

# Data Science for Operations & Planning at Durham Public Schools



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## Project Overview

Durham Public Schools (DPS) is implementing a new assignment plan for students K-12 through its Growing Together initiative. This initiative aims to:

- ❖ Redraw appropriate school boundaries and change school choice requirements.
- ❖ Improve diversity and equity in public schools across the county.

To enact such changes, DPS need data on:

- ❖ racial and socioeconomic barriers to education across the county
- ❖ Reassignment programs across the country

## Objectives

- 1) Collect economic data within Durham County to determine greatest need
- 2) Study other school districts' boundary and application shifts and replicate them according to Durham's changing population
- 3) Assess DPS' "market share", studying retention rates of students compared to charter and private institutions

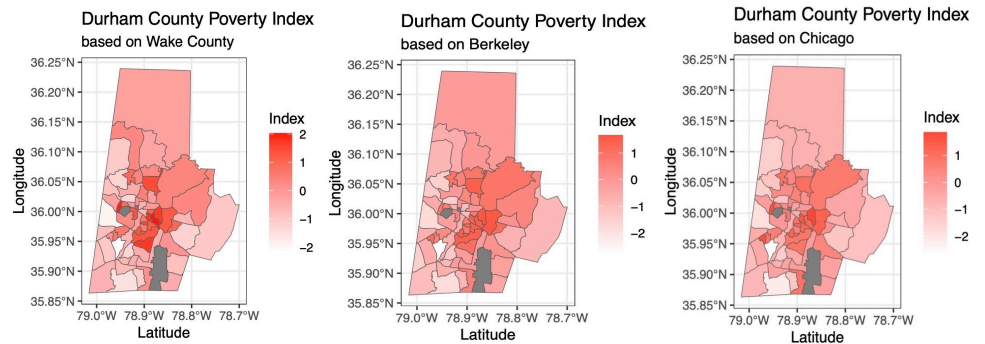
## Methods

- ❖ Family demographic data collected from **US Decennial Census and the American Community Survey (2000-2021)**
- ❖ These databases include 578,000 geographic areas and 20,000+ variables
- ❖ Simplified data into population, ethnicity, poverty, and English proficiency variables
- ❖ Referring to other school districts, we replicated poverty indices that aggregated variables through principal component analysis (PCA)
- ❖ Lastly, we calculated the ratio of students enrolled in DPS, Charter, and Private schools to get the market share of DPS students in Durham County for tracts, block groups, DPS planning units and school boundaries

## Results

(1.) We generated 3 indices of our variables using PCA, each containing 5 unique variables

- ❖ Collected from Wake County, NC, Berkeley, CA, and Chicago, IL
- ❖ Used regression and K-nearest neighbors to rectify missing data
- ❖ Created maps of Durham with our data, we found that each index showed a similar gradient in the tracts



*Factors: Median household income, percentage of households on food stamps, percentage of rent payers paying 30% or more of income on rent, percentage of mortgage payers paying 30% or more of income on mortgage, percentage of people living 100%-200% of Federal Poverty Level*

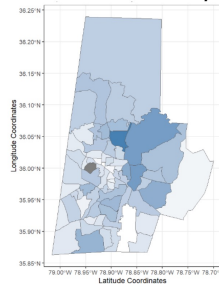
*Factors: Parent education level, parent income level, race & ethnicity*

*Factors: Household income, home ownership, household composition, educational attainment, English-speaking proficiency*

(2.) We moved on to calculating market share

- ❖ DPS market share varied across Durham County
- ❖ There is a higher number of private school students in West Durham, while more charter school students in East and North Durham

**Durham County Public School Market Share % Map**



School Name	Students Total	DPS Percent Total	Charter Percent Total
Hillside	8,111	80.2%	19.8%
Jordan	8,435	89.8%	10.2%
Northern	7,398	77.6%	22.4%
Riverside	7,956	84.5%	15.5%
Southern	8,120	73.0%	27.0%

\* Market Share Percentages are calculated based on all K - 12 DPS and Charter students living in the respective high school boundary

## Conclusion

Using these indices and data, DPS can make informed decisions on their school choice requirements and school boundaries. This data will be available in the future when further adjustments are needed.

Future work will include creating regression models that provide the factors in determining public school market share.



Scan For References and Additional Information