


Examining Premature Death at the County Level: The Role of Alcohol, Suicide, Income, and Education

SURE 2023 | UHG - Optum

Mason **Caskey**^{*}, Pilar **Gibson**^{*}, Erin **Melia**^{*}, and Makenna **Rodriguez**^{*}

^{*} indicates equal contribution



What is Premature Death?

Years of potential life lost before age 75 per 100,000 population

Measuring premature mortality, rather than overall mortality, focuses attention on deaths that might have been **prevented**

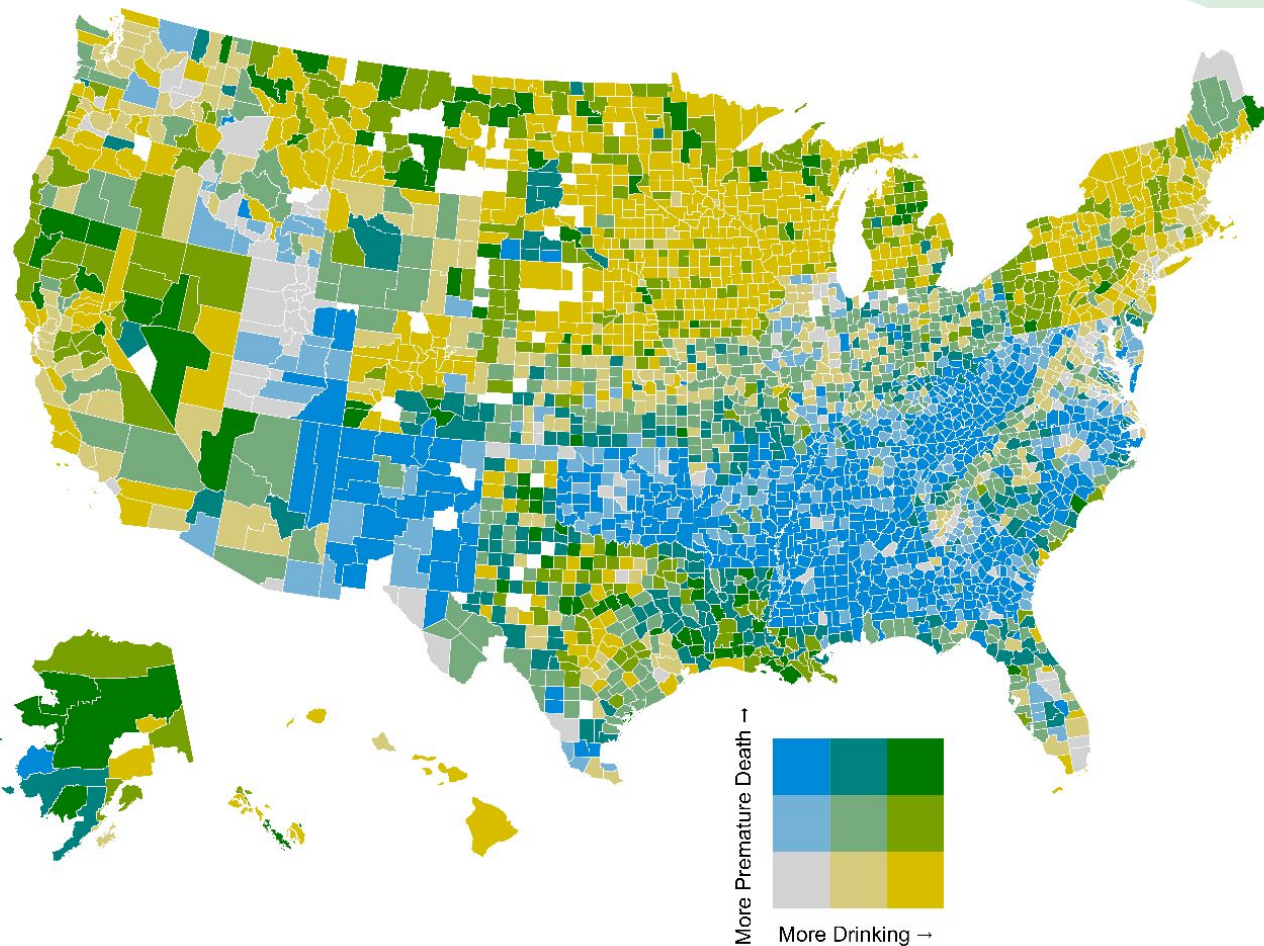
Data Collection

We investigated the following variables in relation to years of life lost to premature death:

| Suicides | Homicides | Firearm Fatalities |
|--------------------|-----------------------------|-------------------------|
| Excessive Drinking | High School Completion Rate | Median Household Income |

Excessive Drinking

There is an unexpected **negative** relationship between excessive drinking rate and premature deaths.



Median Household Income

Median
Household
Income

The income where half of households in a county earn more and half of the households earn less

Premature
Death

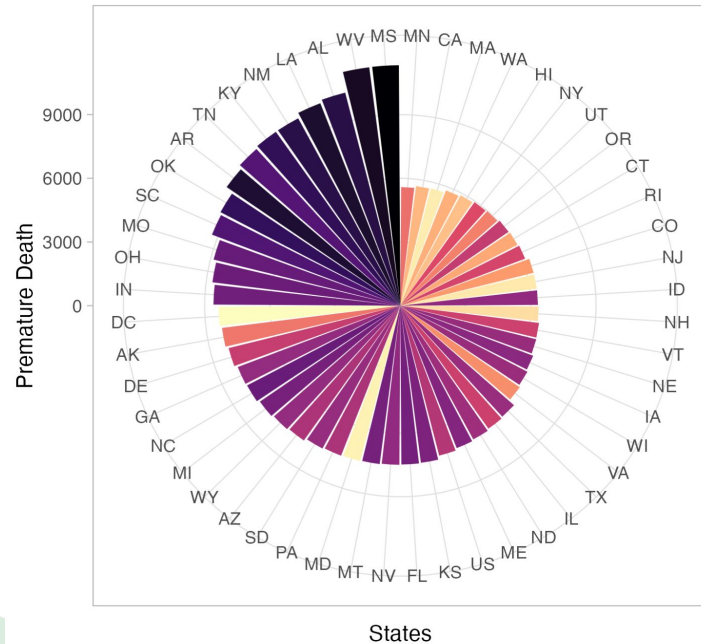
Years of potential life lost before the age of seventy-five per hundred thousand population (age-adjusted)

Hypothesis

States with the highest household median income would have the lowest years of premature death



Greater Median Household Income Translates to a Lower Premature Death Value per State



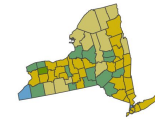
Median Household Income



MA



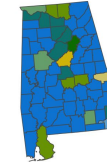
NY



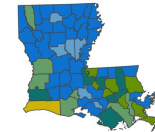
CT



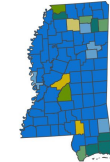
AL



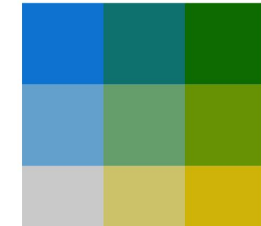
LA



MS



More Prem. Death ↑

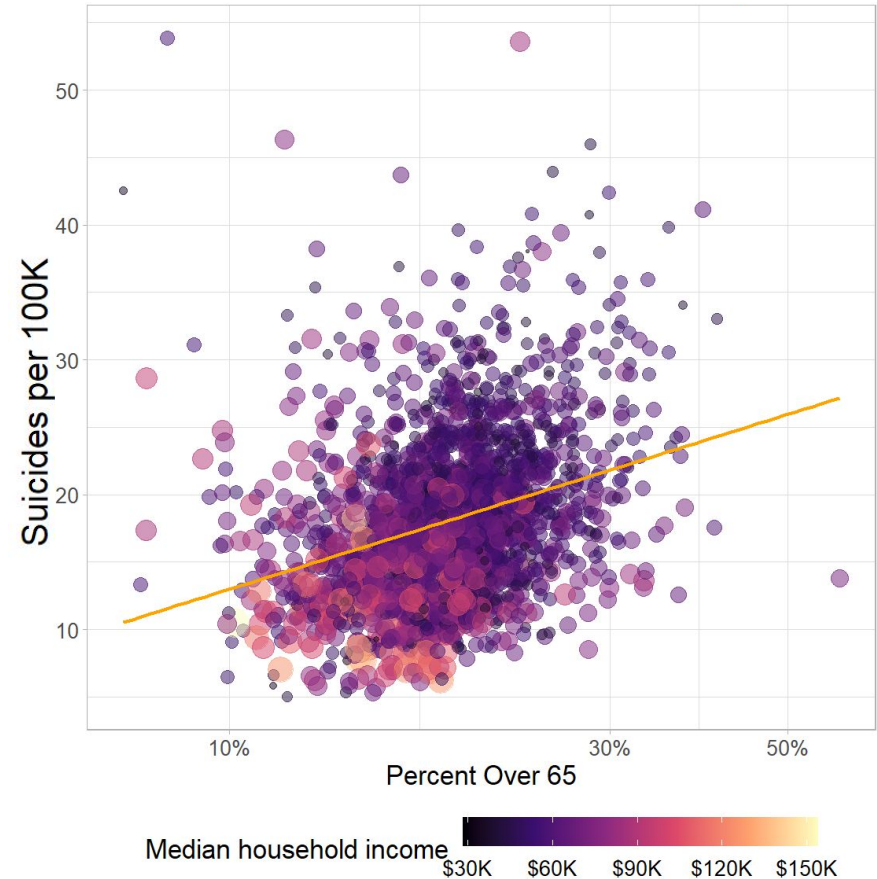


Richer →

Older Counties see more suicide, worsened by income shortfalls

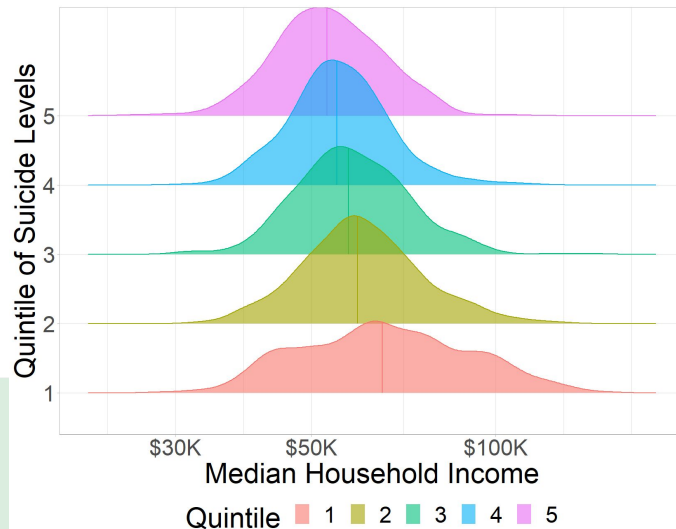
Hypothesis

Suicide rates will be higher in counties that are older and that have a lower median household income

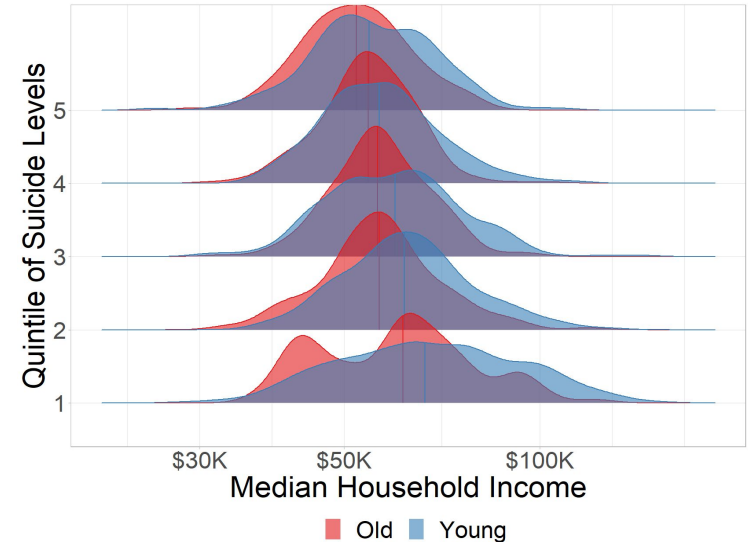


Median Household Incomes in Counties by Suicide Quintiles

Hypothesis: as suicide rates get higher, median household income would decrease.



Median Household Incomes in Counties with Low suicide rates have Trimodal Distributions

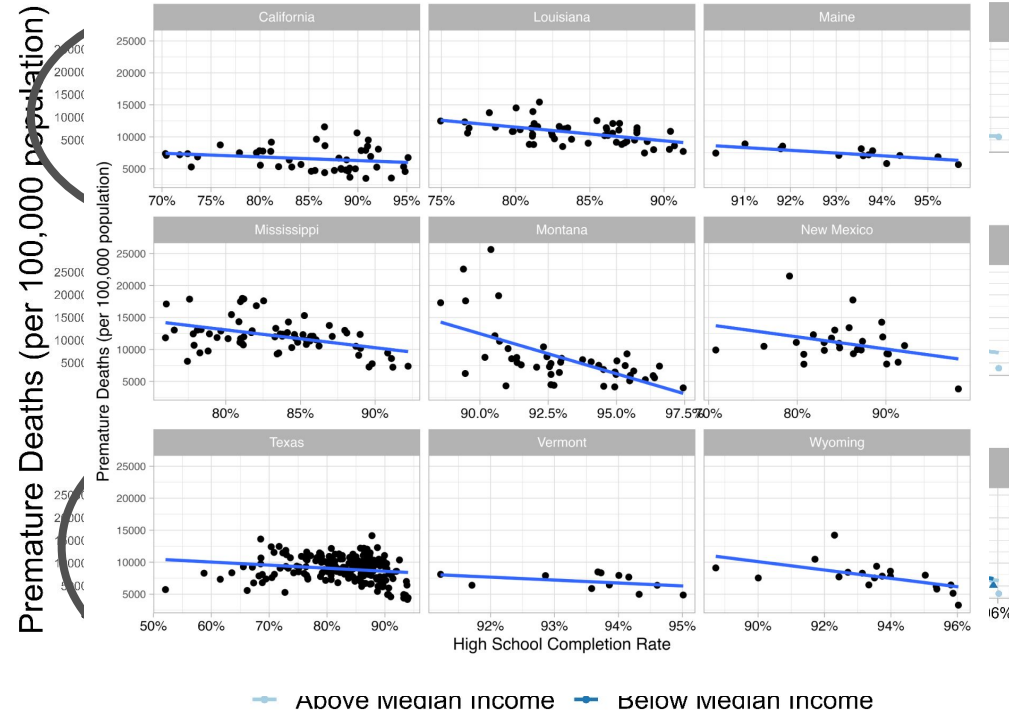


High School Completion

Hypothesis

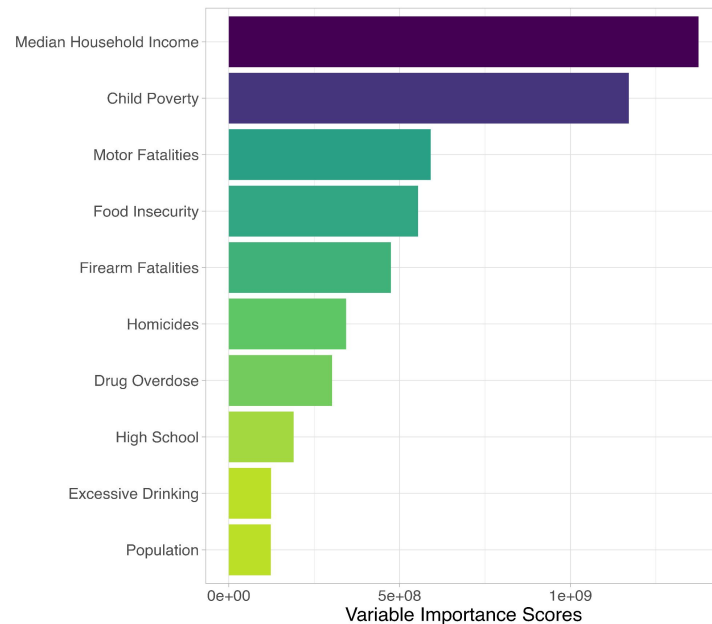
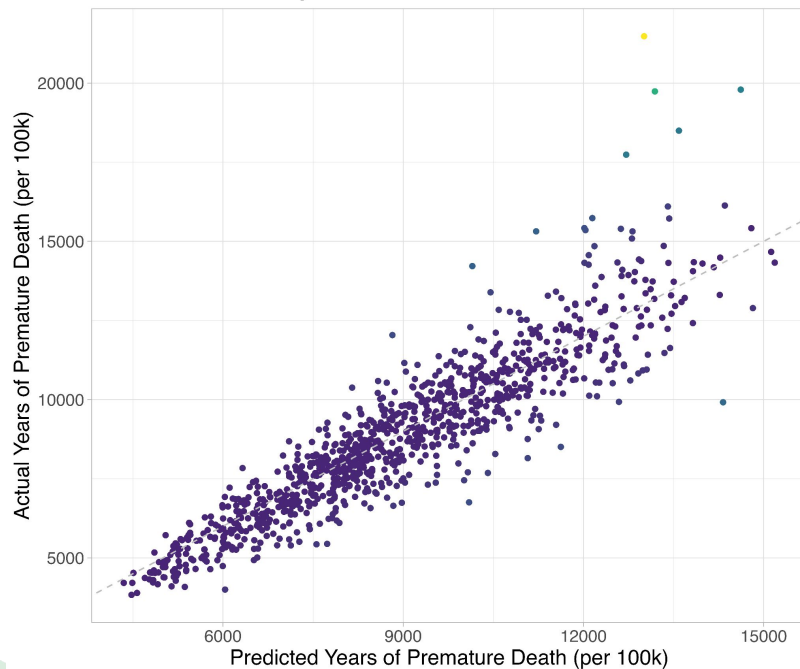
As high school completion rates **increase**, the years of life lost to premature death would **decrease**

Hypothesis held true for counties **above median income**, but counties below showed variability.



Random Forests for Predictive Modeling

Predictive Accuracy of Random Forest Model



Conclusion

States with greater rates of excessive drinking also had lower levels of premature death.

Premature death and median household income have a negative correlation.

To reduce premature mortality, we recommend interventions that may address the **negative effects of low income, excessive drinking, high suicide rates, and high school completion.**

On average, counties with older populations experience more suicides, and counties above the median suicide rate have significantly lower median household incomes.

Our plots of high school completion rates and premature death rates failed to show a consistent trend.

**Thank
You!**

