DISTRIBUTION OF GREEN SPACE AND ENVIRONMENTAL JUSTICE IN CUYAHOGA COUNTY, OHIO

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Introduction
- Race and socio-economic status are known to greatly influence resources allocation and access.
- Most studies have shown that minority groups have less access to green space.
- Uneven distribution of green space has become a serious environmental justice concern.
- Access to green space has been associated with improved health behavior.
- It is therefore important to examine where these inequalities exist and ways to overcome them.

Hypotheses
- Percent black population of census block groups will be negatively associated with proximity to green space.
- Median Income will be positively associated with proximity to green space.
- Percent black population of census block groups will be negatively associated with size of nearest green space.

Methods
- Data Processing:
  - Linked population data to block groups boundary (n=1178)
  - Manually digitized park access points (n=547).
  - Calculated mean center of census block groups.
  - Measured the distance (miles) from mean center to nearest park access point.

- Statistical Analysis:
  - Performed linear regression analysis between dependent and explanatory variables – R software.

- Explanatory variable | Dependent variables
  Percent black population | distance to nearest park
  Median Income | Park size

- GIS Mapping:
  - Mapped spatial distribution of percent black population, median income and green space size.

Study Area: Cuyahoga County, Ohio
- Cuyahoga county is one of the hyper segregated counties in Ohio state and US.
- High segregation is attributed to racial and social exclusion policies in the 19th and 20th centuries.
- 63.6% white, 29.7% black or African American, 2.6% Asian, 4.8% Hispanic or Latino.
- Minority and low-income residents are concentrated around Cleveland city.
- Poor health outcome in the county has been associated with racial segregation and income inequality.

Results
- Multiple Linear Regression for proximity to green space
<table>
<thead>
<tr>
<th>Explanatory Variable</th>
<th>Coefficient - Slope</th>
<th>P - Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent black population</td>
<td>-2.840e+03</td>
<td>3.26e+06 ***</td>
</tr>
<tr>
<td>Median Income</td>
<td>1.017e+05</td>
<td>1.68e+04 ***</td>
</tr>
</tbody>
</table>
  - P – Value indicates a statistically significant relationship between percent the dependent and independent variables.
  - Coefficient for black population indicates that for every 1% increase in black population there is a -0.0043 decrease in distance to park.
  - Coefficient for median income indicates that for every 1% increase in median income there is 1.017e-05 increase in distance to park.
  - Accept the hypotheses that percent black population is negatively associated with proximity to green space and median income is positively associated with proximity to green space in Cuyahoga county.

- Simple Linear Regression for size of nearest park
<table>
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<th>Explanatory Variable</th>
<th>Coefficient - Slope</th>
<th>P - Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent black population</td>
<td>-6.0142</td>
<td>1.35e+07 ***</td>
</tr>
</tbody>
</table>
  - P – Value indicates a statistically significant relationship between percent black population and park size.
  - Coefficient indicates that for every 1% increase in black population there is a -0.0142 decrease in size of nearest green space.
  - Thus as black population increase in a census block group, size of green space consequently decreases.
  - Accept the hypothesis that percent black population of census block groups is negatively associated with size of nearest green space.

Discussion & Implications
- Relationship between proximity to green space and black population in Cuyahoga county deviates from findings of most studies on green space accessibility and environmental justice.
- Results indicates close proximity between black block groups and green space location.
- This can be attributed to Cleveland’s “Greenway Plan”.
- Relationship between median income and proximity to green space on the other hand correlates with most existing literature.
- Relationship between park size and the location of blacks in the county also correlates with most existing literature.
- Black block groups have relatively smaller park size ranging between 0.16 and 0.55 square miles as seen in figure 3.

Conclusion & Future Studies
- Though high percentage of black population lives in close proximity to green space in Cuyahoga county, size of these green spaces are relatively small.
- Future studies should consider other explanatory variables like, population density, unemployment rate and educational attainment.
- Also is the need to examine the relationship between park proximity and health outcomes in these black block groups.
- Future studies should also examine the rate of park usage in these black block groups.

Acknowledgement
- Prof. Louis M. Holmes

References