


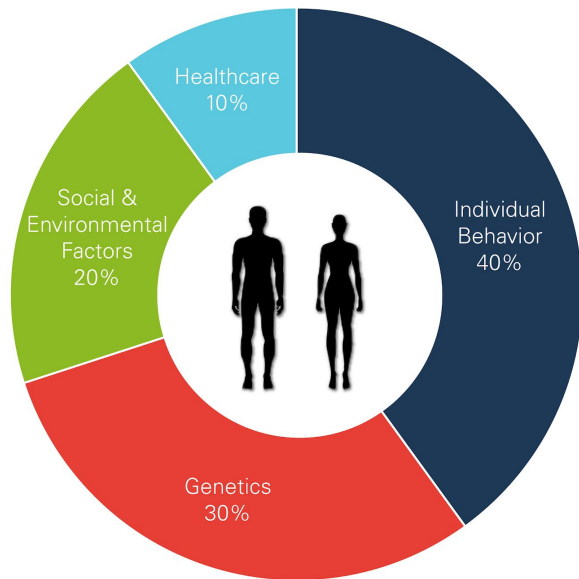
# US Social Determinants of Health Exploration with Shiny

Jake Kobza  
kobzajj93@gmail.com

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# Despite the primary focus of the healthcare industry, only 10% of health outcomes are determined by clinical factors

Impact of different factors on risk of premature death



Source: Beyond Health Care: The Role of Social Determinants in Promoting Health and Health Equity. Kaiser Family Foundation, 2015.

**\$3.5 trillion**

US Healthcare Spend in 2017

**\$582 billion**

Government Spend on Medicaid

**\$29 billion**

Conservative SDOH Opp. (5% of Medicaid)

# Social determinants are an emerging area in healthcare, and include many factors with impact on downstream health outcomes

## Social Determinants of Health: Categories and Sub-Categories

Economic Stability	Neighborhood / Physical Environment	Education	Food	Community & Social Context	Healthcare System
Employment	Housing	Literacy	Hunger	Social Integration	Health Coverage
Income	Transportation	Language	Access to Healthy Options	Support Systems	Provider Availability
Expenses	Safety	Early Childhood Education		Community Engagement	Provider Linguistic and Cultural Competency
Debt	Parks	Vocational Training		Discrimination	Quality of Care
Medical Bills	Playgrounds	Higher Education		Stress	
Support	Walkability				

Several public datasets contain a subset of social determinants information, but the County Health Rankings dataset contained the most relevant data found

## Publicly Available SDOH Datasets

- **County Health Rankings:**
  - *County-level information on many social determinants and health outcomes compiled by the University of Wisconsin Population Health Institute and the Robert Wood Johnson Foundation (RWJF)*
- **500 Cities Health Dashboard:**
  - Variety of social determinants and health indicators available for 500 cities across the US
  - Subset of data available at census tract level, but lots of missing information in this dataset
- **CMS Chronic Conditions Dashboard:**
  - Information on prevalence of various chronic conditions and health indicators for Medicare eligible population

# The CHR data was utilized to develop an application that explores SDOH and health outcomes at a state / county level

## SDOH Dashboard Development Process

### Data Intake / Processing

- Read data, selected and named columns for desired metrics
- Inspected missing data (removed reading proficiency, cancer prevalence, CHD prevalence, and opioid hospitalizations)
- Adjusted metrics so units are apples to apples (all rate metrics as % or per 10,000 people)

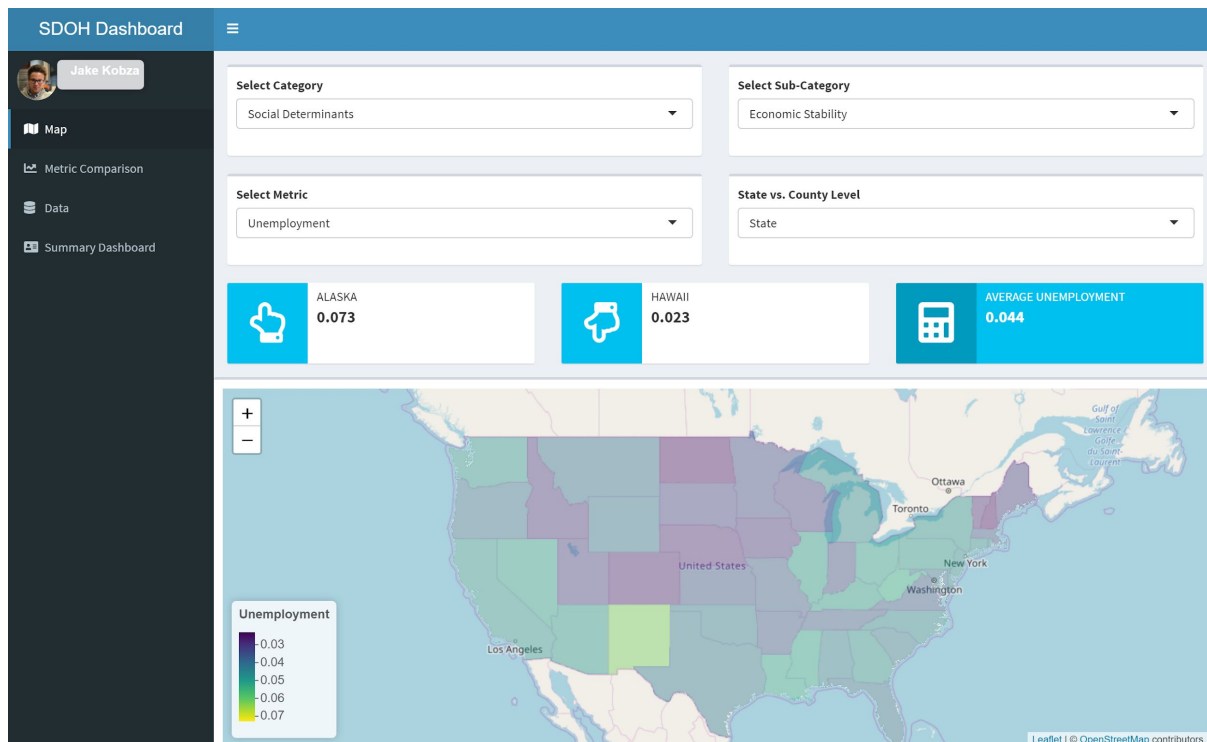
### Table / File Creation

- **Metric Table:** Lookup for social determinant / health outcome taxonomy, including category, sub-category, name, and id for each metric
- **County Table:** county-level metric information for social determinants and health outcomes
- **State Table:** state-level metric information, calculated using weighted average of county metrics by population

### Shiny App Development

- Map and histogram summary for each metric to show variation in social determinants and health outcomes across the country
- Scatterplot view of the relationship between social determinants and health outcomes
- Source dataset in table format

# Shiny App Demo



# There are many future areas that can be refined to develop a more robust SDOH app

## Tactical Updates

- County-level maps / linkage to state level maps
- County and state dashboards to show where each area sits across different metrics
- Data table and metric formatting
- Calibration of color scales based on higher vs. lower “better”
- Inclusion of additional factors / datasets
- Speed it up!

## Aspirational Updates

- Individual-level data
- Summarized social indexes by category and overall social index
- Prediction of individual level outcomes (and financial impact) based on closure of social barriers