The Socioeconomic Roots of Racial Disparities in Hospitalizations

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Preventing Hospital Stays Matters

- In 2017, there was **$33.7 billion** in avoidable hospital expenses
- Medicare rate **12x** higher than ages 14 to 44.
- Black patients face **4x more** preventable stays than Asian/Pacific Islanders.
- Patients face lower quality of life, prolonged recovery times, and patient suffering

How can we bridge the gap to ensure better health outcomes for everyone?

Research Question and Importance

Question: Do income inequality, unemployment and high school completion rates affect the number of preventable hospital stays of certain racial groups at the county level?

Why is this important?

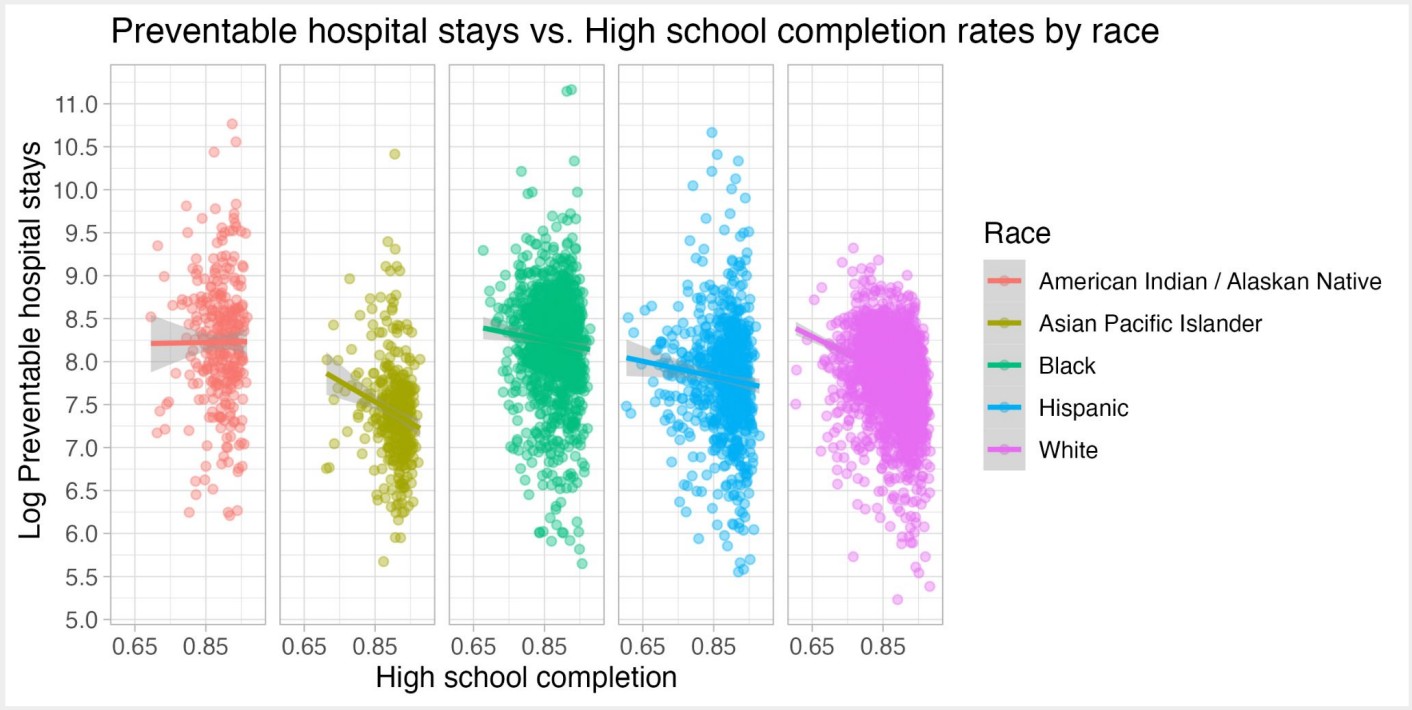
- Help identify and address health disparities
- Guide public health policies
- Develop targeted interventions

Data

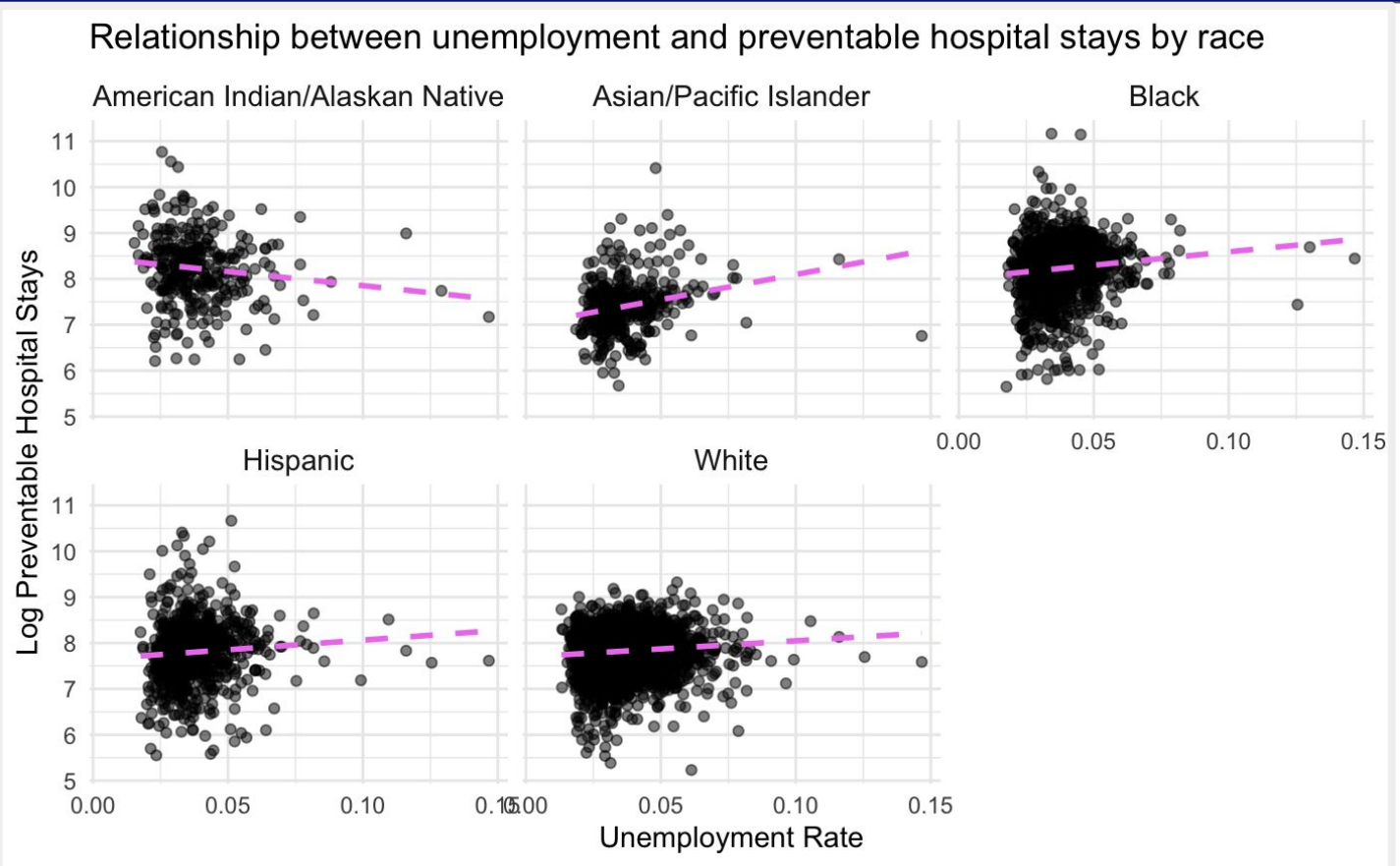
Data is provided by County Health Rankings & Roadmaps

- Explanatory variables:
  - Income inequality - ratio of household income at the 80th to 20th percentiles
  - Unemployment - % of population ages 16+ unemployed but seeking work
  - High school completion - % of adults ages 25+ with a high school diploma or equivalent
  - Race percentages
- Response variable:
  - Preventable Hospital Stays - admissions that result from conditions that, if properly managed in a timely manner in a primary care setting, would not escalate to the point where hospitalization is necessary.

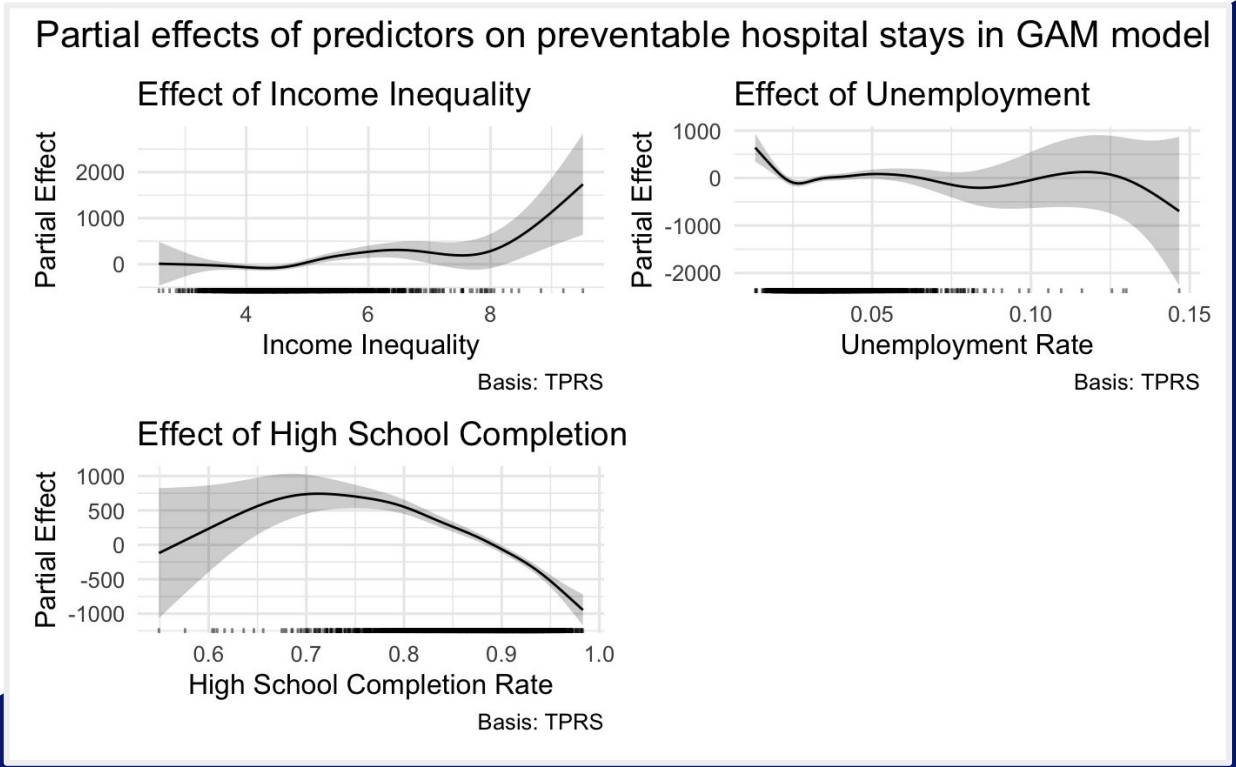
Counties with higher high school completion rates tend to have lower preventable hospital stays for most racial groups



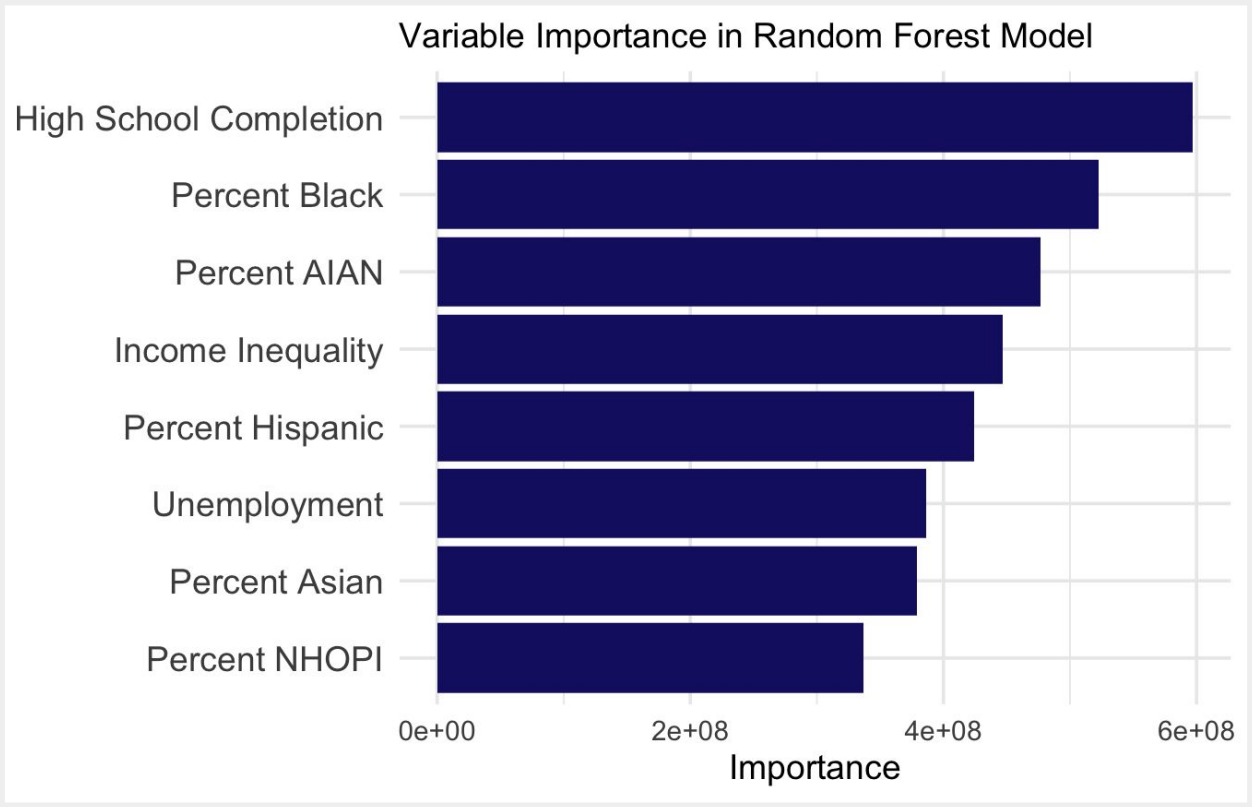
Counties with higher unemployment have more preventable hospital stays for most races except American Indian / Alaskan Native



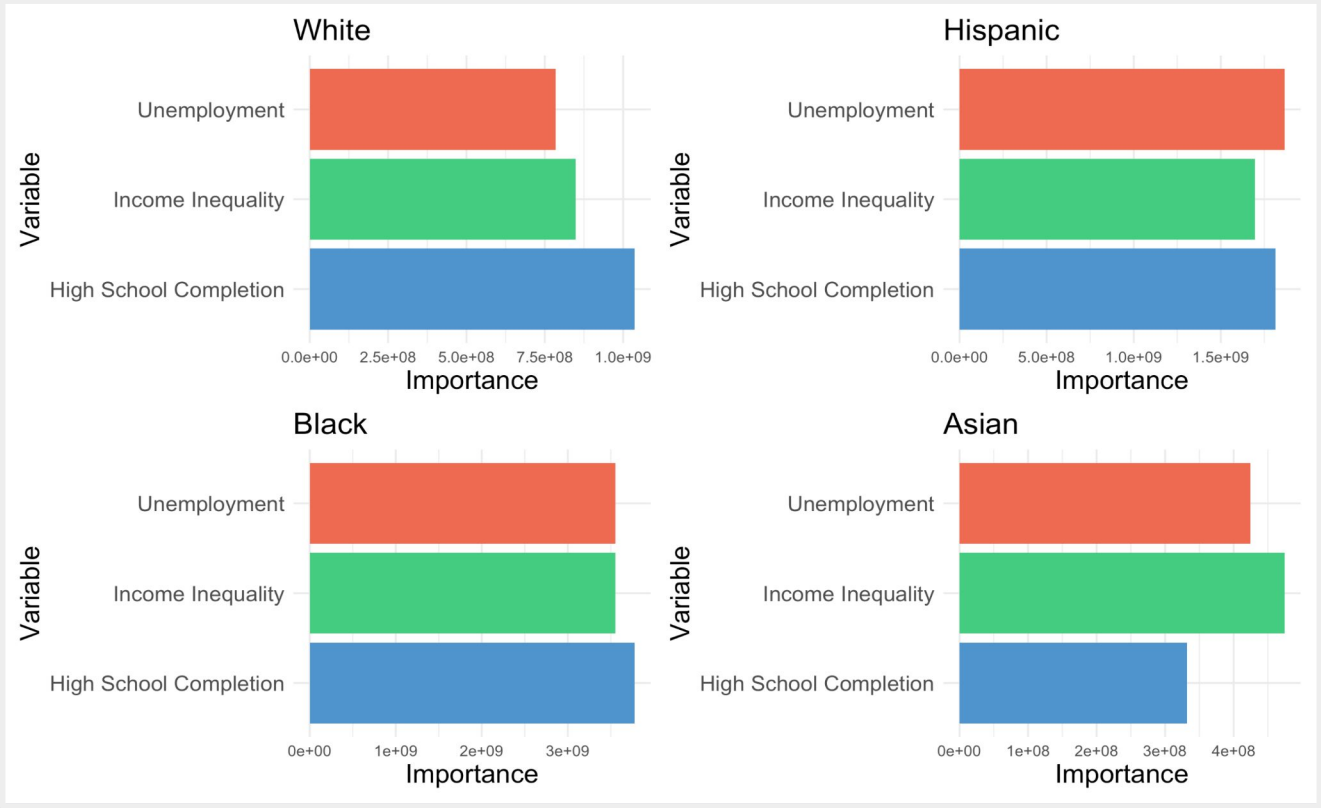
Higher income inequality increases preventable hospital stays, while more high school completion decreases preventable hospital stays



High school completion and percent black appear to be most important in predicting preventable hospital stays



Variable Importance in Predicting Preventable Hospital Stays by Racial Group



Takeaways

1. Counties with higher income inequality tend to have higher rates of preventable hospital stays.

2. As more people in a county complete high school, fewer individuals go to the hospital for preventable conditions.

3. High school completion is most important in predicting hospital stays for white and black people, while income inequality is most important for asians.

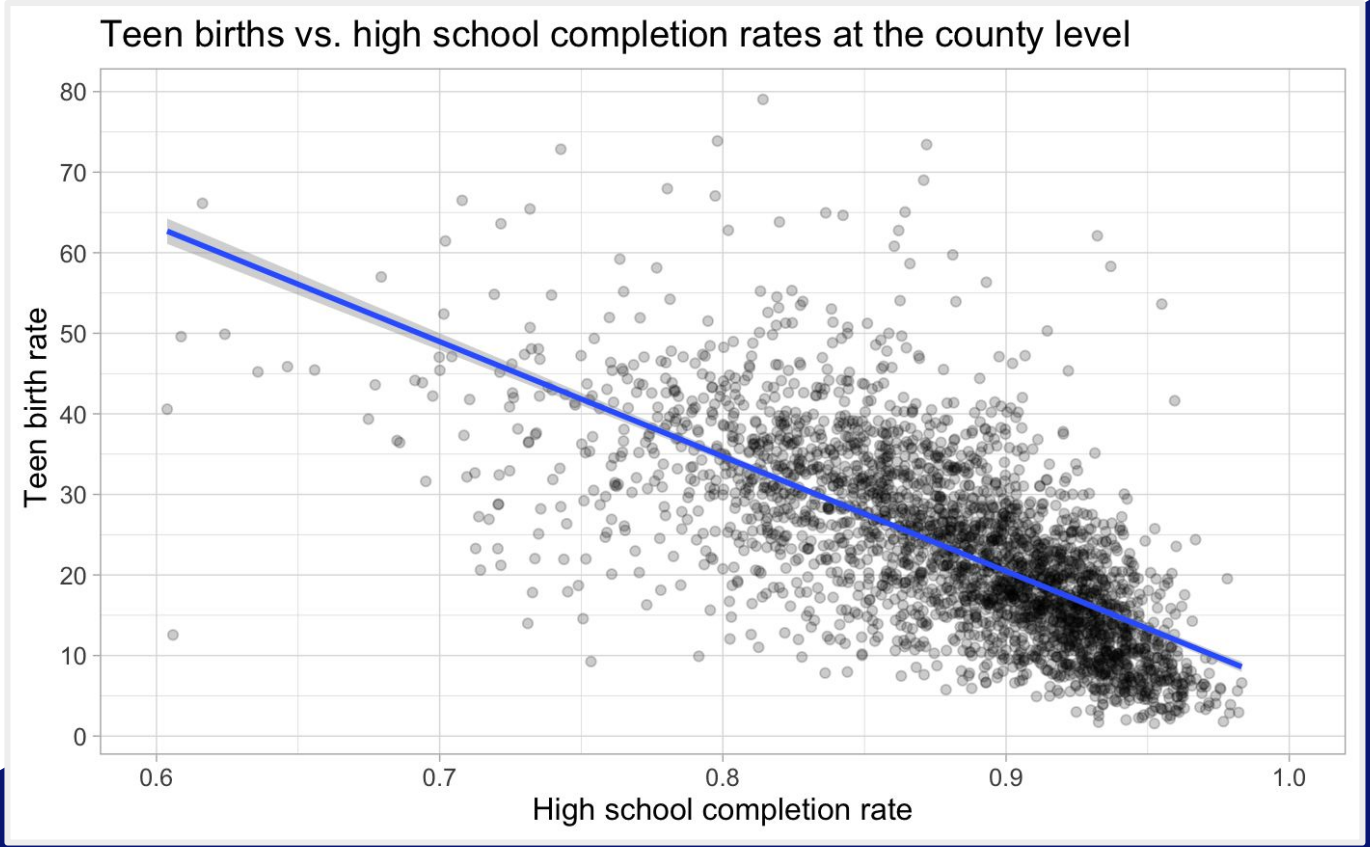
Limitations / Future Directions

- Income inequality, high school completion, unemployment not available for each race
- Variables such as access to healthcare services, community support, and poverty rate might better predict preventable hospital stays
- Conclusions only for individuals 65 and older which excludes younger people who also experience preventable hospital stays

Future directions

- Investigate appropriateness of model
- Examine other influencing factors
- Expand age range of data

Teen births may influence high school completion rates



Plan of action

- 1. EDA to visualize relationships between variables
- 2. Break down associations by race
- 3. Create model to predict preventable hospital stays
- 4. Understand relative predictor importance for each race
- 5. Look into potential confounding variables that affect preventable hospital stays for certain races

Preventable Hospital stays = the number of hospital stays for ambulatory-care (medical services performed on an outpatient basis, without admission)sensitive conditions per 100,000 Medicare enrollees(65+, end stage renal failure, other disabilities.

Income Inequality = Ratio of household income at the 80th percentile to income at the 20th percentile. The 2024 Annual Data Release used data from 2018-2022 for this measure.

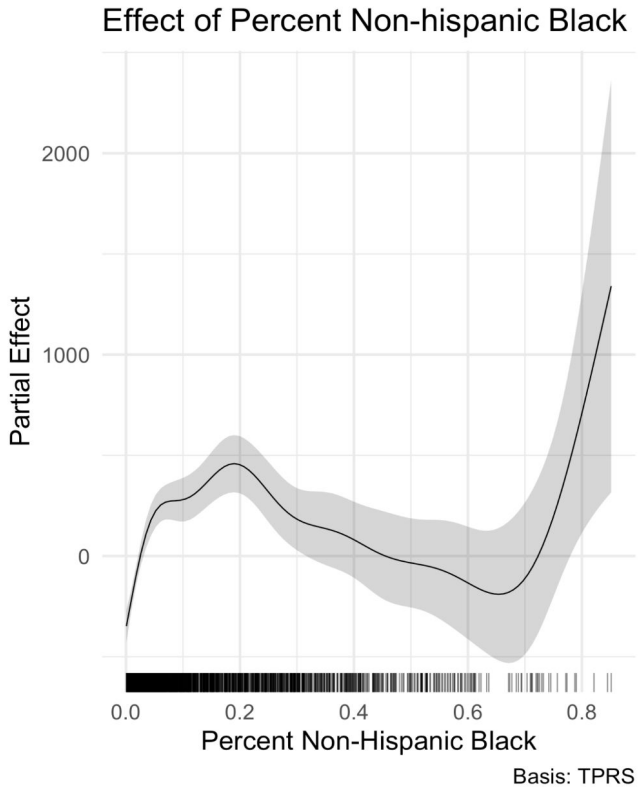
Unemployment = Percentage of population ages 16 and older unemployed but seeking work

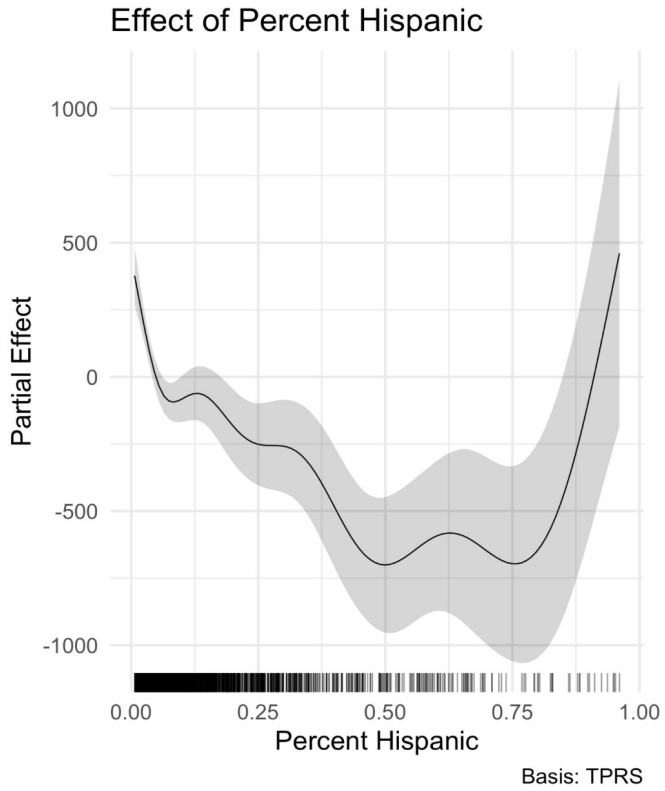
Teen Births - Number of births per 1,000 female population ages 15-19. The 2024 Annual Data Release used data from 2016-2022 for this measure.

Methods

- GAMs, random forest

Relationships between percent black/hispanic and preventable hospital stays appear nonlinear





Methods

- Scatterplots to explore relationships between variables
- Cross validation to compare different models for predicting preventable hospital stays
- Validate GAM model assumptions
- Examine partial effects of predictors in GAM model
- Random Forest for each race to visualize relative variable importance

ncome inequality has the strongest correlation with preventable hospital stays among hispanic communities.