NYC Town + Gown report on
Environmental Determinants to
Health, Wealth & Education in the Bronx
to the Bronx Council for Environmental Quality

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Intro Team

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Introduction & Project Goal

- Compared with other boroughs, the Bronx has not received enough attention given the severity of its intersecting problems.

- The project goal is to gather current data to compare and review reasons why the health, wealth, education and environmental equity for Bronx residents is different from the rest of the City, in order to identify and advocate for environmental justice policies for Bronx.

- The team documented and graphically represented the connection between demographic and environmental conditions in order for stakeholders and decision makers to implement informed policy decisions.
Research Questions

1. What are the relationships among health, wealth, education, and environmental equity in the Bronx?

2. Why do these factors differ in the Bronx in comparison to the rest of New York City?
Health
Eusebia Vazquez
● Data:
  ○ Primary care physician to patient ratio
  ○ Asthma Hospitalizations of children of age 0-17 and public schools
  ○ Areas that lack health insurance in New York State
  ○ Diabetes percentages in all of New York State

● Methods:
  ○ Created charts on Jupyterhub by uploading csv files
  ○ Used QGIS to create maps
  ○ Analyzed data based on population, age, and counties to determine findings
Findings:
- The most cases of asthma are in the South Bronx which is located between three highways.
- Asthma rates remain high throughout the Bronx residents.
- Primary physicians to patient ratio are very high so meanwhile residents are seeking doctors there is not enough of them available in the Bronx.

Conclusions:
- Overall, asthma hospitalization rates have remained at an all time high throughout the years in the Bronx in specific to younger children and older adults.
- Diabetes is prevalent in adults residing in the Bronx area.
Residents who lack health insurance

Source: CDC Health Insurance Crude Prevalence 2012-2013
Asthma Hospitalizations of children of age 0-17 and Public Schools in NYS

Source: NYS Department of Health 2011-2012
Wealth
Kayla Bernard
● Data:
  ○ 2019 American Community Survey (United States Census Bureau)
  ○ Tables DP03 and S0201: Selected Economic Characteristics and Selected Population Profiles in the United States
  ○ Indicators of wealth: median income and unemployment rate

● Methods:
  ○ Conducted bivariate and multivariate analysis using Python.
  ○ Created maps using QGIS
  ○ Analyzed population of New York state; examined population of New York City by race.
  ○ Analyzed median income and unemployment rates across the five boroughs; examined median income and unemployment rates by race in the five boroughs
Findings:

- Unemployment Rate: NYS-4.4%, Bronx-9.1%
  - NYC: Highest: Black New Yorkers from the Bronx (11.0%), Lowest: White New Yorkers from Manhattan (2.7%)
  - NYC: Highest: White New Yorkers who live in Manhattan ($122,085), Lowest: “Other” who live in the Bronx ($35,770)

Conclusions:

- The Bronx has the lowest median income and the highest unemployment rate in New York City.
- Within the Bronx, racial disparities negatively impact the distribution of wealth. Black people have the highest unemployment, and people who identified as “other” (racially ambiguous ethnic groups like Latinos) have the lowest median income in the borough.
Education

Ashe Lewis
● **Data:**
  - New York City Department of Education’s datasets: “Public Graduation Rates”, “Demographic Snapshot”, “Attendance Results” and “Student, Teacher and Parent Surveys”
  - Citizens’ Committee for Children of New York’s “Dropout Rate” table
  - Lehman College’s datasets (Information from the City of New York): “Bronx Parks and Recreation” and “Bronx Public School”

● **Methods:**
  - Ascertain relevant groups to study (determining whether to separate data by the intersections mentioned or analyze data for all groups)
  - Use python (specifically matplotlib) to compare and create data visualizations as well as conduct linear regressions
  - Use ArcGIS to formulate maps that further investigate the correlations among education, wealth, health and environmental equity
Findings:
- The rate of poverty within the Bronx increases by roughly 5.57% for every student with a disability. With a correlation coefficient of 0.71150 (p = 0.1777), there is a strong positive correlation between the two variables.
- Low-income communities (with socio-economic indexes of less than the national average of 50) have access to parks in worse conditions than higher-income neighborhoods.
- Bronx education districts nine and seven experience the most air pollution (with around 8.50 and 8.70 micrograms per m^3) and resultantly a comparably higher dropout rate (of 9.20%) than other districts.
- Education districts bordering major roadways hosted higher dropout rates than those farther away.

Conclusion:
Educational outcomes of students (particularly low-income, Hispanic/ Latinx and Black students) are greatly dependent on proximity to parks in acceptable conditions, the number of parks in city districts per 1000 children, major roadways and overall access to green space.
Source: “US Freeway System”. Esri, 2019

“Dropout Rate”. Citizens Committee For Children, 2020,
https://data.cccnewyork.org/data/table/135/dropout-rate#135/219/99/a/a

“ACS Race and Hispanic Origin Variables - Boundaries”. Esri, 2020
Environmental Equity
Gabriel Fernandez
● Data:
  ○ “Community Districts.” New York City Department of City Planning, 2021, https://data.cityofnewyork.us/City-Government/Community-Districts/yfnk-k7r4
  ○ “Parks Inspection Program.” New York City Department of Parks and Recreation, 2021, https://data.cityofnewyork.us/dataset/Parks-Inspection-Program-Inspections/yg3y-7juh
  ○ “Open Space (Parks).” New York City Department of Information Technology and Telecommunications, 2018, https://data.cityofnewyork.us/Recreation/Open-Space-Parks-/g84h-jbjm
  ○ Environmental equity indicators: city parks in district per 1000 residents (acres), city parks in district per 1000 children (acres), city parks in district per 1000 seniors (acres), percent parkland, residents within a 5-minute walk of a park, park-related 311 calls, tree canopy cover (percent), air pollution (micrograms per m^3), parks considered acceptable for condition, and parks considered acceptable for cleanliness.

● Methods:
  ○ Use basic analysis to visualize Bronx indicators in relation to the rest of New York City with bar charts.
  ○ Use R to conduct correlations to find the connections between indicators of environmental equity, health, wealth, and education
  ○ Map the indicators using QGIS software.
Sources: NYC Department of City Planning, New York Community Health Profiles, NYC Department of Parks and Recreation, NYC Department of Information Technology and Telecommunications, and the American Community Survey (2014-2018).

Obtained from New Yorkers for Parks Research Library
Air Pollution in District (Micrograms Per Cubic Meter) Across NYC

Sources: New York Community Health Profiles 2018 and New Yorkers for Parks Research Library

Air Pollution (Micrograms Per Cubic Meter)
- 0 - 0
- 0 - 4
- 4 - 6.85
- 6.85 - 7.1
- 7.1 - 7.4
- 7.4 - 7.5
- 7.5 - 7.8
- 7.8 - 8
- 8 - 8.15
- 8.15 - 8.53
- 8.53 - 9.33
- 9.33 - 11.3

Sources: NYC Department of City Planning, New York Community Health Profiles, NYC Department of Parks and Recreation, NYC Department of Information Technology and Telecommunications, and the American Community Survey (2014-2018).

Obtained from New Yorkers for Parks Research Library
Proportion of Tree Canopy Cover Across NYC

Proportion of Parkland Across NYC

Sources: NYC Department of City Planning, New York Community Health Profiles, NYC Department of Parks and Recreation, NYC Department of Information Technology and Telecommunications, and the American Community Survey (2014-2018).

Obtained from New Yorkers for Parks Research Library
Sources: NYC Department of City Planning, New York Community Health Profiles, NYC Department of Parks and Recreation, NYC Department of Information Technology and Telecommunications, and the American Community Survey (2014-2018).

Obtained from New Yorkers for Parks Research Library
### Significant Correlations Found Within the Bronx, Organized by Magnitude of Correlation Coefficient

<table>
<thead>
<tr>
<th>Factors</th>
<th>Correlation Coefficient</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent Population in Poverty vs. Air Pollution</td>
<td>0.83</td>
<td>0.00089</td>
</tr>
<tr>
<td>Air Pollution vs. Child Asthma Index</td>
<td>0.76</td>
<td>0.0043</td>
</tr>
<tr>
<td>Percent Population in Poverty vs. City Parks in District Per 1000 Children (Acres)</td>
<td>-0.71</td>
<td>0.01</td>
</tr>
<tr>
<td>Percent Parkland vs. Air Pollution</td>
<td>-0.68</td>
<td>0.015</td>
</tr>
<tr>
<td>City Parks in District Per 1000 Residents (Acres) vs. Percent Population in Poverty</td>
<td>-0.64</td>
<td>0.024</td>
</tr>
<tr>
<td>Air Pollution vs. Percent Tree Canopy Cover</td>
<td>-0.63</td>
<td>0.028</td>
</tr>
<tr>
<td>Percent Tree Canopy Cover vs. Percent Population in Poverty</td>
<td>-0.59</td>
<td>0.041</td>
</tr>
<tr>
<td>City Parks in District Per 1000 Residents (Acres) vs. Adult Obesity Rate</td>
<td>-0.59</td>
<td>0.042</td>
</tr>
</tbody>
</table>

Note: The correlations are considered significant if the p-value is less than 0.05.

Sources: NYC Department of City Planning, New York Community Health Profiles, NYC Department of Parks and Recreation, NYC Department of Information Technology and Telecommunications, and the American Community Survey (2014-2018).

Obtained from New Yorkers for Parks Research Library
## Significant Citywide Correlations, Organized by Magnitude of Correlation Coefficient

<table>
<thead>
<tr>
<th>Factors</th>
<th>Correlation Coefficient</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent of Parks Considered Acceptable for Cleanliness vs. Child Asthma Index</td>
<td>-0.38</td>
<td>0.0027</td>
</tr>
<tr>
<td>Percent Parkland vs. Air Pollution</td>
<td>-0.37</td>
<td>0.0039</td>
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<tr>
<td>Percent of Parks Considered Acceptable for Cleanliness vs. Life Expectancy (years)</td>
<td>0.35</td>
<td>0.0072</td>
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<tr>
<td>Percent of Parks Considered Acceptable for Cleanliness vs. Child Obesity Rate</td>
<td>-0.31</td>
<td>0.018</td>
</tr>
<tr>
<td>Percent of Parks Considered Acceptable for Cleanliness vs. Adult Diabetes Rate</td>
<td>-0.28</td>
<td>0.03</td>
</tr>
</tbody>
</table>

Note: The correlations are considered significant if the p-value is less than 0.05.

Sources: NYC Department of City Planning, New York Community Health Profiles, NYC Department of Parks and Recreation, NYC Department of Information Technology and Telecommunications, and the American Community Survey (2014-2018).

Obtained from New Yorkers for Parks Research Library
Conclusions

- Environmental factors were highly correlated with a multitude of factors of other types.
- The racial makeup of districts was correlated to access to green spaces and consequently the median income, unemployment rates, health and educational outcomes of residents.
- Moreover, park upkeep and cleanliness was correlated with many health factors on a city-wide scale.
- Our research illustrates that importance of environmental equity when addressing issues concerning inequality of health, wealth, and education.
Discussion

- In the future, researchers can examine how the COVID-19 pandemic impacts the relationship between health, wealth, education, and environmental equity in the Bronx as the borough has the highest case per mortality rate in New York City.
- Policy makers should consider the developmental advantages that the access to acceptable (by standards of condition) green spaces has on children enrolled in school. Further research could be conducted on the relationship between compromised physical health (due to pollution) and mental health within both educators and students.
Thank you

Any questions?