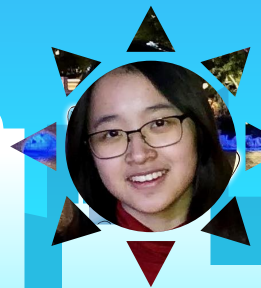


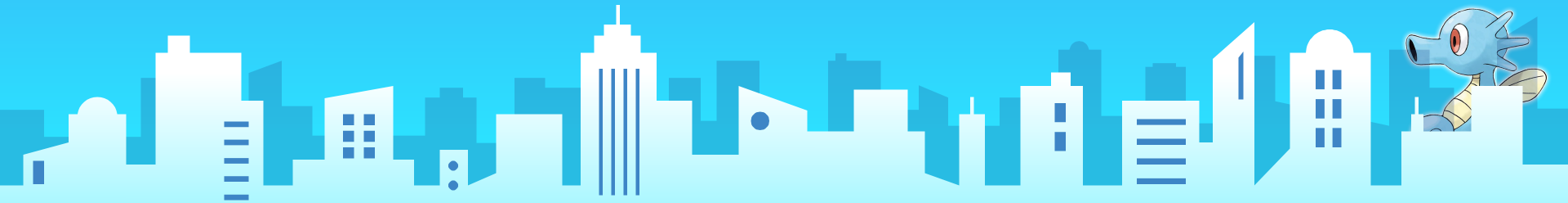
Team Horseas

Fernando Gonzalez-Cruz and Annie Xu

Mentored by Grace Wang



Blood, Lead,
and Racial Injustice
in Philadelphia





*1. Why do inequity and
elevated blood lead levels
matter?*



1. Lead poisoning is a challenge close to home.



Philadelphia

Houston

SCIENCE & TECHNOLOGY

Lead toxicity risk factors in Philadelphia

Two studies identify factors that correlate with high blood-lead levels in children, pointing to ongoing environmental justice issues that disproportionately fall on children of color and poorer communities in the city.

POLITICS // TEXAS POLITICS

'They are being exposed': Experts fear lead poisoning makes Fifth Ward one of 'hundreds of Flints'



“

2. Key question:

Which children are most likely to
experience elevated blood lead levels
in Philadelphia?



2. Key Variables

Geography (GEO_ID)

The ID of the census tract.

Source: 2010 Census

Race/Ethnicity (Black, Asian, etc.)

% of people in that census tract who identify as a given race or ethnicity.

and **Other Demographic Variables**

Children Screened (NumScreen)

The number of children who were screened for blood lead levels.

Lead Levels (Pct5Plus)

The % of children screened who have elevated blood lead levels.

Source: Philadelphia Open Data Portal



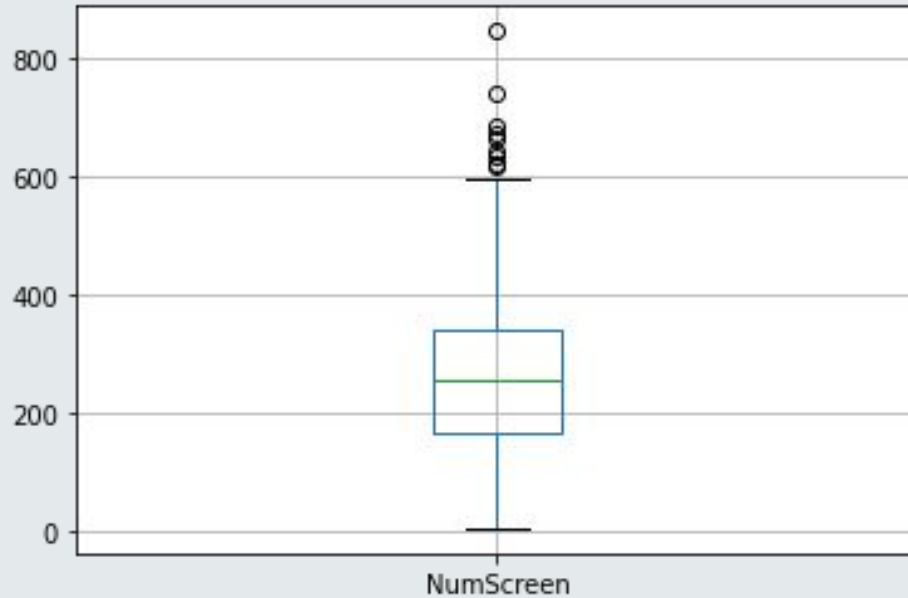


3. *Pre-Processing*



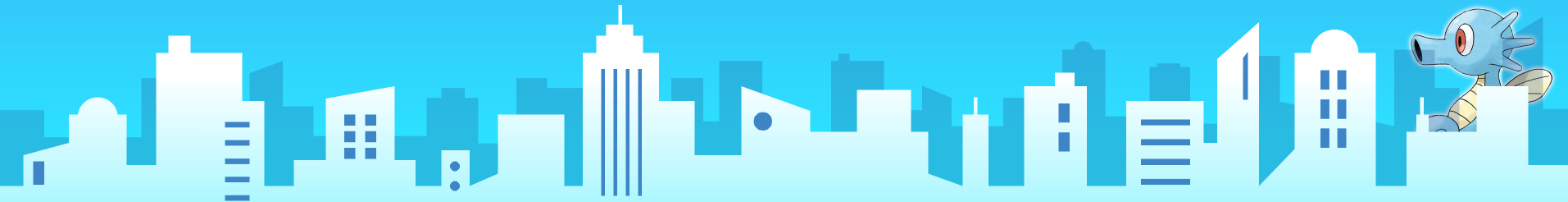
3. Pre-Processing

Distribution of # Children Screened per Census Tract



3. Pre-Processing

1. **Census tracts with few data points:**
 - a. We removed rows with fewer than 30 children screened
 - b. Law of Large Numbers
2. **"IsRedacted" column**
 - a. Documentation said "ignore this variable"
3. **Overall, a pretty clean dataset!**
 - a. No NaN values.





4. *Initial Visualizations*

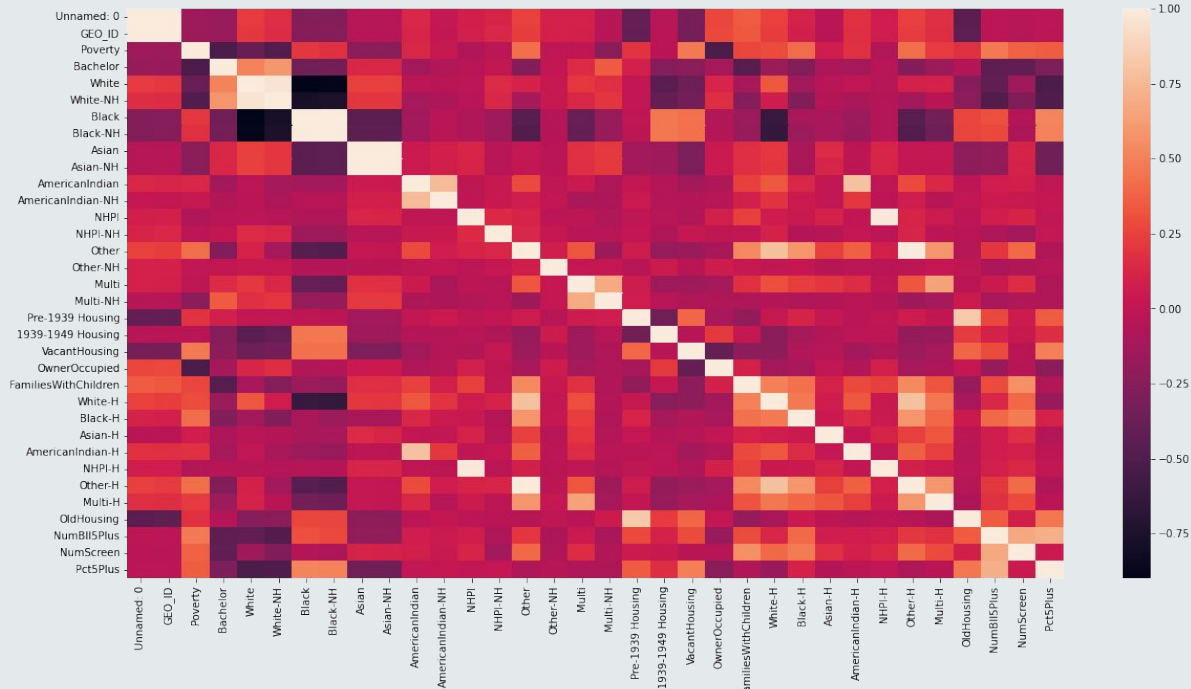


4. Initial Visualizations

Correlations against
Pct5Plus

* **Positive:** Poverty,
Black, Black-NH,
Pre-1939 Housing,
VacantHousing,
OldHousing

* **Negative:** Bachelor,
White, White-NH, Asian,
Asian-NH,
OwnerOccupied, White-H





5. Models

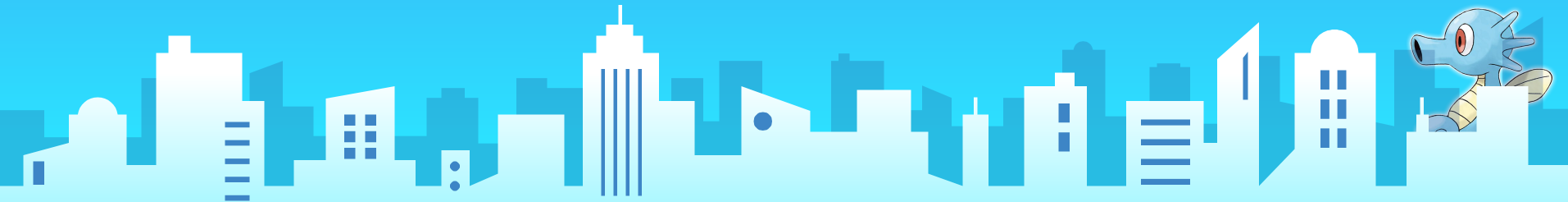


5. Models

Identified variables with smallest
mean squared error (MSE)



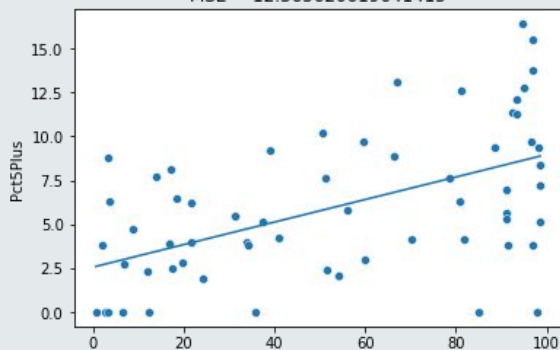
Final product:
positive and negative linear models



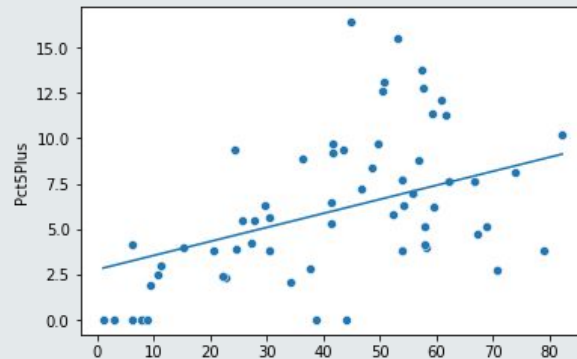
5. Models

Demographics correlate with elevated lead levels

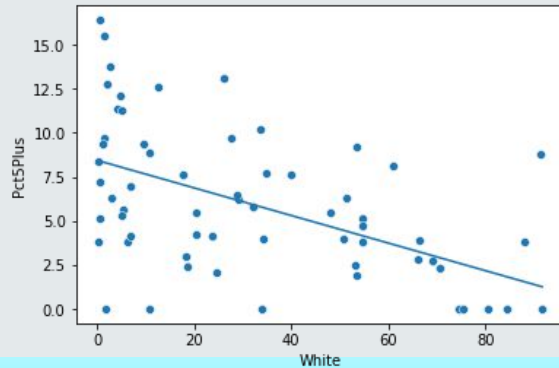
Regression for Black and Pct5Plus
MSE = 12.365620619641415



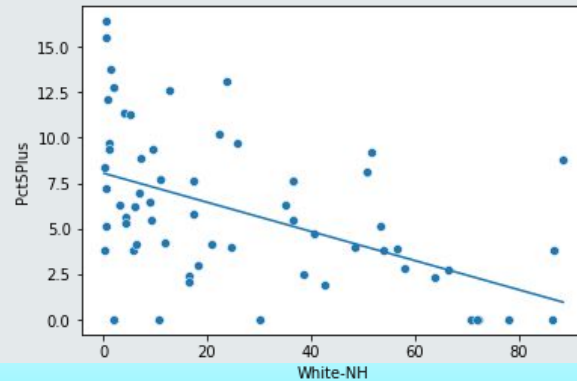
Regression for Pre-1939 Housing and Pct5Plus
MSE = 12.17040763737278



Regression for White and Pct5Plus
MSE = 12.680685663750827



Regression for White-NH and Pct5Plus
MSE = 12.868312625009159





6. *Insight*



6. Insight

Positively correlated: Black, Old Housing

Negatively correlated: White, White Non-Hispanic

Social Determinants of Health:

- From the CDC: Where people are born, live, work, etc.
 - ...but also includes economic systems & policies, development agendas, racism, climate change, etc.
 - <https://www.cdc.gov/publichealthgateway/sdoh/index.html>

Highlights how to effectively allocate resources

