Forsyth County, NC

A STUDY OF

Early Education Enrollment

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Objective

Problem statement: Identifying Key Factors Affecting Early Education Scores in Forsyth County

Community's Challenges: The declining early education enrollment score in Forsyth County, with 34 census tracts scoring below 45, highlights significant gaps in access and participation.

Why it was chosen: Addressing these gaps will be crucial to ensuring equitable opportunities for all children across the community.

Research questions: What factors contribute to the decline in early education enrollment scores in Forsyth County, and how can access and participation be improved across low-scoring census tracts?
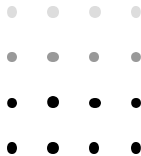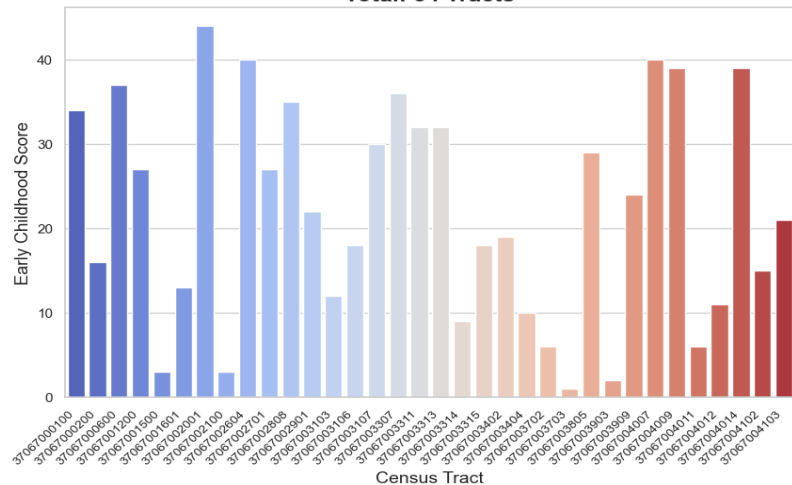
Forsyth County NC
Average Early Childhood Score Over Time
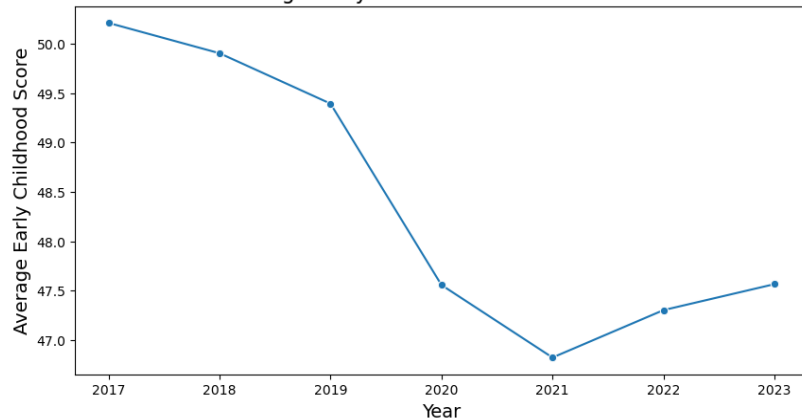
Census Tracts with Early Education Enrollment Scores < 45 in 2023
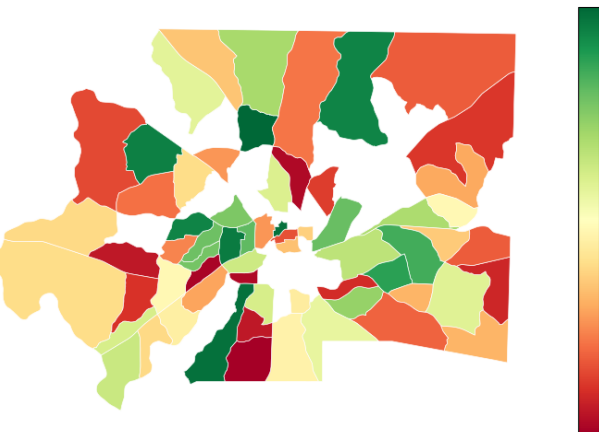### Total: 34 Tracts

Community Overview

In 2022, **Forsyth County, NC**

had a population of **384k people** a median **age of 38.4** a median household income of **$61,229**[1]
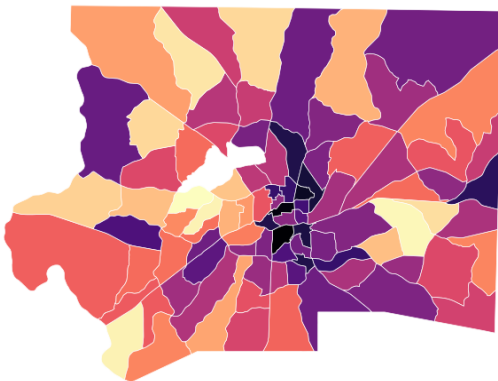
education
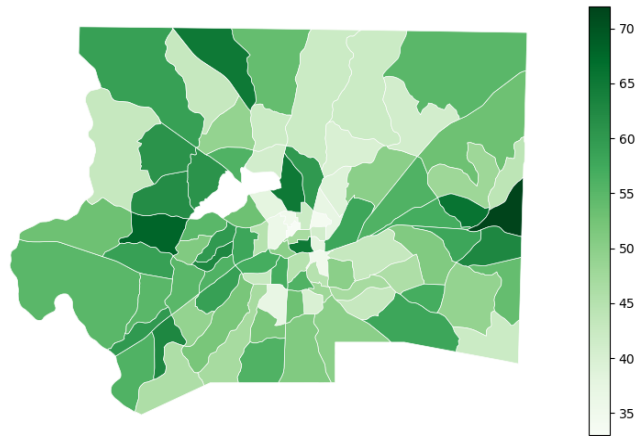
Early Education Enrollment Score[IGS]
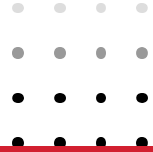
social metrics

Community Inclusion Score[IGS]

economy

Growth Score [IGS]

Benchmarking

16th
in % below poverty[2]

43rd
in public schools[3]

However,

12th
in 5-year GDP Growth[4]

Forsyth County	IGS	Place	Economy	Community	Early Education Enrollment
State	49 Growth 48.3 Inclusion 49.806	55 Growth 52.247 Inclusion 57.548	45 Growth 46.172 Inclusion 44.495	47 Growth 46.753 Inclusion 47.204	46.7
US	49 Growth 49.6 Inclusion 47.366	53 Growth 50.656 Inclusion 55.882	47 Growth 48.57 Inclusion 44.806	46 Growth 49.645 Inclusion 41.376	45.5

"Forsyth County Among Worst For Income Mobility"[5]

Methodology

Merging and Cleaning Dataset
- Primary Dataset from IGS Mastercard Website
- Multiple 2022 ACS 5-year datasets from data.census.gov.
- Selected features like-transportation, median income, occupation that are critical socio-economic factors likely influencing early education enrollment scores
- Merged them with census tract-> One Master Dataset->86 rows, 51 columns

Apply Normalization
- Dataset had different range of values. For example:
  - Median Income = 52,870
  - Commute Mins = 15.75
- StandardScaler().fit(df) -> All values now have a mean of 0 and a std dev of 1

Apply Transformation
- Skewness can lead to biased model predictions
- PowerTransformer (method='yeo-johnson') -> Can deal with both positive and negative values

Find Correlation with P-value
- To measure the **strength** and **direction** of the relationship between variables.
- Pearsonr() to get both correlation and p-value
- Extract most significant 36 columns for linear regression

Linear Regression Model
- To determine which features to target for increasing the score.
- Median Income Coefficient = 2.5 → A 1 **unit increase in income** increases the score by 2.5 points.
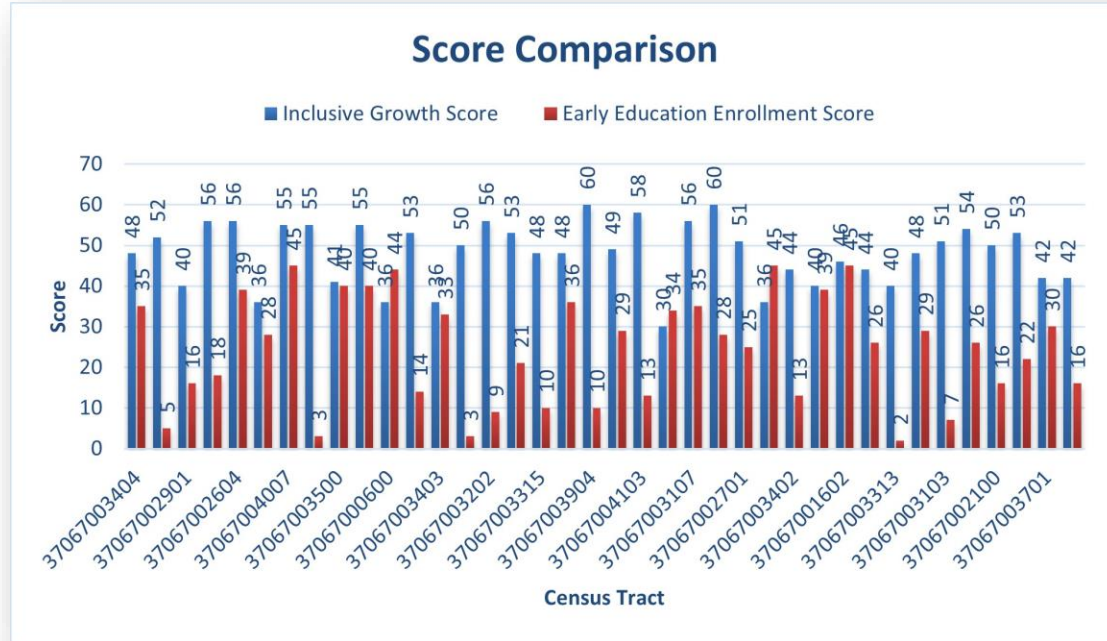
Key Findings

Key Findings (From IGS Dataset)

There is a significant discrepancy between the **Early Education Enrollment score** and the **Inclusive Growth Score**, indicating potential inconsistencies in access, participation, or resource allocation across different areas.


Score Comparison

Key Findings (From Entire Dataset)


Correlation with Early Education Enrollment Score<45
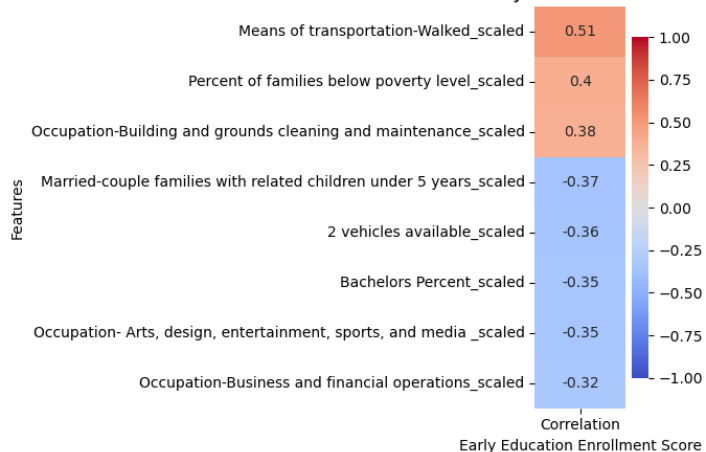
Feature	Correlation	P-Value
Means of transportation-Walked_scaled	0.510600	0.0011
Percent of families below poverty level_scaled	0.396160	0.0138
Occupation-Building and grounds cleaning and m...	0.375207	0.0203
Married-couple families with related children ...	-0.366334	0.0237
2 vehicles available_scaled	-0.359268	0.0267
Bachelors Percent_scaled	-0.349731	0.0314
Occupation- Arts, design, entertainment, sport...	-0.347811	0.0324
Occupation-Business and financial operations_s...	-0.322868	0.0480

Feature Coefficients from Regression Model for Early Education Enrollment Score<45 with significant
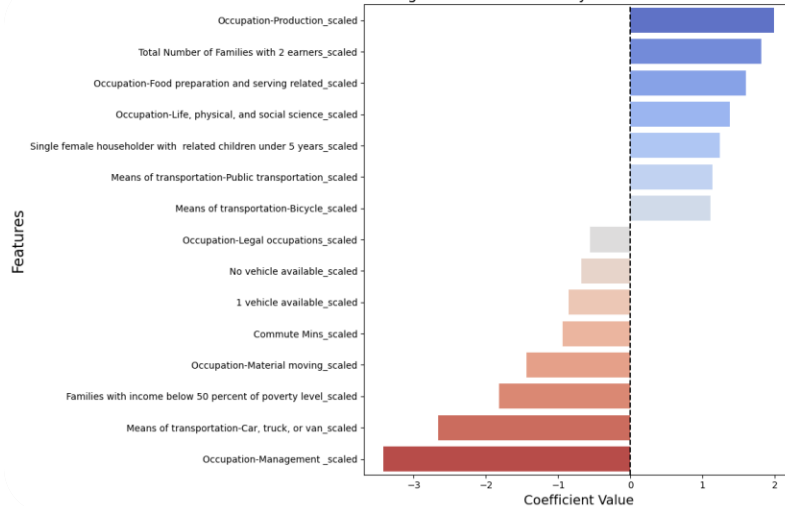
Feature	Coefficient	P-Value
Occupation-Material moving_scaled	-1.4384	0.0132
Occupation-Production_scaled	1.9879	0.0144
Families with income below 50 percent of pover...	-1.8167	0.0172
Single female householder with related childr...	1.2346	0.0177
Occupation-Management _scaled	-3.4179	0.0198
Occupation-Life, physical, and social science_...	1.3759	0.0207
Occupation-Food preparation and serving relate...	1.6027	0.0215
1 vehicle available_scaled	-0.8590	0.0277
Means of transportation-Car, truck, or van_scaled	-2.6645	0.0293
Means of transportation-Public transportation_...	1.1382	0.0300
Means of transportation-Bicycle_scaled	1.1103	0.0304
No vehicle available_scaled	-0.6764	0.0385
Occupation-Legal occupations_scaled	-0.5554	0.0414
Commute Mins_scaled	-0.9411	0.0451
Total Number of Families with 2 earners_scaled	1.8116	0.0481

Proposed Solution
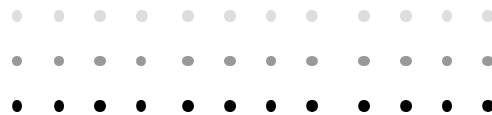
1) Families with income below 50% of the poverty level

- **Coefficient**: -1.8167 (Negative)
- **P-Value**: 0.0172

Interpretation:
Areas with a higher proportion of families earning below 50% of the poverty level are associated with lower early education enrollment scores. This indicates that **financial constraints** limit access to or participation in early education programs.

2) Single female householder with related children under 5 years

- **Coefficient**: 1.2346 (Positive)
- **P-Value**: 0.0177

Interpretation:
Areas with more single female householders with children under 5 years tend to have higher early education enrollment scores. This suggests that these families are more likely to enroll their children in early education programs, potentially due to **the need for childcare while the parent works.**

3) Occupation - Material Moving

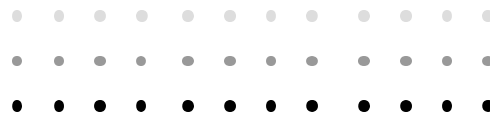- **Coefficient**: -0.3896 (Negative)
- **P-Value**: 0.0166

Interpretation:
Higher employment in material-moving jobs is associated with lower enrollment scores, possibly reflecting **economic or scheduling constraints**.

Implementation Plan

1) Families with income below 50% of the poverty level

Solution:
Subsidized Early Education Programs for families living below 50% of the poverty line.

Conduct community-based outreach to inform low-income families about available education grants, vouchers, or childcare assistance programs.

2) Single female householder with related children under 5 years

Solution:
Increase access to affordable childcare to further support single mothers who rely on these services while balancing work and parenting.

Extend program hours or provide after-care services to accommodate the schedules of working single mothers.

3) Occupation - Material Moving
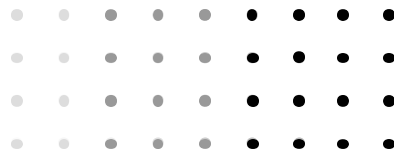
Solution:
Provide subsidized early education programs targeting families working in these occupations.

Offer flexible enrollment hours to accommodate parents with irregular or shift-based work schedules.

Conclusion

- The research highlights key socio-economic factors influencing early education enrollment in Forsyth County.
- Findings suggest that certain occupations, family structures, and economic conditions significantly affect enrollment rates.
- Addressing these disparities through targeted subsidies, outreach programs, and support services will be essential to improving access to early education, ensuring all children have the opportunity to benefit from early learning programs.

REFERENCES

[1]   DATA USA. "Forsyth County, NC | Data USA." Datausa.io, datausa.io/profile/geo/forsyth-county-nc. Accessed 24 Oct. 2024.

[2]   Economic Research Service, U.S. Department of Agriculture. "Poverty." Usda.gov, 2023, data.ers.usda.gov/ Accessed 27 Oct. 2024.

[3]   World Population Review. "Public School Rankings by State 2020." Worldpopulationreview.com, 2022, worldpopulationreview.com/state-rankings/public-school-rankings-by-state.

[4]   IBISWorld. "IBISWorld - Industry Market Research, Reports, and Statistics." ibisworld.com/united-states/economic-profiles/northcarolina/. Accessed 27 Oct. 2024.

[5]   wfdd. "Forsyth County Among Worst For Income Mobility", wfdd.org/story/stub-230. Accessed 27 Oct 2024