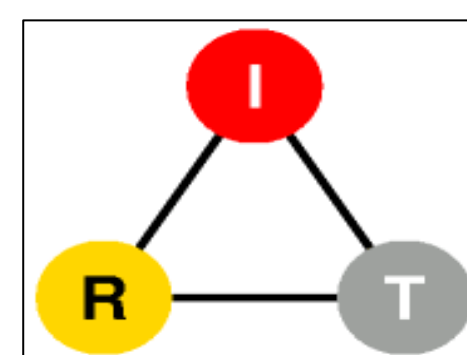


# Disentangling the Macro-Level Determinants of Broadband Adoption:



## Subsidies, Languages, Income, and Medicaid



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### Introduction & Background

High-speed internet access (broadband) has become a utility as essential as water and electricity, with many people relying on an internet connection for school, work, and access to vital services. We found that broadband usage depends strongly on income. A new subsidy program, ACP, can make broadband affordable to more households. We show factors that explain early enrollment. Understanding the relationships between the variables that impact broadband and household broadband subsidy adoption will allow for more effective and efficient program development, funding, and outreach.

### Goals & Hypotheses

Our project aims to determine to better understand the correlation between demographic, geographic, and institutional factors in broadband availability. We hypothesize that household internet and adoption of the national broadband subsidy ACP are affected by major factors:

- Household income
- Household language and education level
- Automatic state and federal Medicaid database verification

### Data Sources & Processing

We used public data from:

- Broadband adoption: Census American Community Survey
  - Educational attainment: US Dept. of Agriculture
  - ACP adoption: USAC, FCC
  - Automatic Eligibility Verification: USAC, FCC
- Data tool chain Google Cloud Platform, BigQuery, SQL, R, Python (google-cloud, censusdata, tabulate, plotly, geopandas, pyshp, shapely, stats, scikit-learn, pandas)

### Results & Discussion

2016-2020 National Household Fixed Broadband Adoption  
% of households without internet

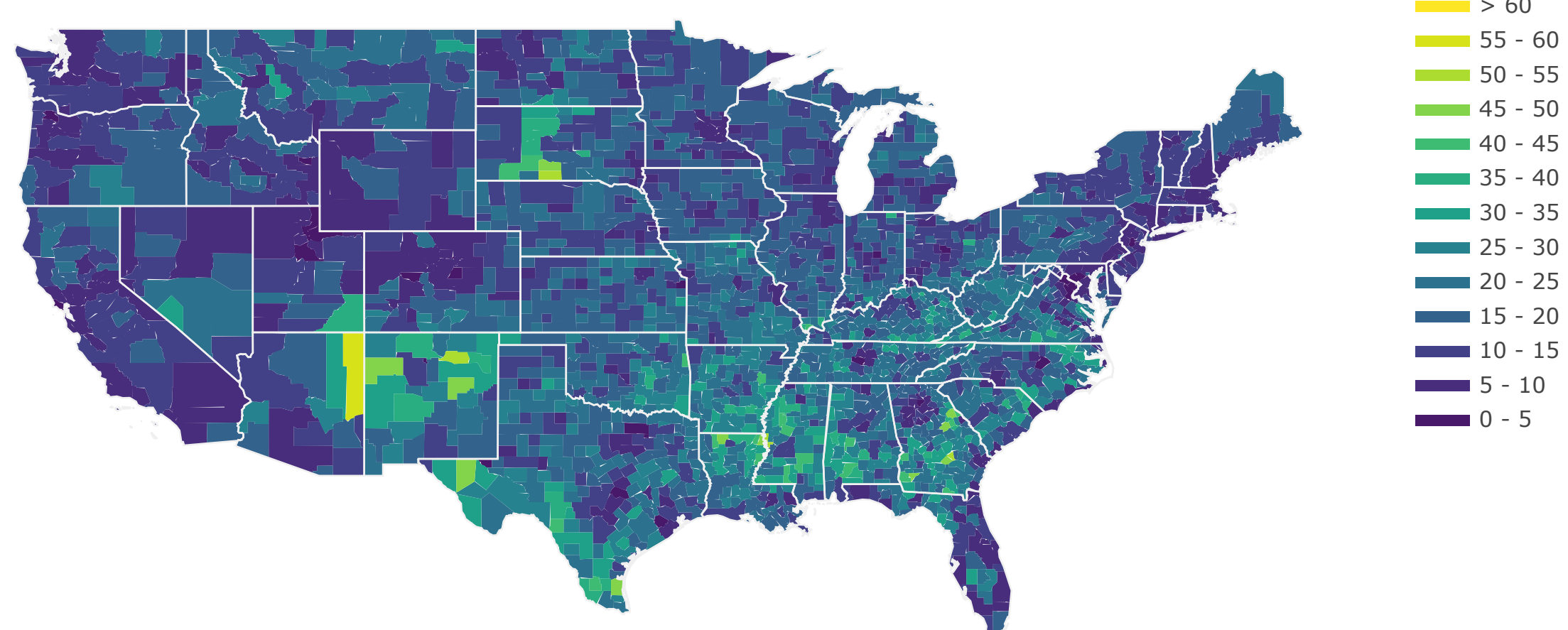


Fig 1. By cleaning and merging Public Use Microdata Areas (PUMAs) into state and county level we created a national broadband distribution map where lighter colors indicate a higher percentage of households without internet access.

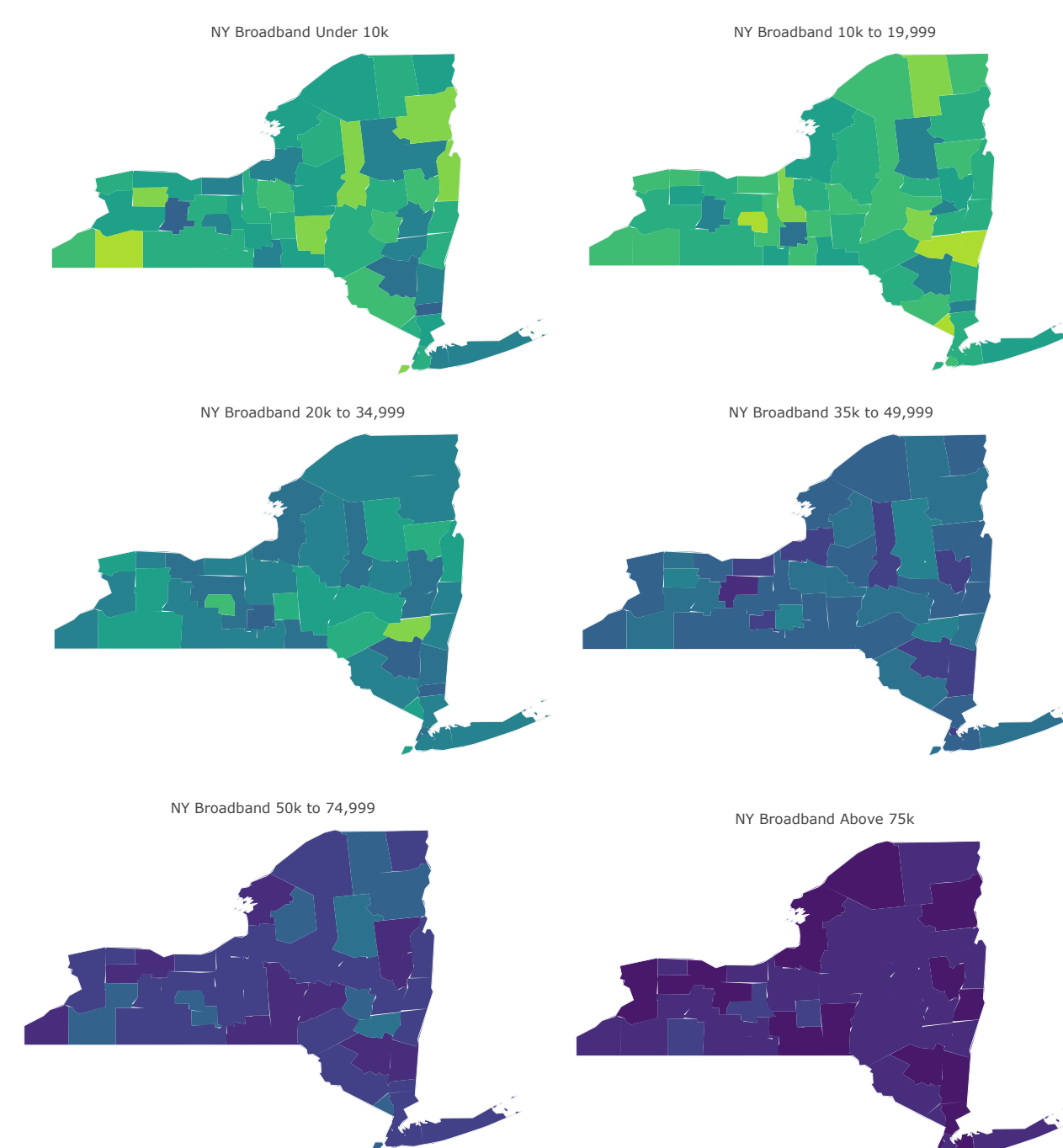


Fig 2-7. Examining internet access in New York state stratified by six income thresholds. Income best predicts household internet access, while rurality has a significant impact on lower income groups.

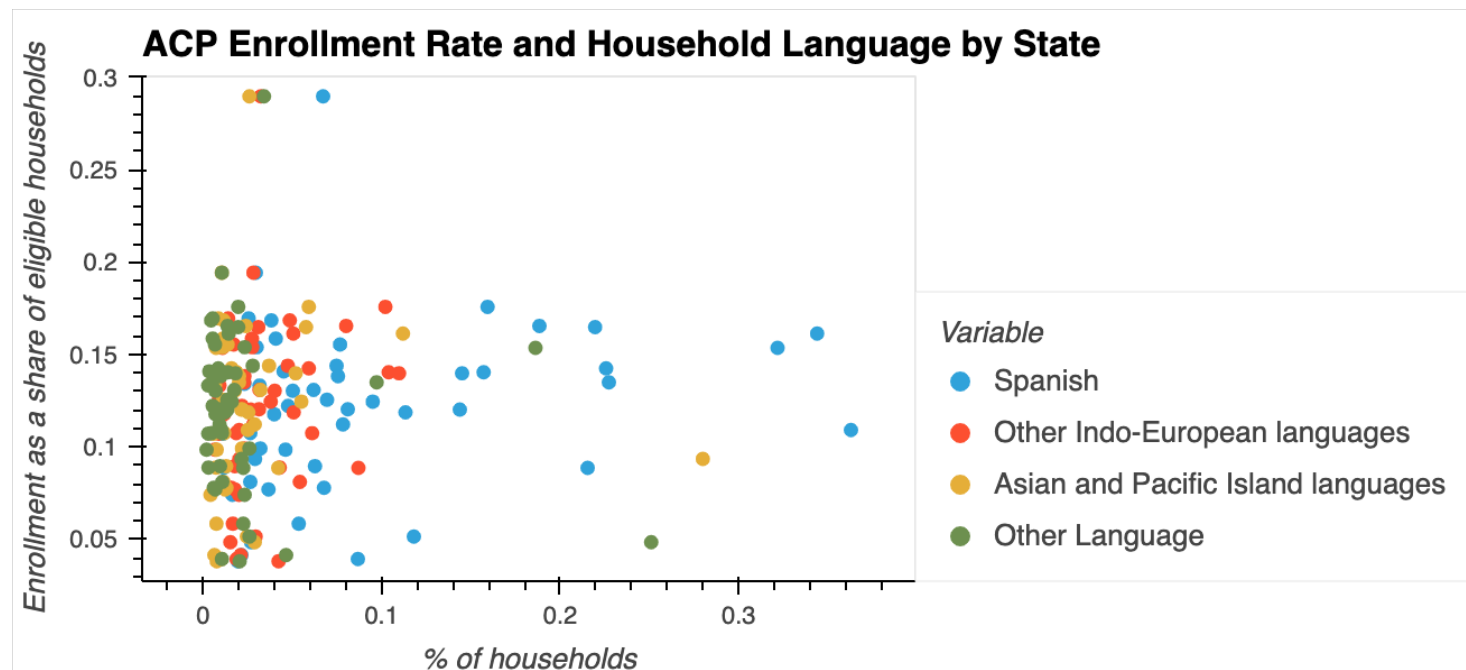


Fig 8. In states where a greater percentage of households speak a language other than English, ACP enrollment is not significantly lower. This indicates language may not be a significant barrier in ACP enrollment.

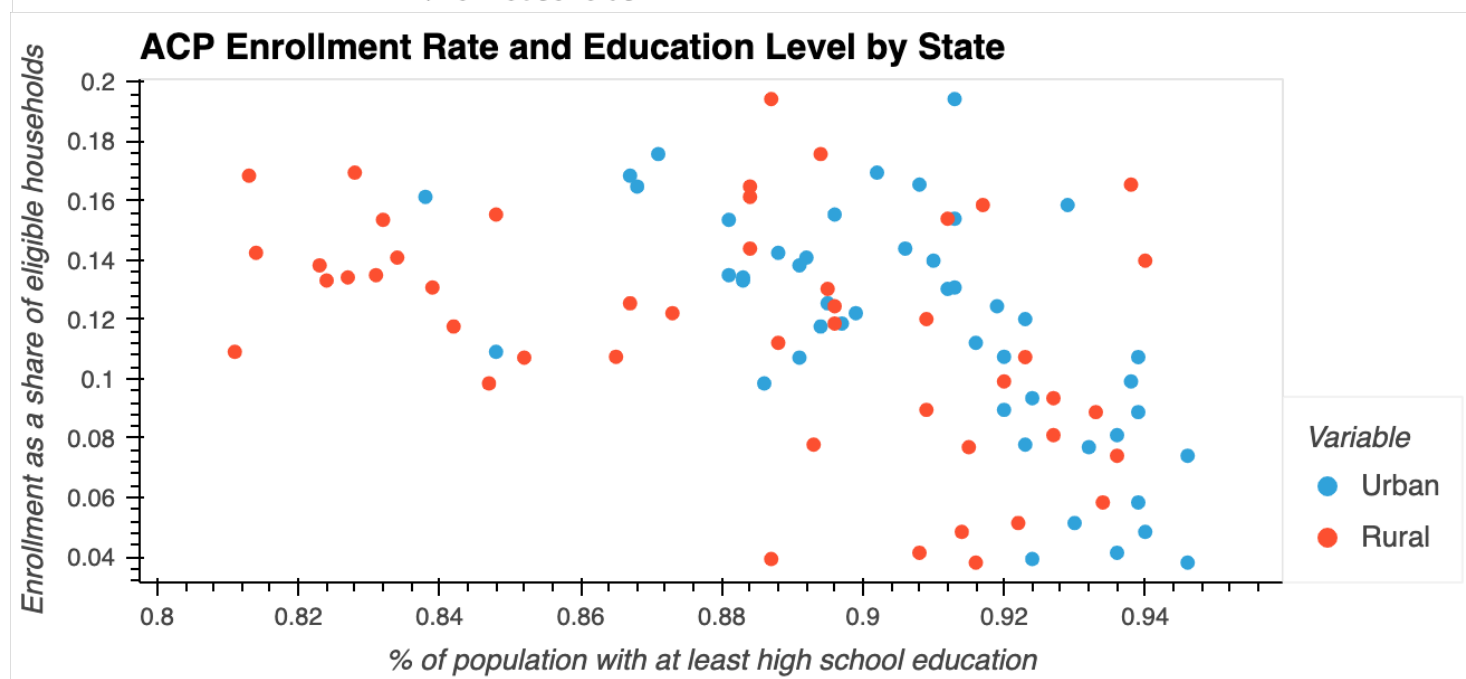


Fig 9. In both urban and rural areas, as the percent of population with at least a high school degree rises, ACP enrollment decreases. We hypothesize that this trend may occur because education level serves as a proxy variable.

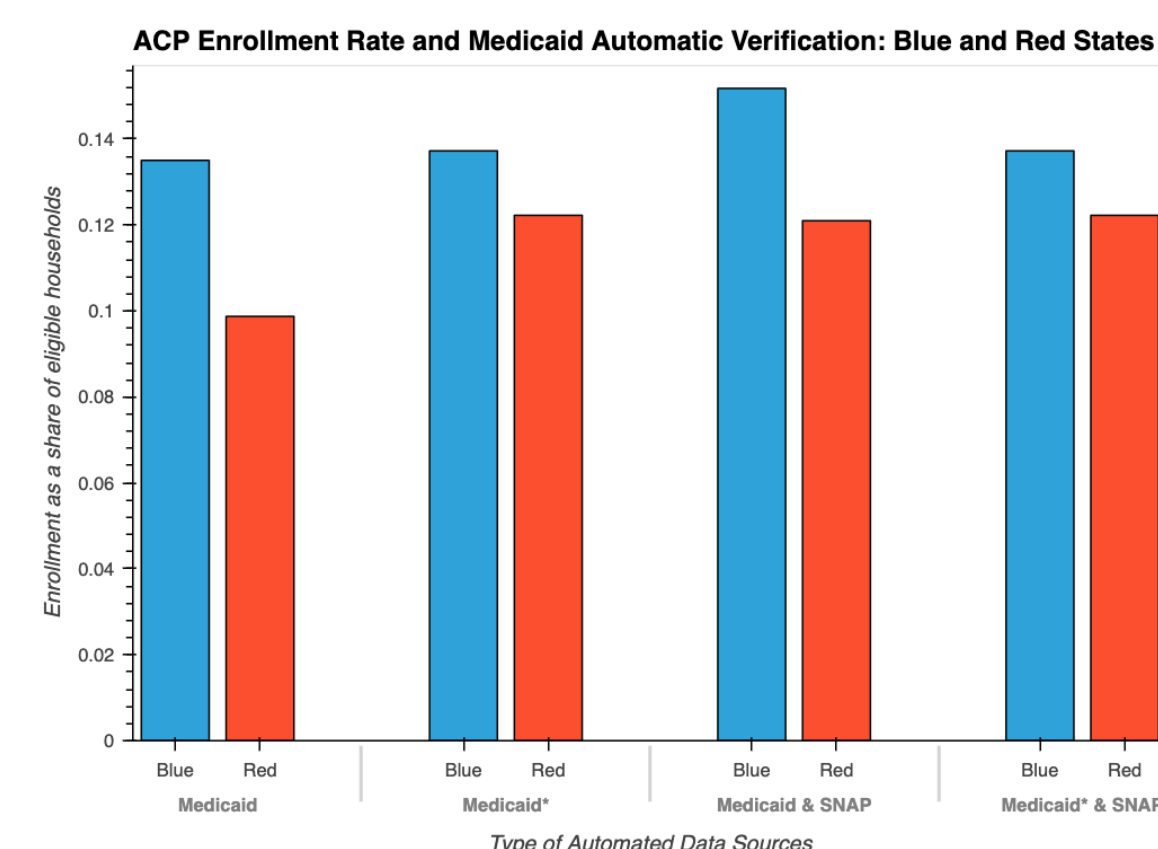


Fig 10. Blue states have higher ACP enrollment than red states. Automated enrollment based on state Medicaid increases enrollment only in red states.

### Conclusions & Next Steps

We developed a focused analysis of broadband deployment and ACP to better understand the demographic barriers to both internet access and household internet subsidy programs across the nation.

- Income is the greatest predictor of internet access, with low-income groups impacted more significantly by rurality than high-income groups.
- Language and education appear to have little to no impact on ACP adoption at the state level.
- Type of automatic verification matters: red states with both a federal and state connection for Medicaid verification have significantly higher ACP enrollment rates.

This research will lay the groundwork for future use in both county-based internet adoption analysis and further work with ACP adoption and barriers.

- This work will help funding programs better understand what populations are most vulnerable and their barriers to accessing ACP, and thus will be better able to allocate funding and outreach efforts.
- Explore other ACP adoption factors such as the media (newspapers, TV, radio) and number of children

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