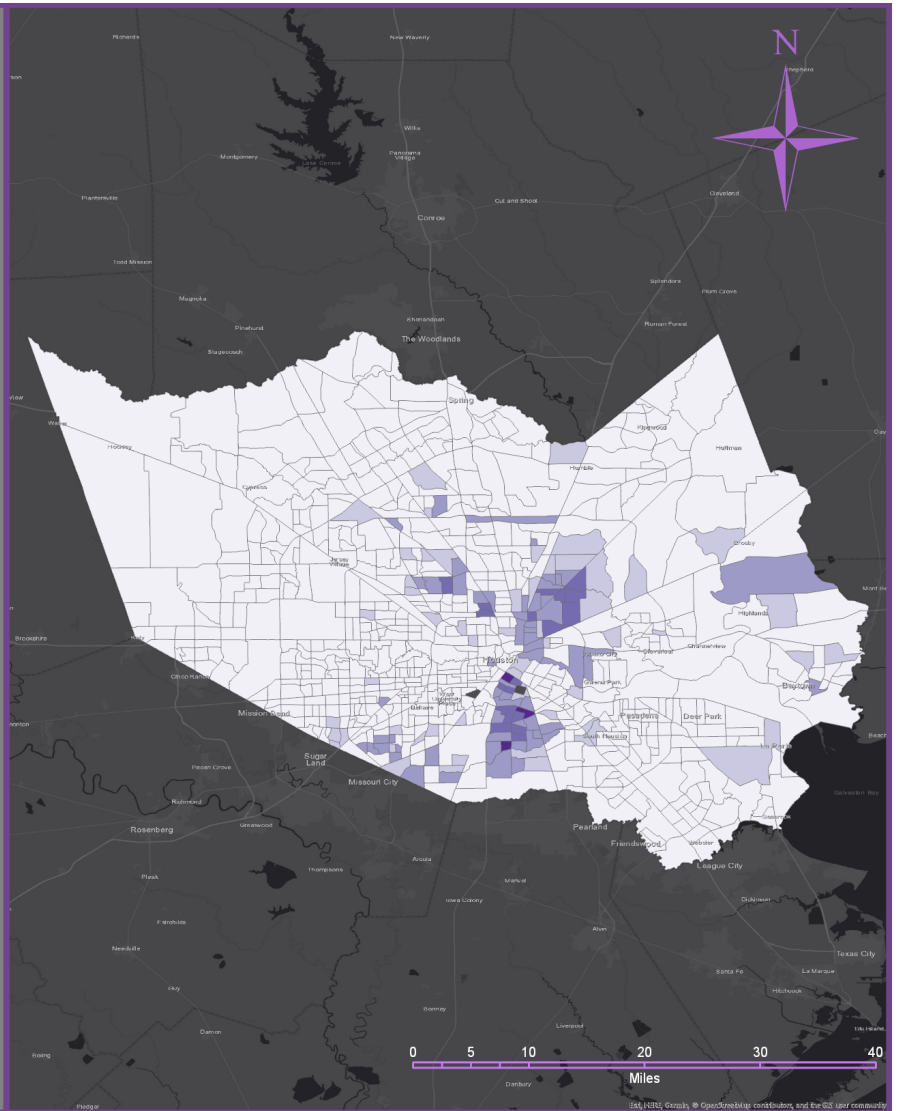
Percentage of Elderly Black Americans in Poverty

- ≤ 0.5%
- ≤ 1%
- ≤ 3%
- ≤ 5%
- ≤ 10%



This map displays the rate of elderly black Americans currently living under the poverty line in Harris County, TX. For this analysis, persons age 65 or over were included in the "elderly" category. Geographic and demographic data were gathered from the 2016 ACS and was obtained from the US Census Bureau.

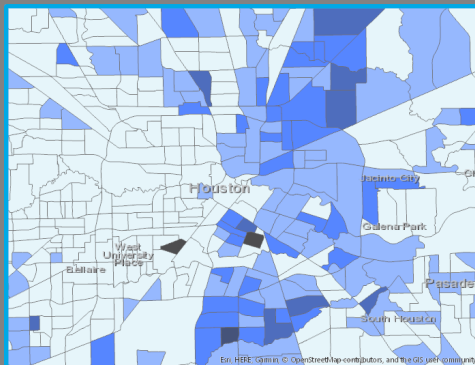
Cartographer: Michael W Biehl  
Date Created: October 27, 2018



## Areas of Harris County with Highest Rates of Elderly Households on Food Stamps

### Percentage of Elderly Households on Food Stamps

- ≤ 5%
- ≤ 10%
- ≤ 15%
- ≤ 20%
- ≤ 30%



This map displays the rate of food stamp reliant households that contain at least 1 elderly citizen in Harris County, TX. For this analysis, any persons age 60 years or older were considered 'elderly'. Geographic and demographic data were gathered from the 2016 ACS and was obtained from the US Census Bureau.

Cartographer: Michael W Biehl  
Date Created: October 26, 2018

