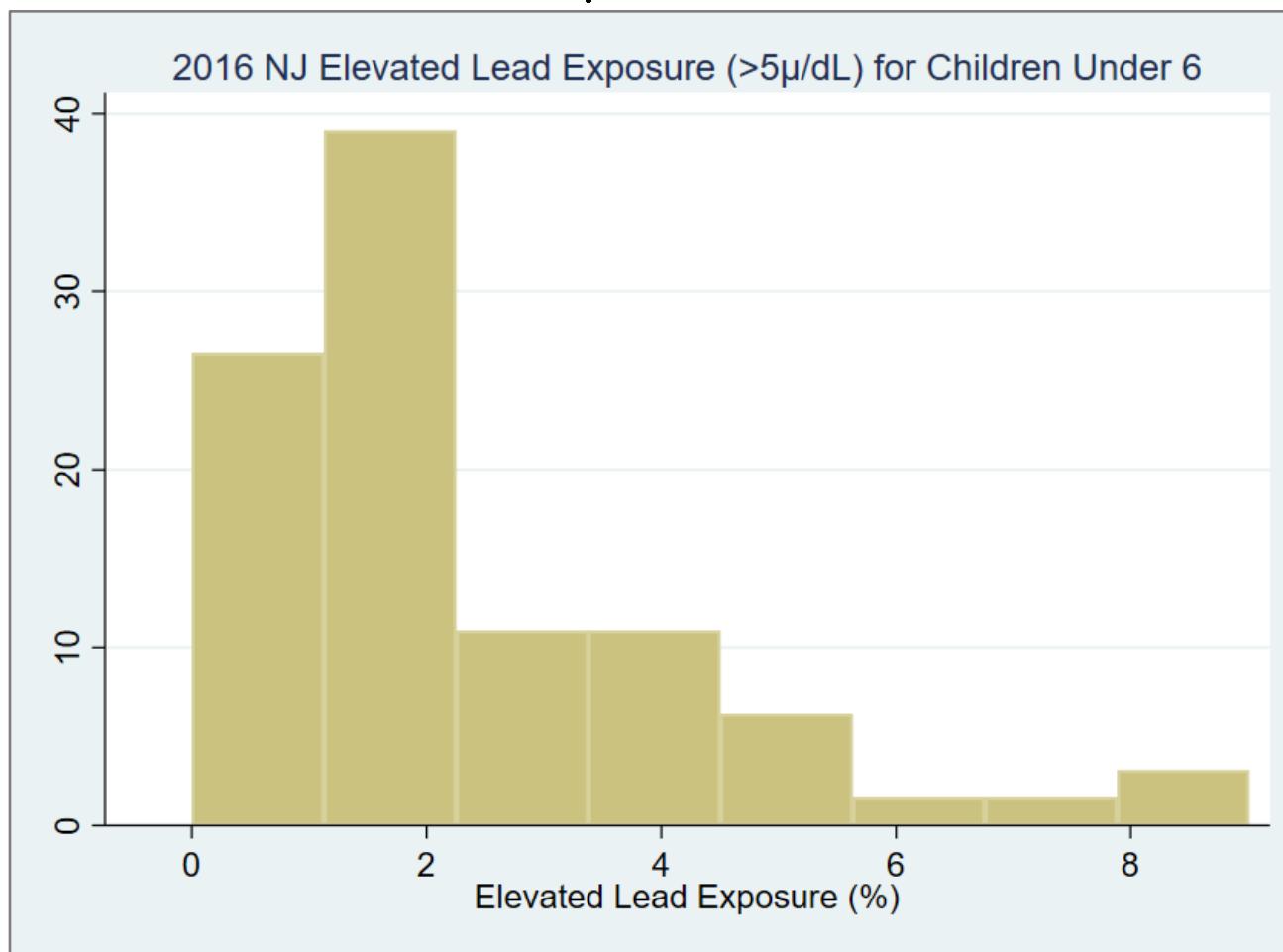


DANGEROUS LEVELS OF LEAD EXPOSURE FOR NEW JERSEY CHILDREN

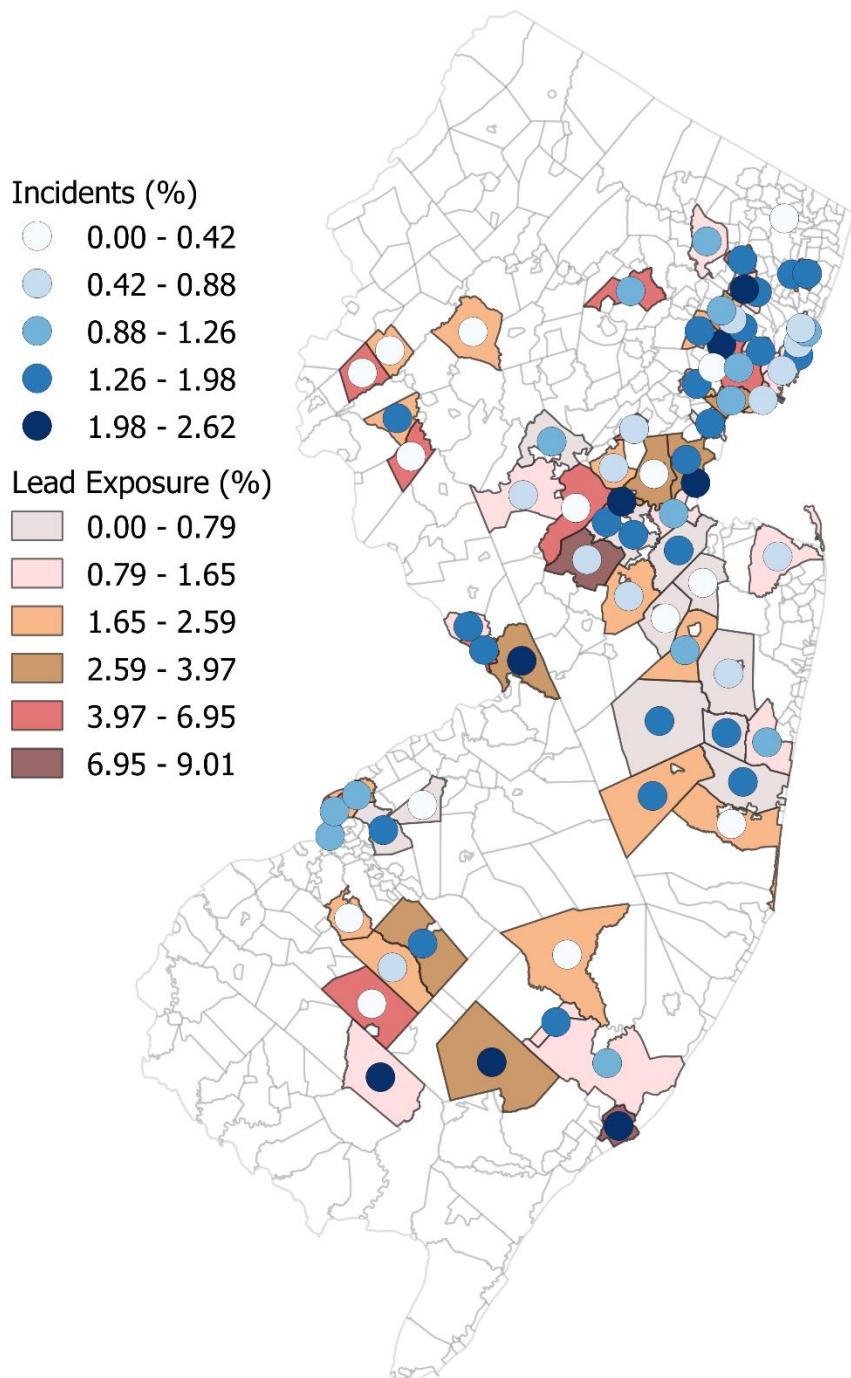
GIS Final Project
[REDACTED]



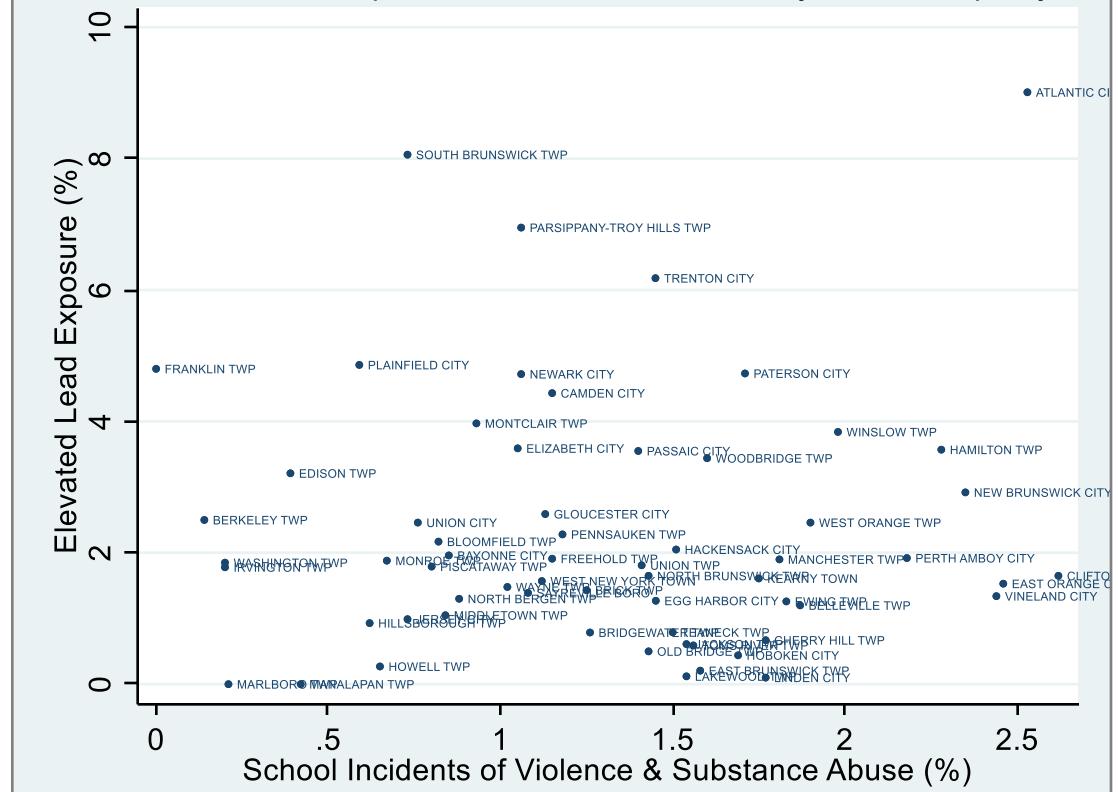
It is well documented that New Jersey has a lead crisis, in fact over 4,800 children were identified with elevated blood lead levels (EBLL) (at/above $5\mu\text{dL}$) in 2016ⁱ. Furthermore, since 2000 there have been about 225,000 children poisoned by lead in New Jersey and research shows that lead exposed children are seven times more likely to drop out of school and six times more likely to be involved in the juvenile justice systemⁱⁱ.

The histogram above shows the distribution of elevated levels of lead exposure in children under 6 in 2016ⁱⁱⁱ. The most frequent levels of elevated lead exposure are 1.5-2 followed by 0.1 to 1.5. There are a few rare cases where lead exposure levels are greater than 5%. In some rare cases 8% of children tested showed elevated levels of exposure. However, all levels of exposure greater than .5ug are extremely detrimental.

2016 Lead Exposure & School Incidents by Municipality

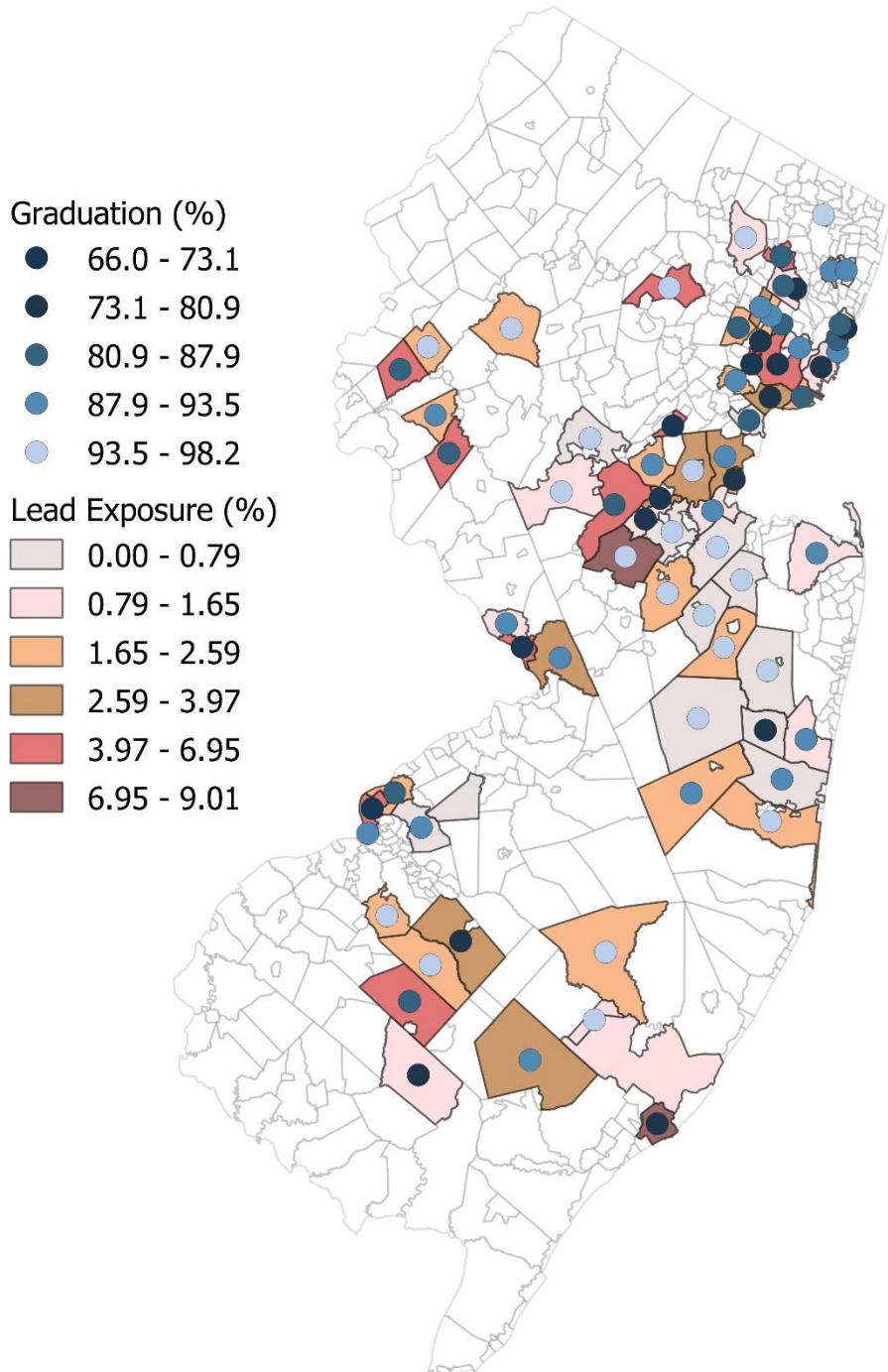


2016 Lead Exposure & School Incidents by NJ Municipality

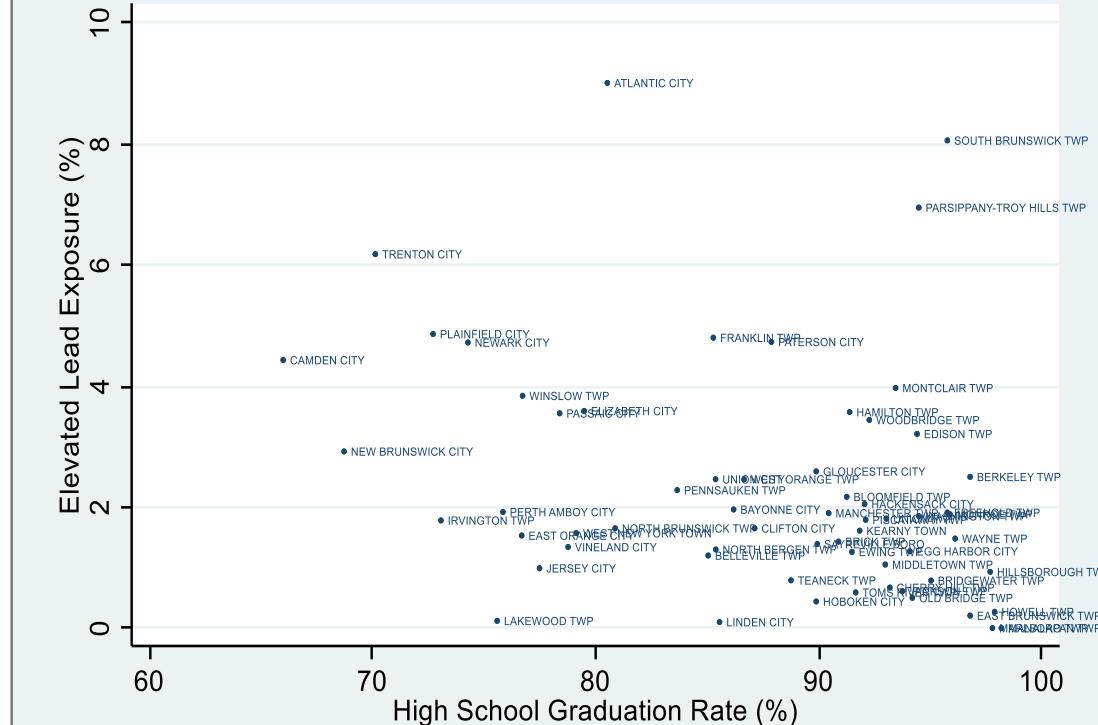


In order to test the relationship between lead exposure and behavior in children, I compare lead exposure and school incidents data from 2016 in New Jersey. The data of school incidents includes violence and substance use^{iv}. As seen in the scatterplot above, there is not a clear correlation. For instance, in Camden where 4.4% of children under 6 have elevated lead levels, the proportion of school incidents is 1.5 and in neighboring Cherry Hill where only .6% of children have elevated lead levels, there was a greater proportion of school incidents (1.77). There are several limitations to this data. First the data contains two different samples and there is great variation within each, including the length of time a student has lived in the municipality. Second, the data is limited (and therefore biased) because many parents choose not to have their child tested. Finally, the incident data does not track behavioral or education outcomes and therefore is missing several of the variables that recent lead research shows is important- autism, behavioral health and test scores.

2016 Lead Exposure & High School Graduation Rates by Municipality



2016 Lead Exposure & Graduation Rates by NJ Municipality

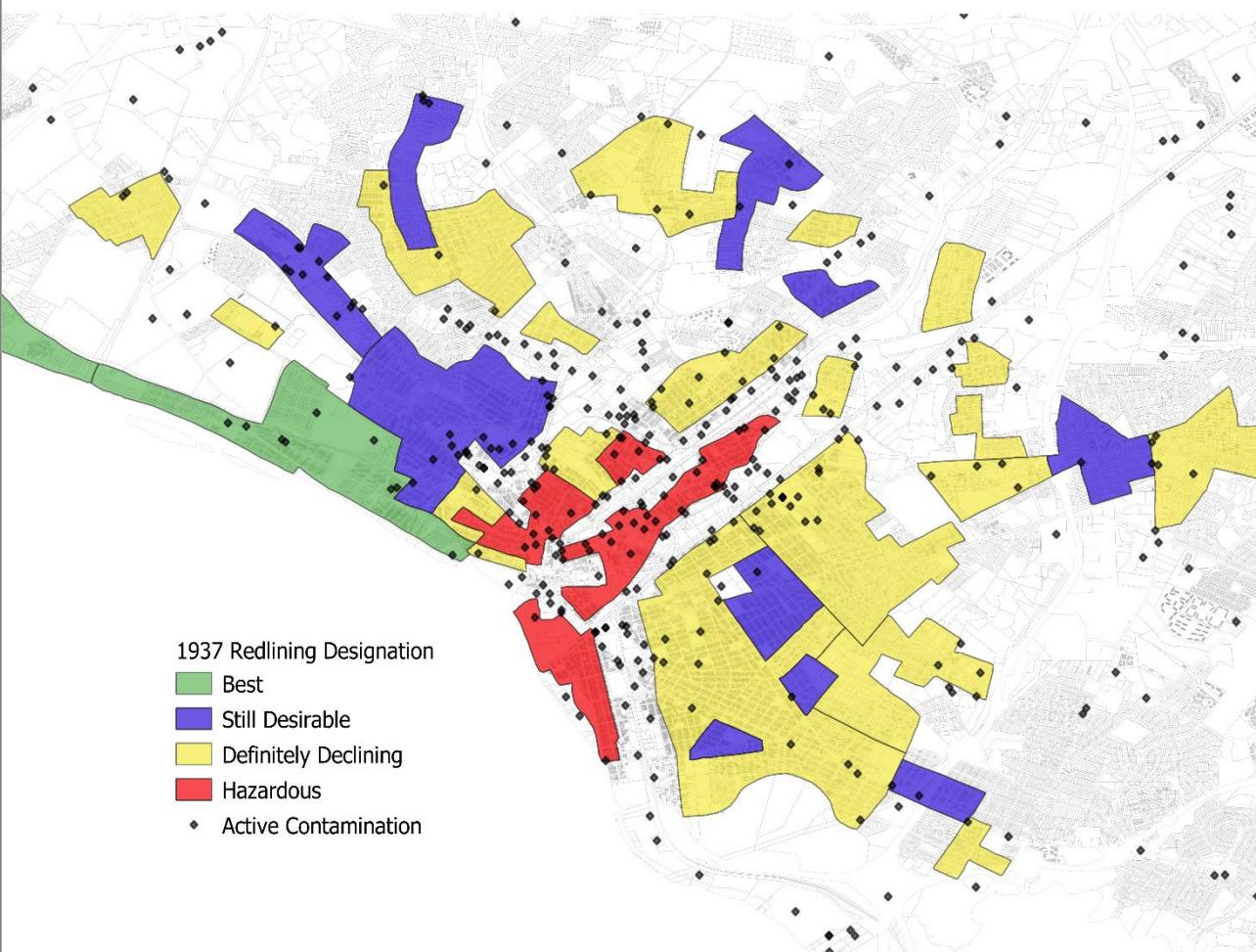


Similar to the hypothesis about school incidents and lead exposure, I sought out to test for a relationship between lead exposure and high school graduation rates^v. There does seem to be more of a correlation between lead exposure and high school graduation rates. Schools with lower levels of exposure seem to cluster around 90-100% graduation rates. There are several outliers however with very high lead exposure levels and good graduation rates (South Brunswick and Parsippany for example). The same limitations apply to this data however. The youth in both samples are not the same and there are countless variables that impact graduation rates (income, parental involvement etc.).

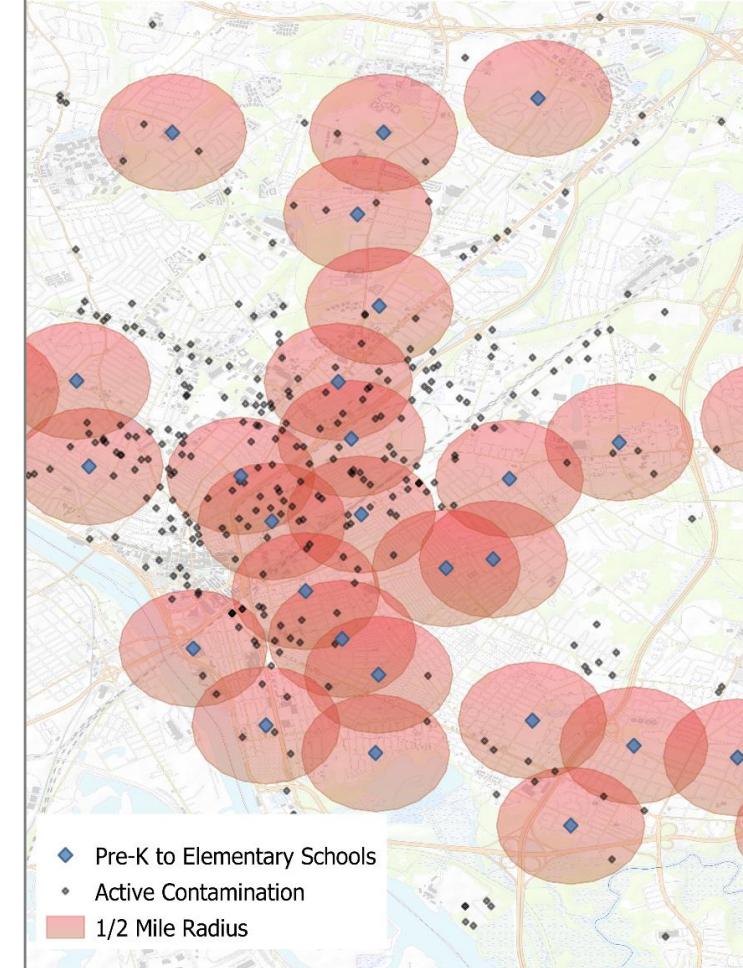
This map importantly calls Atlantic City, Trenton, Camden, Plainfield and Newark to attention as municipalities with very high levels of lead exposure and some of the lowest levels of high school graduation in the State.

TRENTON NEW JERSEY: LEAD EXPOSURE & ENVIRONMENTAL RACISM

Trenton New Jersey
1937 Redlining Designations & Current Contaminated Sites



Trenton New Jersey
Contaminated Sites Within 1/2 Mile Radius of Schools



In order to look for a relationship between structural racism and contamination (environmental racism) I used the historic policy or redlining as a proxy for racism and in overlaying the 1937 map^{vi} and current day contaminations^{vii} a pattern emerged. The first map shows a clustering of current contaminated sites in areas that were deemed hazardous and declining in 1937. While there is expected to be a great amount of decline throughout the city due to deindustrialization and policies of disinvestment (that followed redlining) there is two times as much contamination in areas that were deemed declining and hazardous (38 sites versus 78). The second map shows the same contaminated sites and their proximity to schools in Trenton^{viii}. The schools with the most concentrated areas of pollution are indeed within the same redlined areas. This shows that children in Trenton are at a higher risk for lead and pollution exposure in areas that were historically redlined.

Notes

I chose natural breaks for my lead exposure data and created an extra bin. I felt it differentiated between the differing levels of exposure more appropriately. There are fewer extreme exposure numbers but I wanted to highlight that there are a few very extreme cases (outliers).

Similarly, I chose natural breaks for graduation rates- it was the best representation of the data and reflected graduation rates well- lower, average and excellent.

Histogram and scatterplots were done using Stata.

There are several implications for further research. It would be valuable to gather data from schools in terms of autism diagnoses, behavioral issues and test scores in order to compare these variables in schools with differing amounts of lead exposure. It would also be good to further test the redlining hypothesis by mapping several NJ cities for redlining and contamination to see if the relationship exists in places other than Trenton. It would also be helpful to determine the types of properties redlined and the types of pollution that exists.

i <https://www.state.nj.us/health/childhoodlead/documents/reports/childhoodlead2016.pdf> pg. 7

ii <https://www.hcdnnj.org/assets/documents/lead%20infographic.pdf>

iii Lead Exposure data was collected from <https://www.state.nj.us/health/childhoodlead/documents/reports/childhoodlead2016.pdf> Table 4 pg. 19 and manually entered into Excel database.

iv School Incident data was collected from <https://www.nj.gov/education/schools/vandv/1516/vandv.pdf> Appendix-D pg. D-2 and manually entered into Excel.

v High School Graduation data was collected from

https://www.nj.com/education/2018/02/njs_graduation_rate_climbs_again_look_up_your_scho.html#Search%20tool Download Data and search 2016

vi Redlining Map was collected from <https://dsl.richmond.edu/panorama/redlining/#loc=11/40.2570/-74.9178&opacity=0.8&city=trenton-nj>

vii Contaminated Sites data was collected from http://njgis-newjersey.opendata.arcgis.com/datasets/6f11f6204ffa40a09527c8205aec4425_7?selectedAttribute=CATEGORY SQL used to determine active sites

viii Trenton School district data collected from http://njgis-newjersey.opendata.arcgis.com/datasets/d8223610010a4c3887cfb88b904545ff_4 SQL used to determine Elementary Schools and under.