Final Report

MATH3745: Topics in Mathematical Modeling

MAJIC Data Analysis

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Executive Summary

Racism has been declared as a public health crisis in the city of Youngstown. Together with the Mahoning Anti-Racist and Justice Inclusion Coalition (MAJIC), we have acquired and analyzed data regarding racial disparities in Mahoning County. With the use of Tableau Public, we have found that there is a distinct rift between majority-White communities and majority-Minority communities. Communities with higher Minority populations tend to have higher rates of poverty, public cash assistance, people without a vehicle, people paying excessive housing costs, and lower income than communities with predominantly White populations. Additionally, compared to White people, People of Color experience higher mortality rates for the same diseases, such as cancer and cardiovascular disease. Not only this, but Black and Hispanic people face alarmingly higher rates of child poverty and unemployment than White people.

Introduction

Located in Northeastern Ohio, Mahoning County is full of scenic views and interesting locations. It is home to about 228,000 people. Most notable is the city of Youngstown, boasting a population of around 65,000[1]. Here in Mahoning County, and in the United States as a whole, there are people from many different backgrounds. In spite of this, and even all societal progress made nationwide, there still remains inequality in our communities. From bias to outright hostility, many minority groups face disadvantages simply for existing, and this is completely unjustified. These issues must be addressed and dealt with in order to ensure a better tomorrow for everyone, regardless of who they are.

Racism is a major problem, and it doesn't only exist in interactions between individuals. It also exists in the systems meant to benefit the community as a whole, and Mahoning County is no exception to this. In July of 2020, racism was declared as a public health crisis in the city of Youngstown. This is a serious issue, which is why, for our purposes, we have endeavored to collect enough data first that relate to the demographics, health conditions, income levels, and other social determinants of Mahoning county. We then analyze the data, anticipating that it might lead us to any statistical evidence of racism in Mahoning county.

Method

We began by combing through multiple different sources and datasets. While some are helpful, there were many which were either unusable or sketchy at best. Not all data is created equal, and without proper sources and citation, it is best to avoid dodgy links. Due to this, the hunt for data was easily the most time-consuming part of the project. Still, we were able to acquire multiple useful sources to aid in the completion of this project.

To analyze the data, we used Tableau Public[2], a software offering many ways to join and visualize different sets of data and how they interact. Though it has a steep learning curve, it proved to be a very helpful tool in assembling the different data and cross-analyzing the information. In addition to the creation of visualizations, Tableau also offers the ability to assemble them into what they call a Story - this is just a way of presenting researched information in a more seamless and concise manner.

[1] US Census Data, 2019 Estimates
[2] Link to Tableau's About Page

Results

One of the first things we modeled was based on demographic information. The visualizations can be found here. In this link, there are three separate maps - one concerning Minority statistics, one concerning poverty rates, and one concerning excessive housing costs[3].

The first map (Figure 1) describes Minority populations by Census Tract, with darker colors on the visualization corresponding to higher populations of Minority folks. Areas around Youngstown tend to have a higher population of Minority individuals. The Tooltip describes some more details, such as percent of Black or Hispanic people, as well as other statistics: percent of people with no vehicle available, percent of people with health insurance coverage, percent of people with public cash assistance, and median household income. As for percent without a vehicle available and percent with public cash assistance, these numbers tend to rise as the Minority population rises. There does not appear to be that significant of a change with health insurance coverage, though it is of note that Tract 8103 has a Minority population of 74.7%, and only 73% health insurance coverage, compared with other Tracts with averages in the 90%s. Incredibly surprising is the difference in median household income: lower incomes correspond with higher populations of Minority individuals (and contrariwise, higher incomes correspond with higher populations of white people). Many of the areas in Youngstown have a median household income of under $20,000 - compared with Tract 8121's median income of $80,000, this is shocking. Of course, suburbs tend to be a little more wealthy than inner-city areas, but this difference is much more profound than expected.

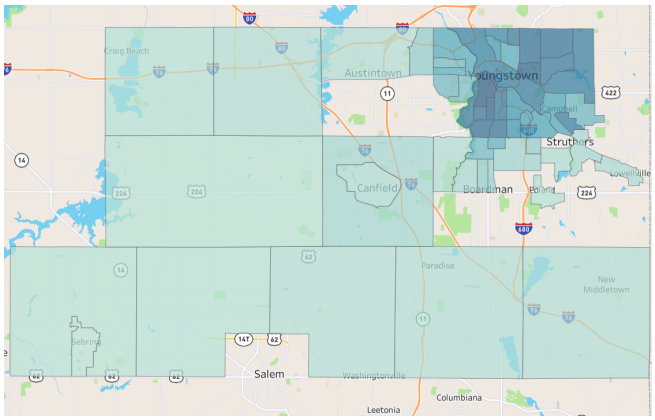

Figure 1: Map of Percentage of Population as Minority

The second map (Figure 2) describes poverty rates in Mahoning County, also by Census Tract. Surprisingly, there is a major concentration around the city of Youngstown - some areas have more than 60% of their respective population under the poverty line. Not only this, but many of the areas with higher poverty rates have a majority population of Minority individuals. The only exception is Tract 8141 (60.51% below poverty line), which only has a Minority

[3] City Health Dashboard, Youngstown Excessive Housing Cost Estimates

population of 44.4%, compared with areas such as Tract 8005 (63.37% below poverty line, Minority population of 84.12%) and Tract 8016 (64.45% below poverty line, Minority population of 83.11%). Tract 8112 boasts the lowest poverty rate at 3.21%, and it has a Minority population of only 2.3%. Other areas with low poverty rates share similarly low Minority populations, with the exception of Tract 8042, which has a poverty rate of 8.7% and a Minority population of 67.57%.

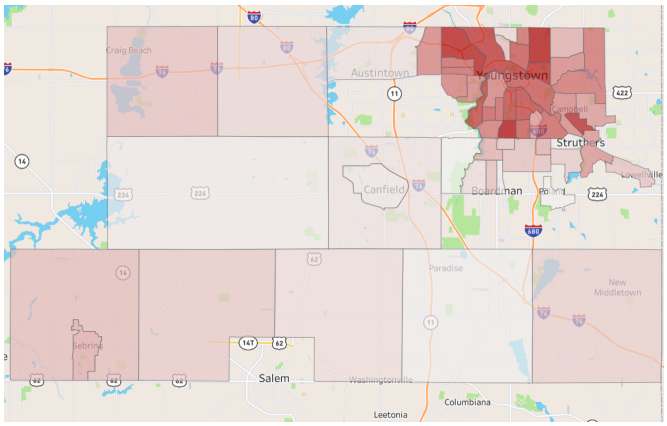

Figure 2: Map of Percentage of Population Below Poverty Line

The third map (Figure 3) describes excessive housing costs, or the percentage of people paying more than 30% of their income towards housing costs in Youngstown, with darker colors corresponding to more people paying excessive amounts. Hovering over a specific Census Tract will display more information associated with that location, including Tract number, ZIP code, and percent of population White versus percent of population Minority. The US average percent of people paying excessive housing costs is 35.8%. Areas paying more than average in housing tend to have higher proportions of Minority individuals, while areas paying less than average in housing tend to have a higher proportion of White people. This is not always the case, however - for example, Census Tract 8006 has a 92% Minority population, while on average, they only pay about 23.2% of their income in housing costs - far below average.

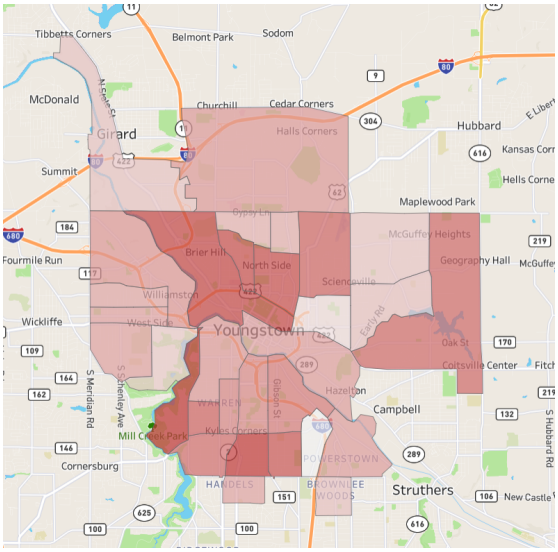

Figure 3: Map of Percentage Paying Excessive Housing Costs

In many societies, discrimination based on race been prevailing for a long time. Minority group populations are found to be in the problem in every sector because they are judged by their appearance. They are compelled to wait for a long time in the hospital or healthcare, it's very hard for them to get health insurance. Another thing we modeled was cardiovascular disease deaths, breast cancer deaths, and colorectal cancer deaths. The visualization plots race in the x-axis and death estimates in the y-axis. Here, it is clear that the number of people dying from different diseases in the minorities is higher as compared to the white race. The visualization shows death from Cardiovascular diseases, breast cancer and colorectal cancer in Youngstown city is higher among minorities as compared to other races. The estimated death from breast cancer among black is 23.2 per 100,000 whereas the estimated death among white is only 20.9 per 100,000. Similarly, the estimated death from Cardiovascular diseases among black is 275.2 per 100,000 , Hispanic is 137.5 per 100,000, white is 203.9 per 100,000. Moreover, the estimated death from Colorectal cancer among black is 1.5 times more than white. Overall, we can say more numbers of minorities die each year from diseases like Cardiovascular, breast cancer, etc.

Death from different diseases in Youngstown.

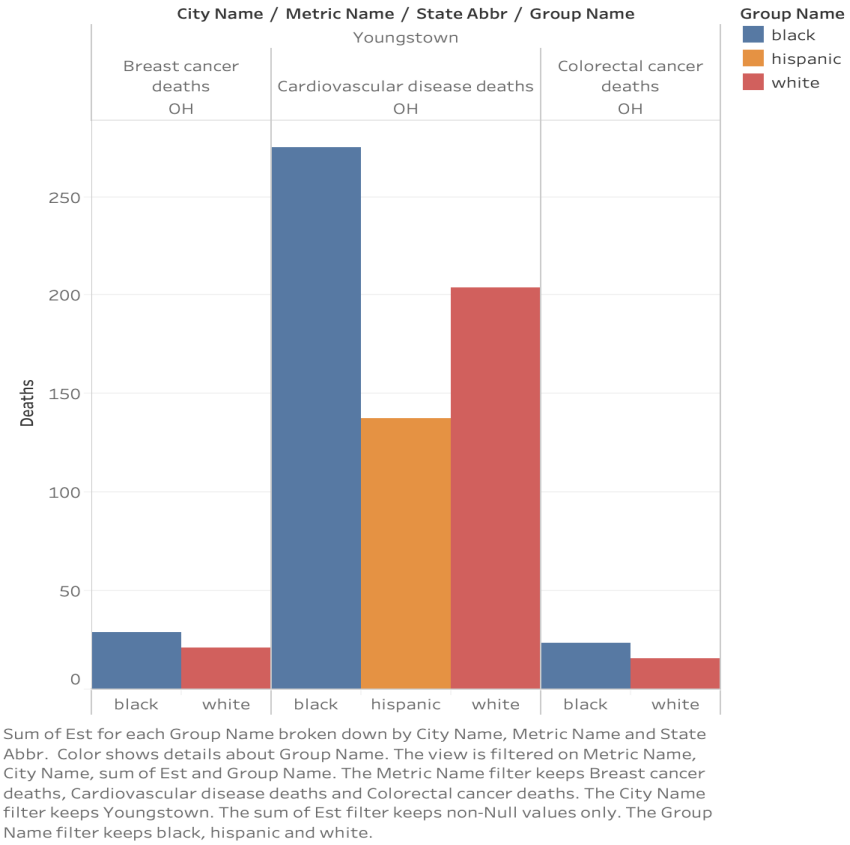

Figure 4: Bar Chart Displaying Deaths by Race in Youngstown

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[4] City Health Dashboard, Youngstown Breast cancer deaths, Cardiovascular diseases deaths, Colorectal cancer deaths

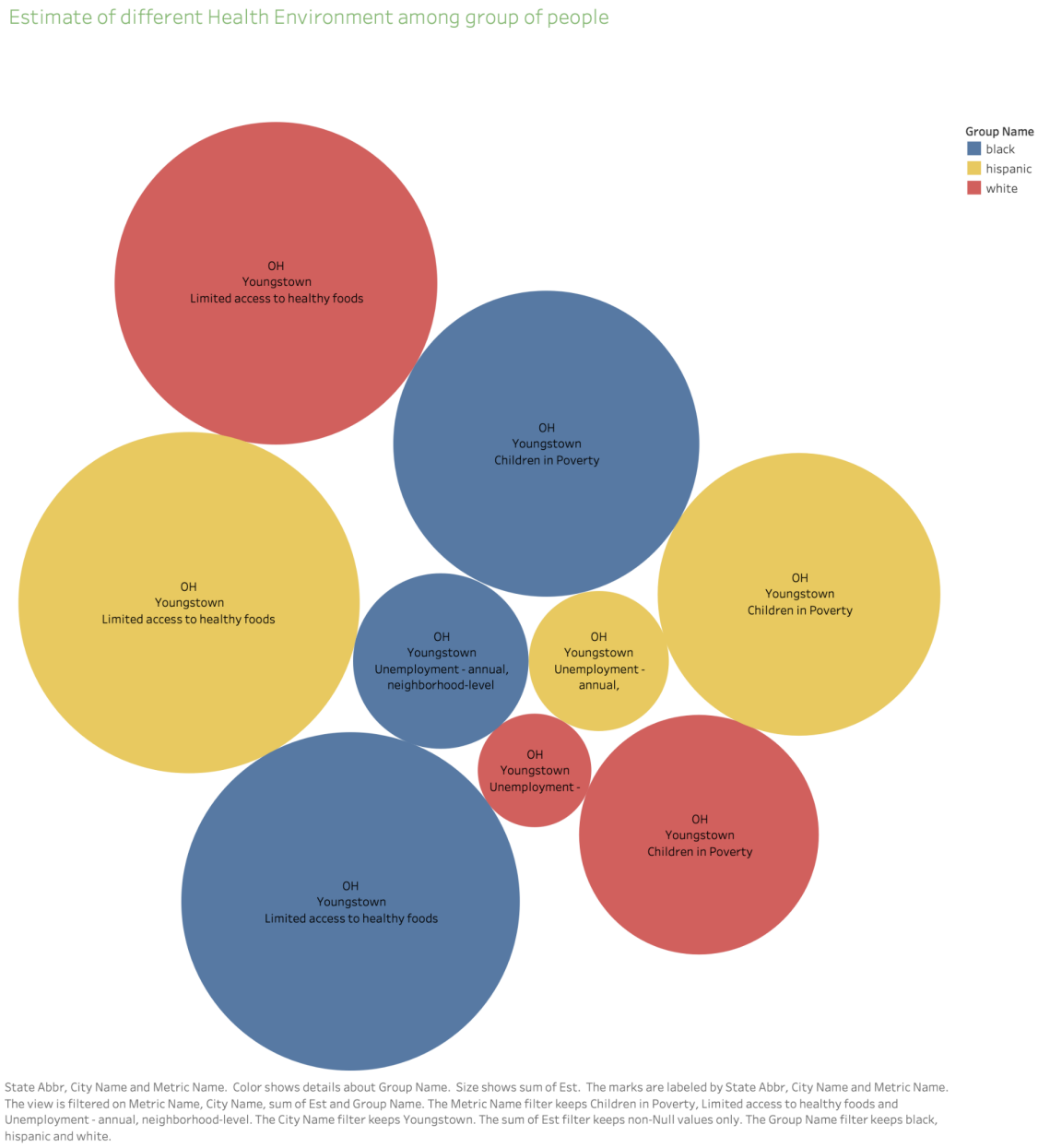

Figure 5: Unemployment, Children in Poverty, and Limited Access to Healthy Foods by Race

Here, the color blue represents the black population, yellow represents Hispanic, and red represents the white population. We can see the big bubbles for the black population in all three aspects: Limited access to healthy people, Children in poverty, and Unemployment which means there is more problem for the black population as compared to the Hispanic and white population. According to the visualization, the children in poverty in Youngstown among black population is 1.17 times more than that of hispanic and 1.63 times more than white population. Likewise, unemployment in Youngstown is higher in the case of black population which is 21.50 per 100,000. We can say, there is a 2.38 times more unemployment problem among black

population as compared to white population and 1.52 times more as compared to hispanic. The bubbles in case of limited access to healthy food look quite similar but there is about 0.90 and 0.89 times more access to healthy foods in case of white population and hispanic population respectively as compared to black population.

City Health Dashboard, Youngstown Limited access to healthy people, Children in poverty and Unemployment

Conclusions

In conclusion, there is a clear disparity between Minority and White populations in Mahoning County. Predominantly White communities experience higher income (and thus lower rates of poverty and public cash assistance), and lower rates of unemployment, which directly contributes to systemic inequality. Because they have more income, they can afford more and better health care. This is just brushing the surface of reasons that Minority populations can face worse health outcomes than White populations. This is also evidenced by the higher rates of mortality.

This project is not without limitations. Perhaps the largest limitation on this project was time constraints. With less than 16 weeks, there is only so much we could accomplish. As previously mentioned, gathering usable data and datasets was perhaps the most challenging and time-consuming part of the project. While there are many datasets out there, very few contain the information we needed to complete this analysis. Mahoning County is only so big, and there is not a whole lot of publicly available data with the level of detail we need. And, when it is available, it takes time to acquire. Beyond data collection, another challenge under time constraints was performing the analysis. Between a completely new software to each of us and the already-present issues with detailed data, figuring out meaningful ways to model the data we had was a bit stressful under the semester's time constraints.

A possible path for future research is clearly obtaining more and better data. This project encompasses finding disparities in communities by details as focused as zip code. While effective to find disparities in the county by itself, it would help so much more to have inequalities narrowed down by zip code in order to effectively tackle these problems.

One notion that could be given special emphasis when it comes to projects like ours is Targeted Universalism. Targeted Universalism is the idea of achieving universal goals through the usage of targeted approaches. In socio-economic problem solving, this methodology involves targeting specific marginalized groups and the problems that they might be facing -- which may be hindering the achievement of an overall goal in the community -- and working towards tackling those problems so that any hindrance to a universal goal could be mitigated. This idea -- if used

to approach problems related to health, finances, education, housing, and food security -- could lead to very accurate and specific data about the groups that are facing the problem. And that could heavily benefit organizations involved in the study of communities facing the problems as they could formulate better and accurate strategies to tackle problems.

In relation to our project, one of our chief goals during data collection was to obtain data that was specific about the marginalized groups and did not just consist of over-encompassing numbers that told us nothing specific. Sources that employed approaches such as targeted universalism were preferred.

References

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