Project

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# Introduction

Stroke has become the most fatal disease in Australia, therefore Stroke Foundation (SF) Australia has approached AA consulting firm with the aim of deepening their understanding of risk factors associate with stroke mortality rates.

This technical report, produced by AA consulting firm, provides a preliminary exploratory data analysis on the US national datasets and evaluates a preliminary regression model with suggestions on potential improvement.

Besides, this report also explores the feasibility of the same type of analysis to Australian context along with contextualisation notes on business understanding and stakeholder analysis.

# Exploratory Data Analysis

Exploratory data analysis (EDA) on the US datasets was conducted in R.

## Source of Data

The US datasets were published by various US entities including the US Centers for Disease Control and Prevention (cdc.gov) for stroke mortality and incidence data and Census (census.gov) for poverty, income, health insurance and population data. All these datasets contain the information for the 2015 calendar year.

## Data Exploration

### Checks on Duplicate and Data Type

Initial checks were performed on duplicated values, which none of the datasets included. Investigation in missing value checks were intentionally ignored at this stage as they were known to exist due to the reasons of the insufficient data size or confidentiality. Missing value will be explored in the later stage of EDA.

Checks on data format were performed for each dataset and types of some variables were converted. For example, variable “Age-Adjusted Death Rate” and “Average Deaths per Year” in the stroke mortality dataset were stored as character, which have been converted to numeric variables for further analysis.

The stroke mortality dataset was also reshaped by separating the state information from the county information. For example, “Perry County, Kentucky” was separated into “Perry County” and “Kentucky”. Based on the domain knowledge, the United States is made up of a total of 50 states, plus the District of Columbia (DC). Checks and corrections were performed to ensure the unique number of states is 52, with an additional entry for US as a whole.

### Checks on Internal Consistency

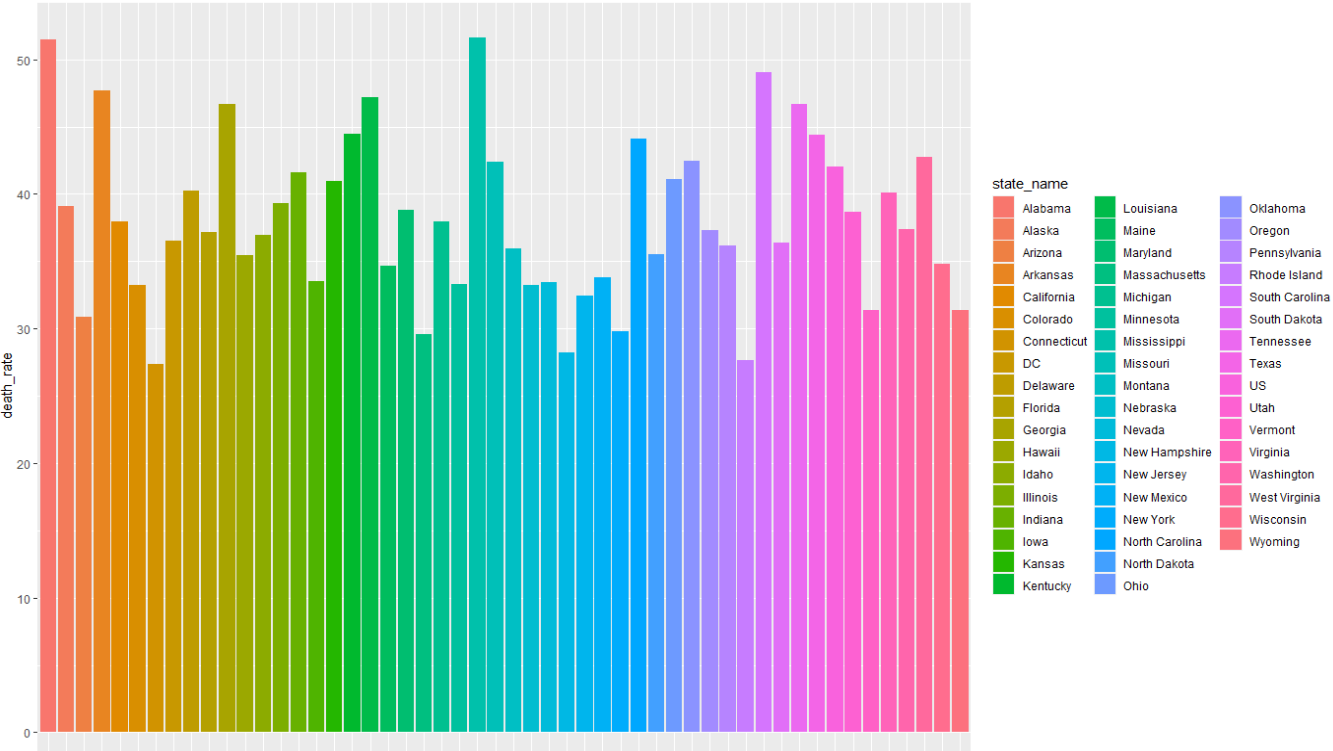
To gain a better understanding of the datasets, internal consistency checks on a few variables were performed, especially for those being used for the preliminary regression model. For instance, the relationship among certain variables was examined. Below lists several examples:

* non-institutionalized population was proved to be equal to the sum of male non-institutionalized population and female non-institutionalized population within the health insurance dataset.
* Population for whom poverty status is determined was proved to be equal to the sum of below poverty level population and above poverty level population.

### Sense Checking

Sense checking was performed on the population dataset, where the total US national population at the mid-year 2015 was 642 million. However, based on the domain knowledge, the population of the United States should be in the range of 300 to 350 million. The number in the population dataset appeared to be doubled in some way. To resolve the uncertainty, death dataset was cross checked. The number of stroke death and the stroke mortality rate was used to back solve the population for each county, which suggested the US national population in 2015 was 329 million. Therefore, all the county level data in the population dataset was halved and the total population was reduced to 321 million, which is more consistent with the real world.

## Manipulate and Cleanse the Data



# Evaluation of the Preliminary Multiple Linear Regression Model

*Excellent evaluation of the linear model*

Assessment of ...

Evaluation of …

# Australia Contextualization

*Excellent explanations/considerations are provided*

# Appendix A – Technical Analysis

# Appendix B – Contextualisation Notes

# Appendix C – R Code

# Appendix D – Reference