



Analyzing the effects of socio-economic factors on pregnancy outcomes



Business Context: Pregnant women in the United States are more than twice as likely to die from complications related to pregnancy or childbirth than those in most other high-income countries in the world. Our project seeks to investigate the association between maternal mortality and some of its pertinent socioeconomic factors in order to provide insights that could guide and prevent pregnancy-related complications and deaths overall.

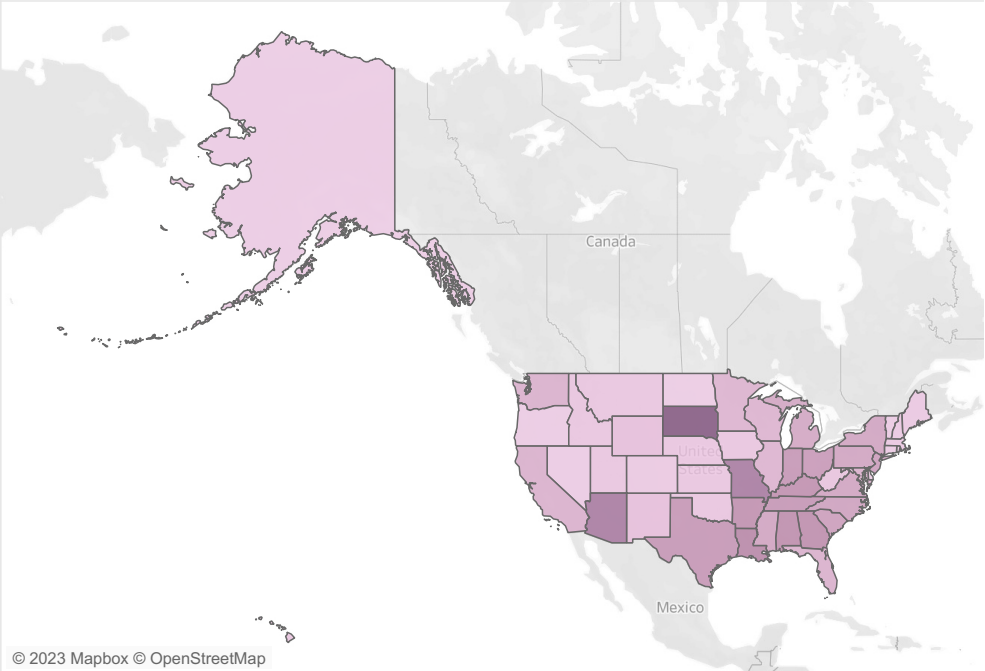
Data Transformation: We obtained and transformed pregnancy-related mortality data from the CDC Wonder database and socioeconomic data from the US Census Bureau website.

Results: We found that there is a statistically significant difference in pregnancy-related mortality rates between Blacks and Whites. Although poverty rates are still **positively** correlated with pregnancy-related mortality, poverty rates in black married couples is not correlated to mortality. In black people, being married or never married is **negatively** correlated with pregnancy-related mortality, but in the white group, marital status is **positively** correlated with pregnancy-related mortality regardless of the status. In black people, being employed is **positively** correlated to pregnancy-related mortality, while being unemployed is **negatively** correlated to mortality rates. This is the opposite of what was observed in the overall population, as well as the white population. In the black population, access to any type of health care insurance (private or public) is **negatively** correlated to pregnancy-related mortality. In the white population, only access to private health care insurance is **negatively** correlated to pregnancy-related mortality rates, i.e., being publicly insured or uninsured increases a white woman's risk of dying of pregnancy-related causes.

Race

All

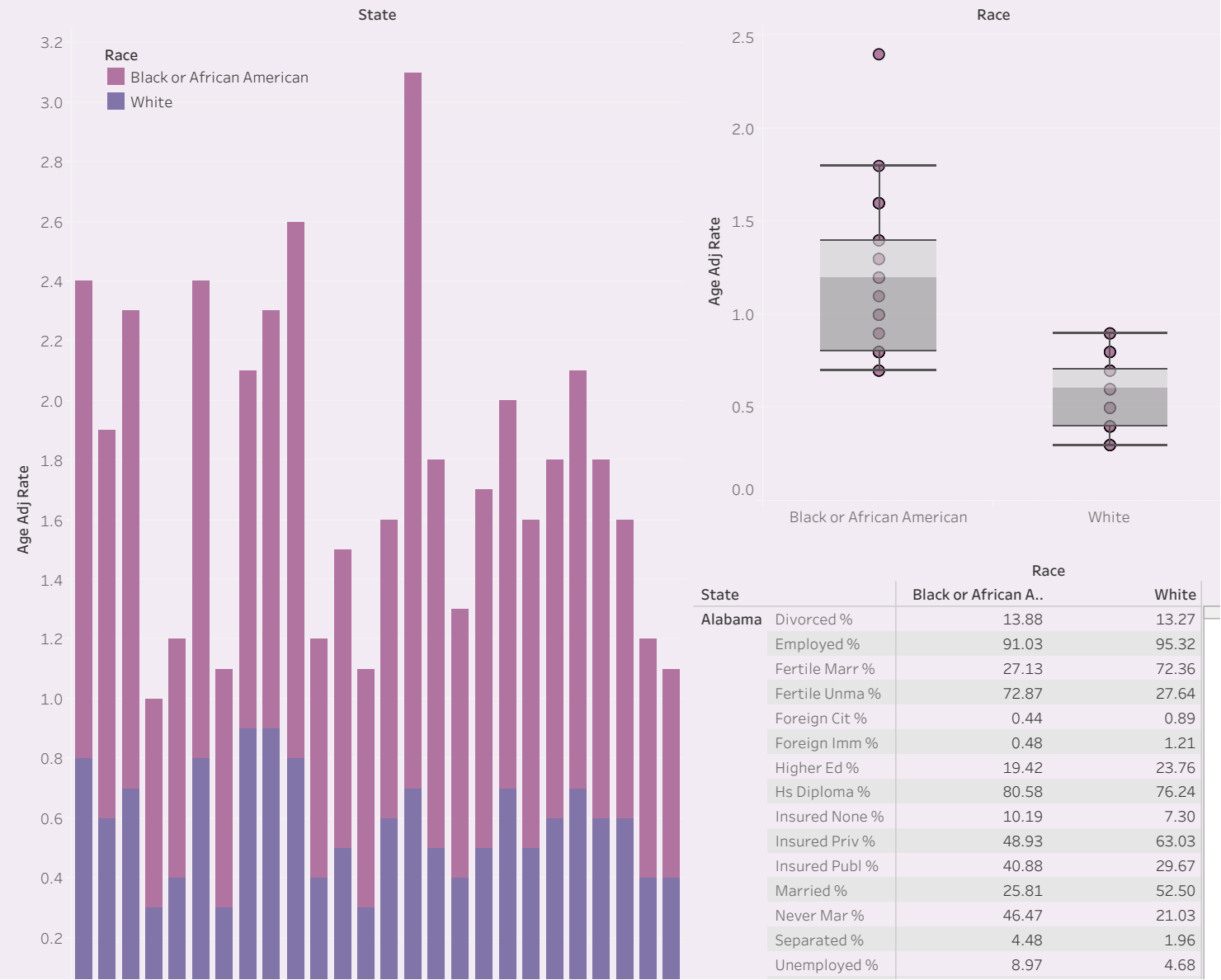
While Texas Leads the U.S. in Count, South Dakota Leads in Rates of Pregnancy-Related Deaths (2015-2019)



Age Adj Rate 0.300 4.400

| State | | | | | | |
|-----------------|--|--|--|--|--|--|
| Alabama | | | | | | |
| Alaska | | | | | | |
| Arizona | | | | | | |
| Arkansas | | | | | | |
| California | | | | | | |
| Colorado | | | | | | |
| Connecticut | | | | | | |
| Delaware | | | | | | |
| District of C.. | | | | | | |
| Florida | | | | | | |
| Georgia | | | | | | |
| Hawaii | | | | | | |
| Idaho | | | | | | |
| Illinois | | | | | | |

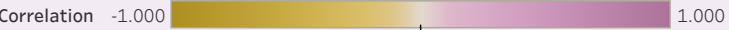
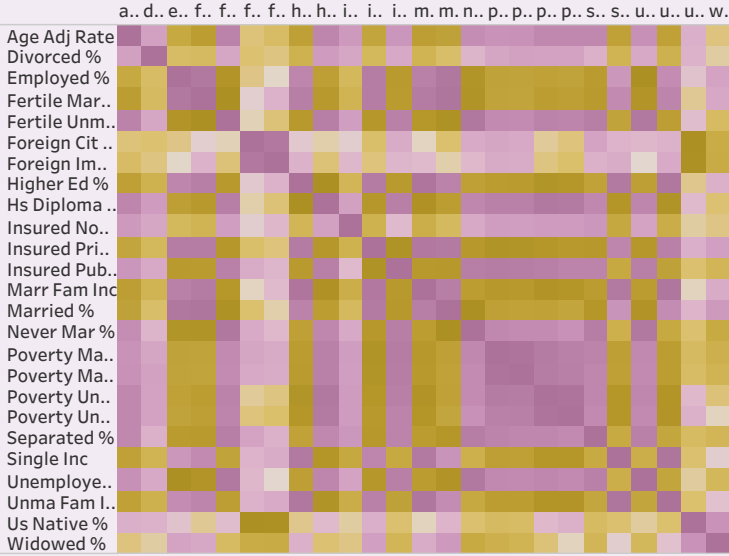
Exploratory Data Analysis of Black and White



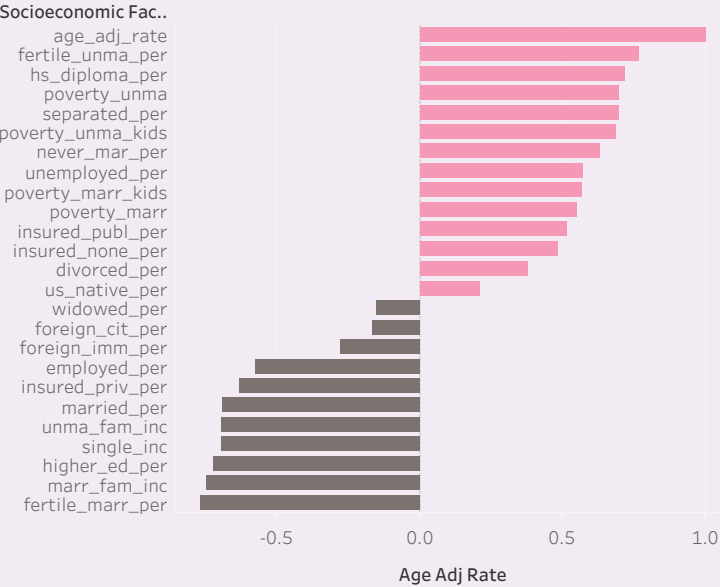
Insights on Correlations to Pregnancy-Related Mortality



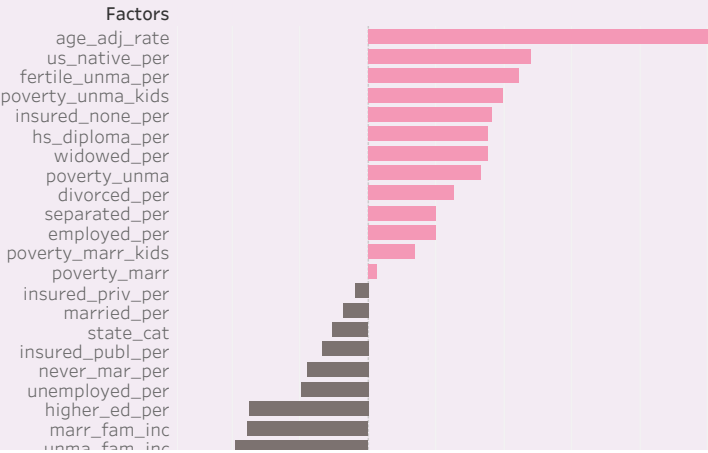
Socioeconomic Factors



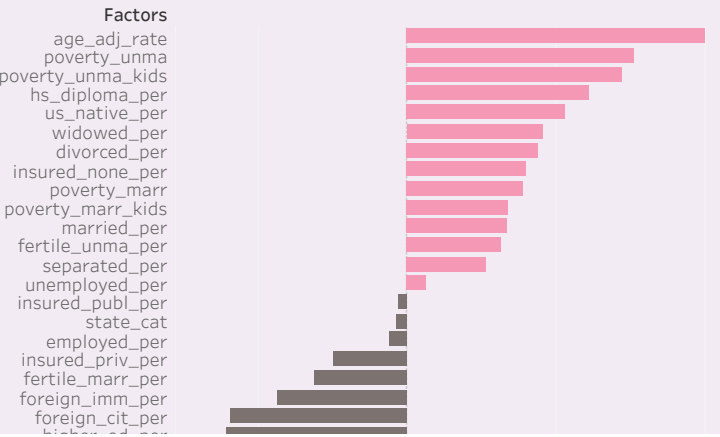
Regardless of Race



Black or African American

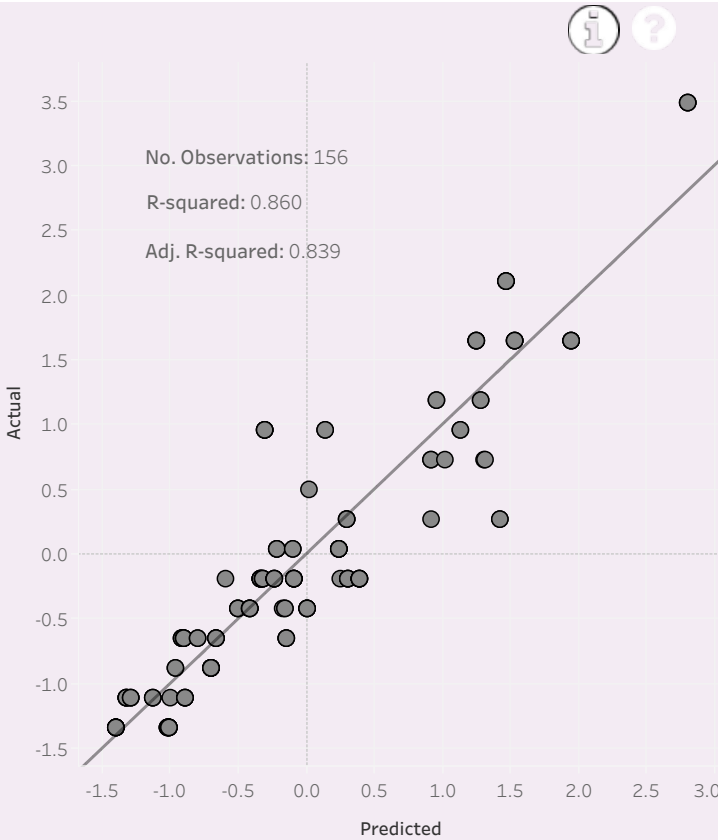


White



Regression Regardless of Race and Model Refinement

| Factors | (0.025 | 0.975) | Coef | P> t | Std Err | T |
|-------------------|--------|--------|-------|------|---------|-------|
| divorced_per | -0.20 | 0.08 | -0.06 | 0.42 | 0.07 | -0.81 |
| employed_per | 0.23 | 0.51 | 0.37 | 0.00 | 0.07 | 5.39 |
| fertile_marr_per | -1.27 | -0.25 | -0.76 | 0.00 | 0.26 | -2.95 |
| fertile_unma_per | 0.25 | 1.27 | 0.76 | 0.00 | 0.26 | 2.95 |
| foreign_cit_per | -0.04 | 0.52 | 0.24 | 0.09 | 0.14 | 1.72 |
| foreign_imm_per | -0.72 | 0.03 | -0.35 | 0.07 | 0.19 | -1.85 |
| higher_ed_per | -0.26 | 0.15 | -0.06 | 0.58 | 0.10 | -0.55 |
| hs_diploma_per | -0.15 | 0.26 | 0.06 | 0.58 | 0.10 | 0.55 |
| insured_none_per | -0.11 | 0.30 | 0.09 | 0.36 | 0.10 | 0.92 |
| insured_priv_per | 0.12 | 0.76 | 0.44 | 0.01 | 0.16 | 2.70 |
| insured_publ_per | -0.82 | -0.22 | -0.52 | 0.00 | 0.15 | -3.40 |
| Intercept | 0.15 | 1.47 | 0.81 | 0.02 | 0.34 | 2.41 |
| marr_fam_inc | -1.85 | 0.18 | -0.84 | 0.11 | 0.52 | -1.63 |
| married_per | -0.15 | 1.13 | 0.49 | 0.13 | 0.32 | 1.53 |
| never_mar_per | -1.17 | 0.12 | -0.53 | 0.11 | 0.33 | -1.62 |
| poverty_marr | -1.88 | -0.55 | -1.21 | 0.00 | 0.34 | -3.61 |
| poverty_marr_kids | 1.08 | 2.03 | 1.55 | 0.00 | 0.24 | 6.44 |
| poverty_unma | 0.46 | 2.10 | 1.28 | 0.00 | 0.42 | 3.07 |
| poverty_unma_kids | -1.28 | 0.04 | -0.62 | 0.06 | 0.33 | -1.87 |
| race_cat | -2.63 | 0.11 | -1.26 | 0.07 | 0.69 | -1.82 |
| separated_per | -0.05 | 0.56 | 0.25 | 0.11 | 0.16 | 1.63 |
| single_inc | 0.10 | 1.36 | 0.73 | 0.02 | 0.32 | 2.29 |
| state_cat | -0.03 | 0.00 | -0.01 | 0.04 | 0.01 | -2.07 |
| unemployed_per | -0.51 | -0.23 | -0.37 | 0.00 | 0.07 | -5.39 |
| unma_fam_inc | -0.18 | 0.75 | 0.28 | 0.23 | 0.24 | 1.21 |
| us_native_per | -0.10 | 0.08 | -0.01 | 0.81 | 0.04 | -0.24 |
| widowed_per | -0.29 | 0.14 | -0.07 | 0.51 | 0.11 | -0.66 |



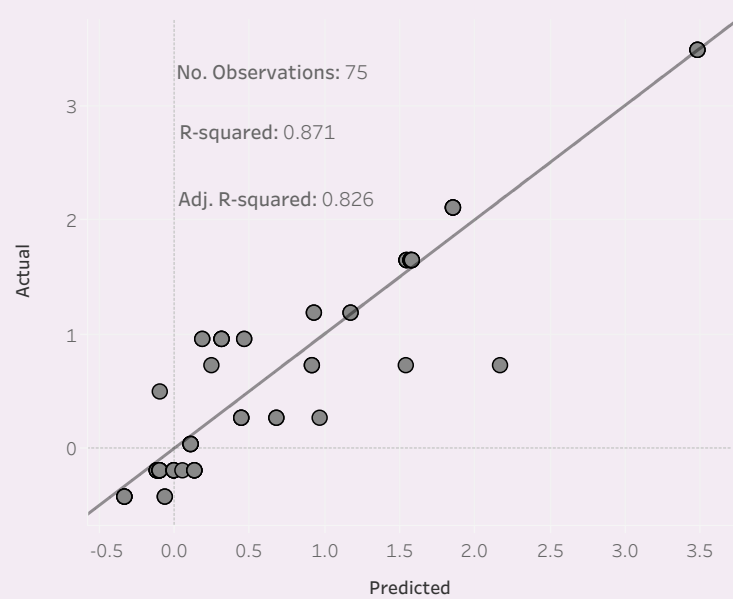
Model Refinement:
In a bid to optimize
our regression
model, we decided
to select the most
important features
to remove noise in
our data. Two
methods were used
to identify the most
important features,

| Variable |
|-------------------|
| poverty_marr_kids |
| poverty_unma |
| race_cat |
| poverty_marr |
| marr_fam_inc |
| fertile_unma_per |
| fertile_marr_per |
| single_inc |
| poverty_unma_kids |
| never_mar_per |
| insured_publ_per |
| married_per |
| insured_priv_per |
| employed_per |
| unemployed_per |
| foreign_imm_per |
| unma_fam_inc |
| separated_per |
| foreign_cit_per |
| insured_none_per |
| widowed_per |

Regression by Race



Black or African American



White

