

# Checking for a pulse:

## Identifying how socioeconomic factors influence cardiovascular disease

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### Background

In 2019, approximately 660,000 deaths in the US were cardiovascular disease-related (CVD). Research shows that socioeconomic factors have a quantifiable effect on cardiovascular outcomes. Hence, to understand these socioeconomic factors we need to assess the four main social determinants of health:

- 1. Socioeconomic status
- 2. Neighborhood and/or physical environment
- 3. Educational attainment
- 4. Employment

### Intention

Our team analyzed CVD mortality rates through the lens of income inequality in conjunction with other socioeconomic factors. We examined these variables on a state, county, and county income class level for six states across the US in hopes of contributing to more equitable and sustainable interventions.

### Methodology

- Data collected from:



- **Variables:** Median Income, Poverty, Unemployment, Education, Medicaid Enrollment, Food Access, and Age/Race Demographics
- **States:** California, Florida, Georgia, Illinois, New York, & Texas (Gini Index used to measure income inequality)



- Total deaths and death rates were calculated and normalized, respectively, using age-standardized mortality rates.

### Findings

*Median income grows for all income classes with high-income counties seeing the fastest growth*



All six states see a rise in average median income, especially in high-income counties. Thus the wealth gap widens as high-income counties see a faster rise in median household income. We see the impact of this as the number of low-income counties increases over time



*Generally speaking, as median income decreases, death rates increase*

Looking at death rates versus median income over time, we filtered the data by income class designations. We observe the following trends:

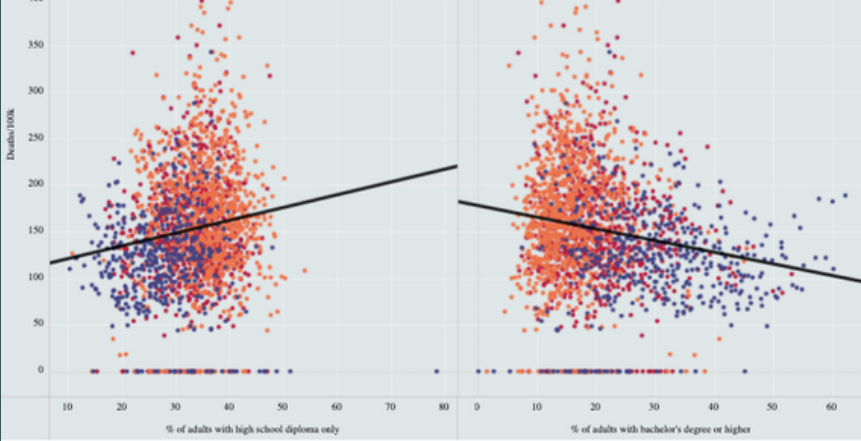
- As income rises, death rates seem to fall
- Low-income counties display higher death rates compared to high-income counties.

These findings are further supported by its negative correlation

*Average cardiovascular disease mortality on the rise*



Average CVD death rates rise steadily from 2010 to 2019 across all six states; Illinois is the only state that falls below the national average (161.5 deaths per 100k). Among these states, Illinois also had the lowest income inequality index and average highest education



*Educational attainment provides insight into how death rates change with higher education*

CVD death rates vs. percent of adults with only a high school diploma show a positive trend. We observe that high-income counties appear to have fewer adults with solely a high school diploma and lower death rates. For adults with a bachelor's or higher, there is a trend showing that as more adults receive tertiary education, death rates decline. Here we see that high-income counties possess larger percentages of adults with a bachelor's or higher

### Highlights

- By 2019, all states, besides Illinois, had average death rates greater than the national average of 161.5 deaths per 100,000
- Cardiovascular-related disease death rates and median income display a negative correlation.
- Many of our correlations are moderate or weak when compared to CVD death rates; however, high collinearity is indicative of an underlying relationship between our variables which requires further analysis

### Insights

- Low-income counties showed a 43% increase in death rates compared to a 30% increase in high-income counties
- The average CVD rate for the 34-65 has grown by 47% since 2010 compared to a 16% increase in the 65+ age group. This challenges the common perception that the risk for CVD increases with age.
- By 2019, all six states saw an increase in the number of low income counties compared to high or mid income. Within low income counties, we saw an increase in low income and low food access populations which only serves to further highlight the impacts of income disparity.



### Limitations

To better understand the relationship between social determinants of health and CVD more time and resources are needed to address high multicollinearity

[CVD Mortality Dashboard Link](#)