



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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Vazquez
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Intro Team

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Team:

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Client: Bronx Council for Environmental Quality

Karen Argenti, MPA, BCEQ Secretary

Robert Fanuzzi, PhD., BCEQ President

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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

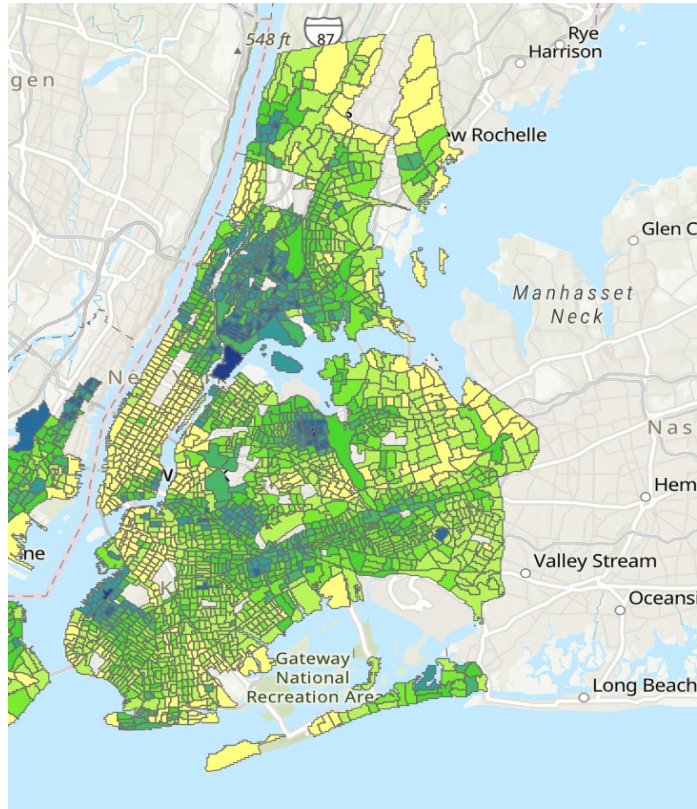


- Findings:

- 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.

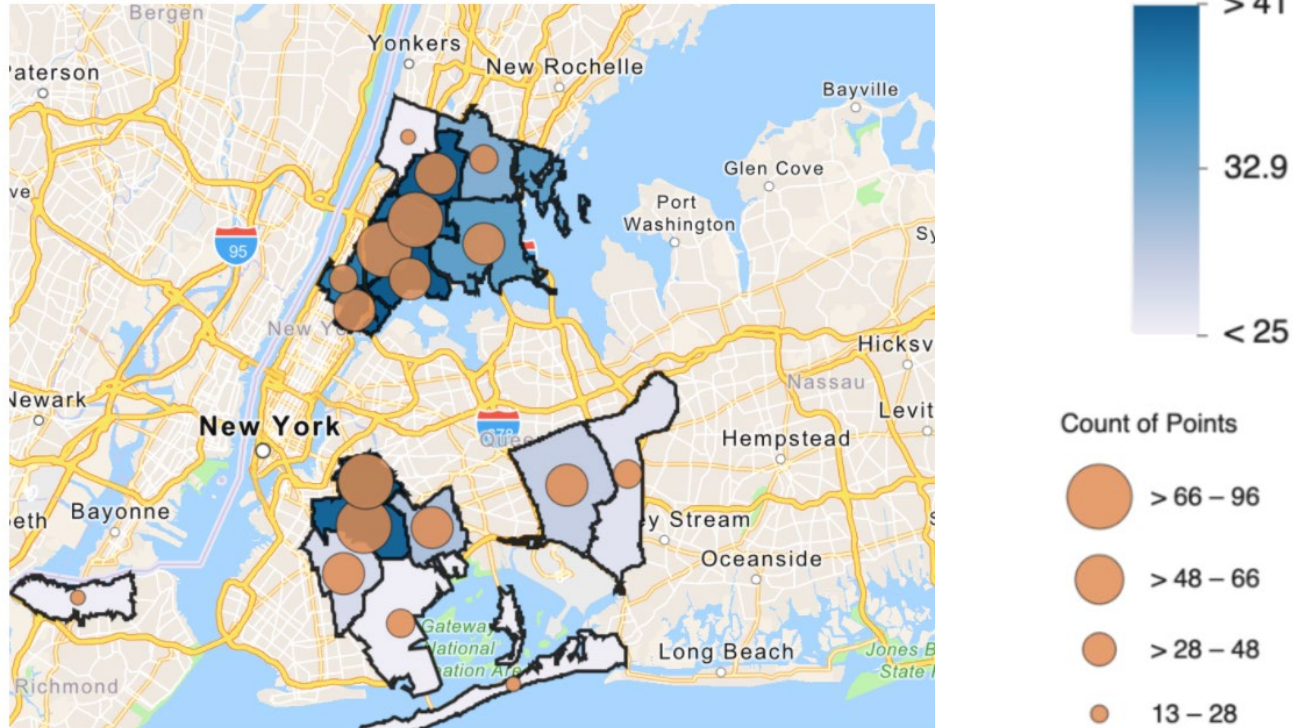


Residents who lack health insurance

Lack of health
insurance_CrudePrev



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



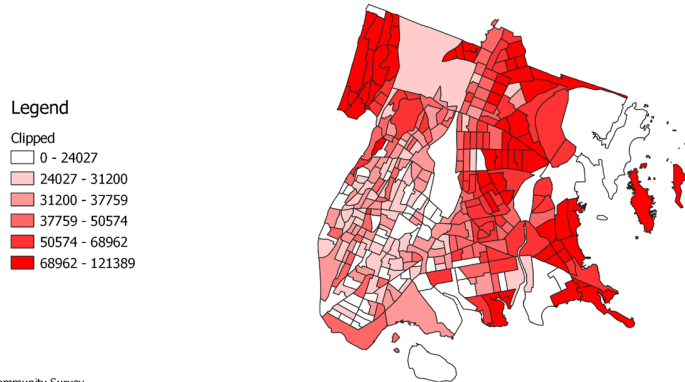
- Findings:

- 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%)
- Median Income: NYS: \$72,108, Bronx: \$41,432
 - NYC: Highest: White New Yorkers who live in Manhattan (\$122,085), Lowest: “Other” who live in the Bronx (\$35,770)

- Conclusions:

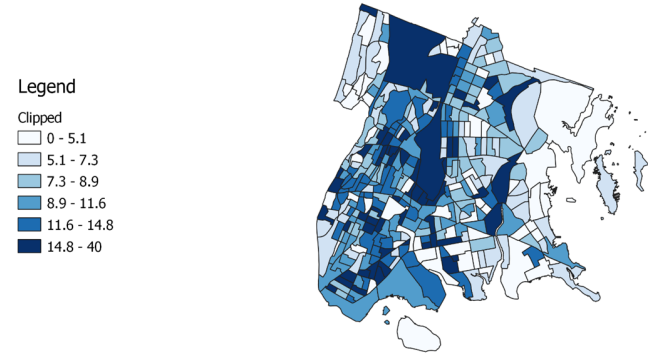
- The Bronx has the lowest median income and the highest unemployment rate in New York City.
- Within the Bronx, racial disparities negatively impact the distribution of wealth. Black people have the highest unemployment, and people who identified as “other” (racially ambiguous ethnic groups like Latinos)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

Median Income in the Bronx by Census Tract



2019 American Community Survey

Unemployment Rate in the Bronx by Census Tract



2019 American Community Survey

Median Income in The Bronx in 2019, Data: American Community Survey; 2019: ACS 1-Year Estimates Data Profiles table DP03, data.census.gov

Unemployment Rate in The Bronx in 2019, Data: American Community Survey; 2019: ACS 1-Year Estimates Data Profiles table DP03, data.census.gov



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
- The following Esri live atlas layers (information from the American Community Survey : "US Freeway System", "ACS Race and Hispanic Origin", "ACS Labor Force Participation by Age", "Socioeconomic Status (NSES Index) by Census Tract, 2011-2015", "ACS Median Household Income", "ACS Poverty Status".
- 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



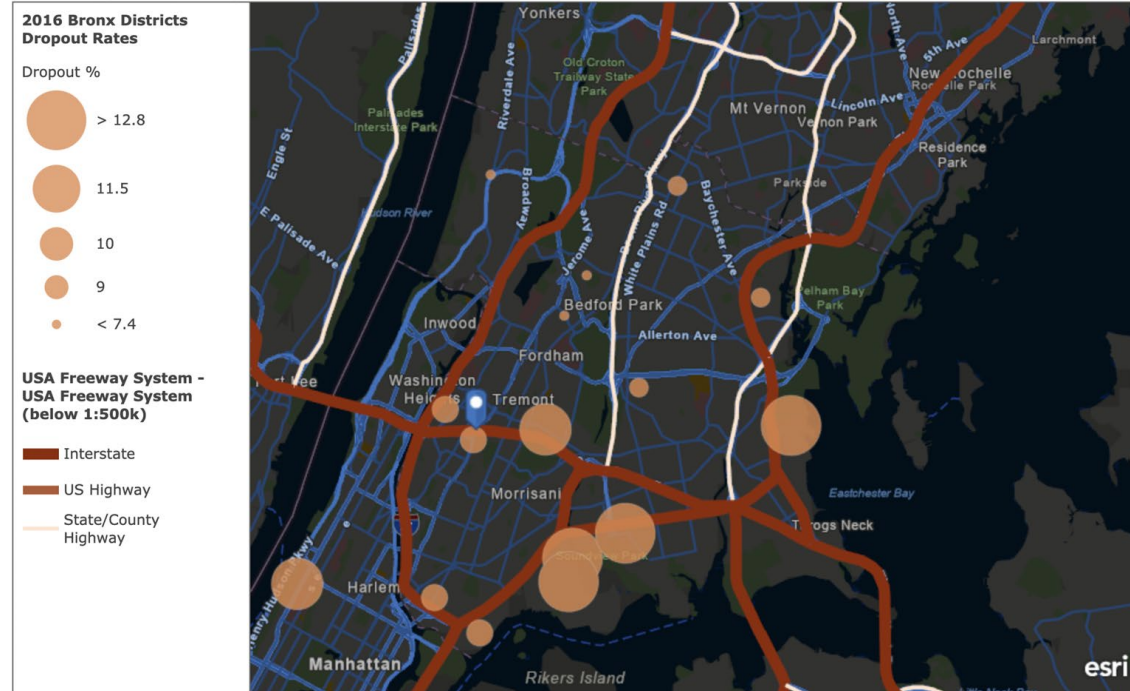
- Findings:

- 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.

Proximity to Freeways v. Dropout Rates

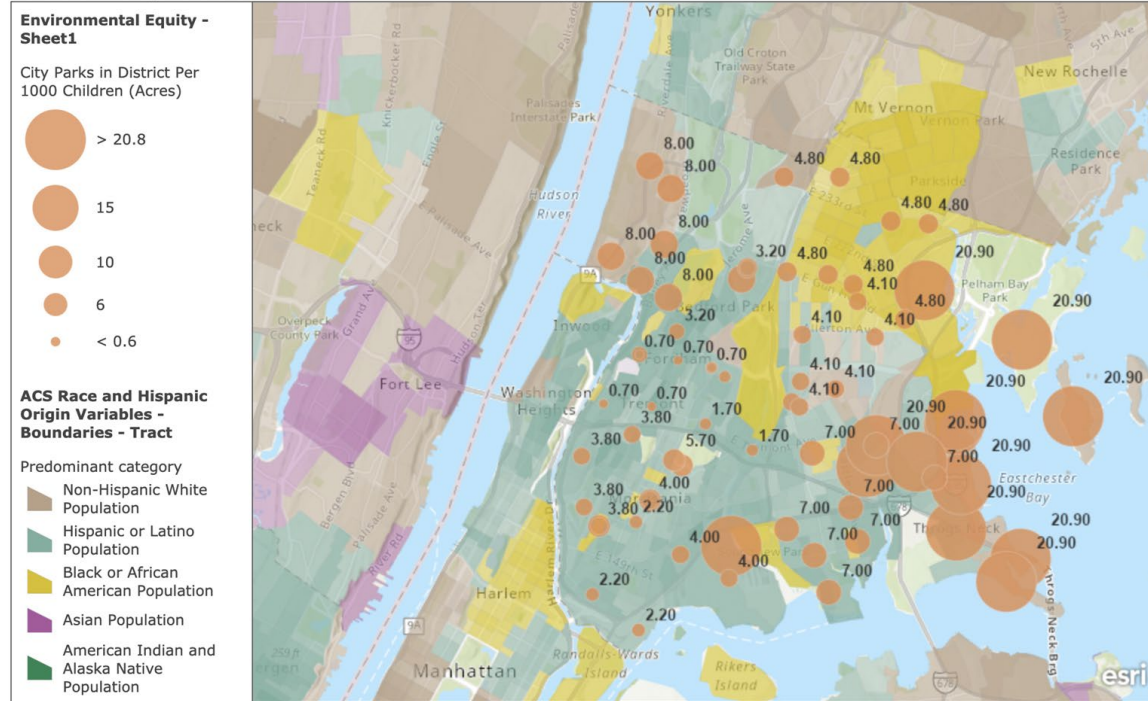


Source: “US Freeway System”. Esri, 2019

“Dropout Rate”. Citizens Committee For Children, 2020,

<https://data.cccnewyork.org/data/table/135/dropout-rate#135/219/99/a/a>

Race and City Parks in District Per 1000 Children (Acres)



Source: “2021 Open Space Profiles.” New Yorkers for Parks Research Library, 2021,
<http://www.ny4p.org/data-and-research/research-library/open-space-profiles>
 “ACS Race and Hispanic Origin Variables - Boundaries”. Esri, 2020



Environmental Equity

Gabriel Fernandez



- Data:

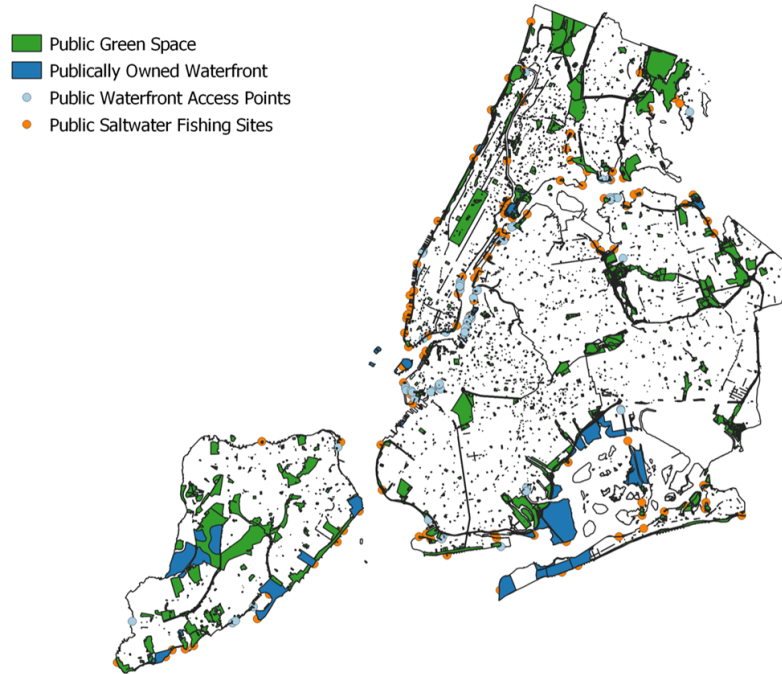
- “2021 Open Space Profiles.” New Yorkers for Parks Research Library, 2021, <http://www.ny4p.org/data-and-research/research-library/open-space-profiles>
- “Community Districts.” New York City Department of City Planning, 2021, <https://data.cityofnewyork.us/City-Government/Community-Districts/yfnk-k7r4>
- “New York City Community Health Profiles.” NYC Health, 2018, <https://www1.nyc.gov/site/doh/data/datasets/community-health-survey-public-use-data.page>
- “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>
- “American Community Survey.” American Community Survey, 2014-2018, <https://data.census.gov/cedsci/>
- 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 m³), 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.

New York City Green Space and Waterfront Access Map

Sources: New York City Department of Information Technology
and Telecommunications and NYC Open Data



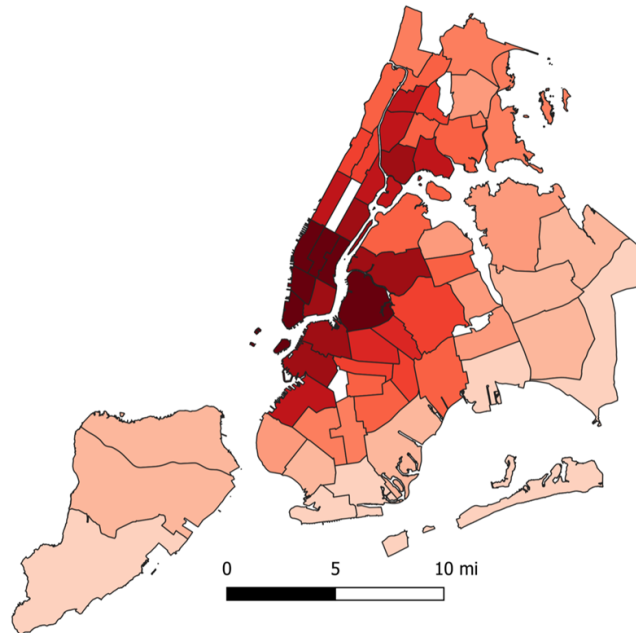
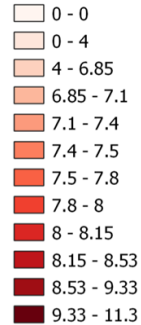
Sources: NYC Department of City Planning, New York Community Health Profiles, NYC Department of Parks and Recreation, NYC Department of Information Technology and Telecommunications, and the American Community Survey (2014-2018).

[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)



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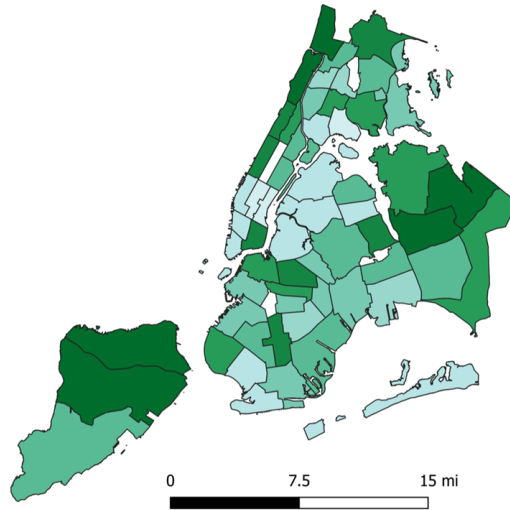
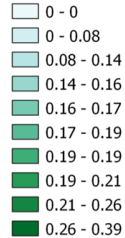
Sources: NYC Department of City Planning, New York Community Health Profiles, NYC Department of Parks and Recreation, NYC Department of Information Technology and Telecommunications, and the American Community Survey (2014-2018).

[Obtained from New Yorkers for Parks Research Library](#)

Proportion of Tree Canopy Cover Across NYC

Sources: New York City Department of Information Technology, New York City Department of City Planning, and New Yorkers for Parks Research Library

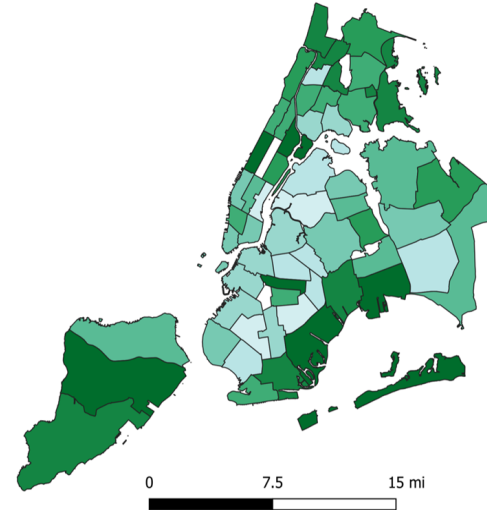
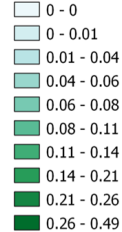
Proportion of Tree Canopy Cover



Proportion of Parkland Across NYC

Sources: New York City Department of Parks and Recreation, New York City Department of City Planning, and New Yorkers for Parks Research Library

Proportion of Parkland in District



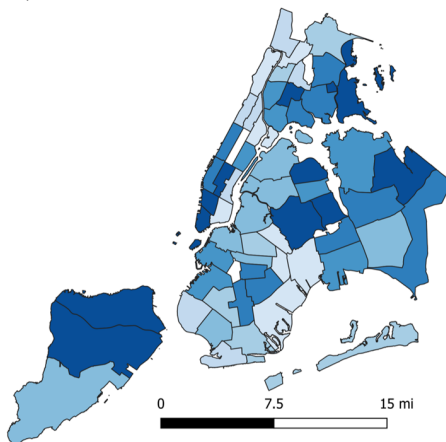
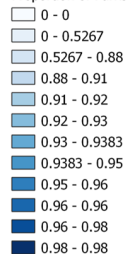
Sources: NYC Department of City Planning, New York Community Health Profiles, NYC Department of Parks and Recreation, NYC Department of Information Technology and Telecommunications, and the American Community Survey (2014-2018).

[Obtained from New Yorkers for Parks Research Library](#)

Proportion of City Parks Considered Acceptable for Cleanliness Across NYC

Sources: New York City Department of Parks and Recreation Parks Inspection Program and New Yorkers for Parks Research Library

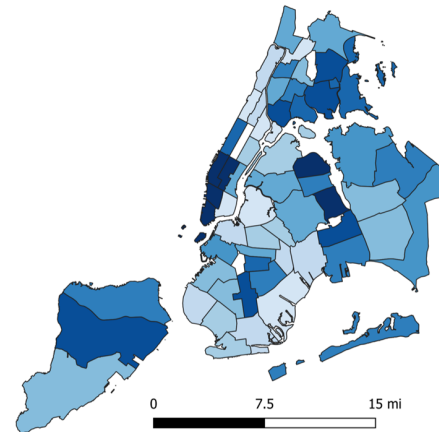
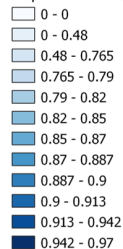
Proportion of Parks Considered Acceptable for Cleanliness



Proportion of City Parks Considered Acceptable for Condition Across NYC

Sources: New York City Department of Parks and Recreation Parks Inspection Program and New Yorkers for Parks Research Library

Proportion of Parks Considered Acceptable for Condition



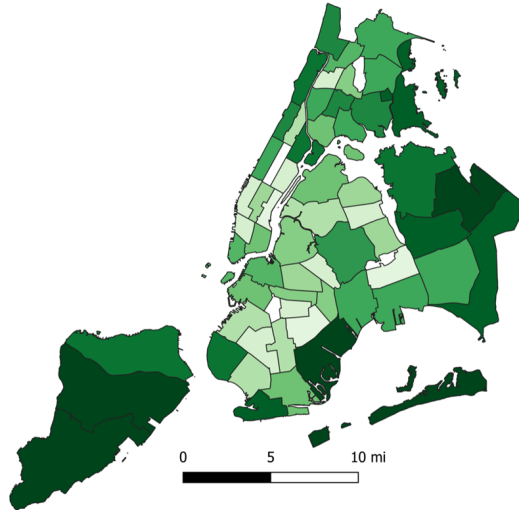
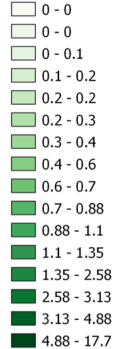
Sources: NYC Department of City Planning, New York Community Health Profiles, NYC Department of Parks and Recreation, NYC Department of Information Technology and Telecommunications, and the American Community Survey (2014-2018).

[Obtained from New Yorkers for Parks Research Library](#)

City Parks in District Per 1,000 Resident (Acres) Across NYC

Sources: NYC Department of Parks and Recreation, American Community Survey 2014-2018, and New Yorkers for Parks Research Library

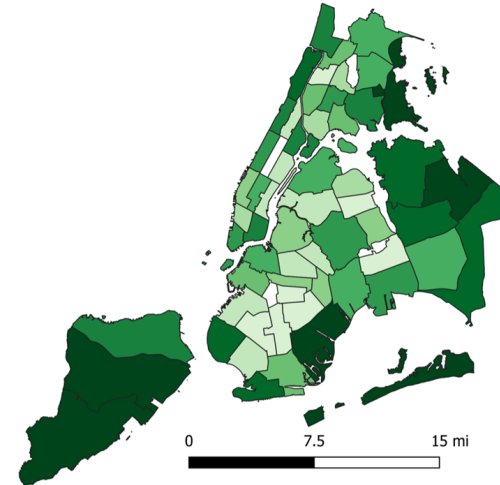
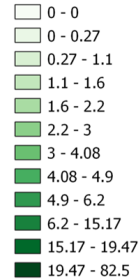
City Parks in District Per 1000 Residents (Acres)



City Parks in District Per 1,000 Children (Acres) Across NYC

Sources: New York City Department of Parks and Recreation American Community Survey 2014-2018, and New Yorkers for Parks Research Library

City Parks in District per 1,000 Children (Acres)



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

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

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

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

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?