



# Marketing Health Products to the Elderly



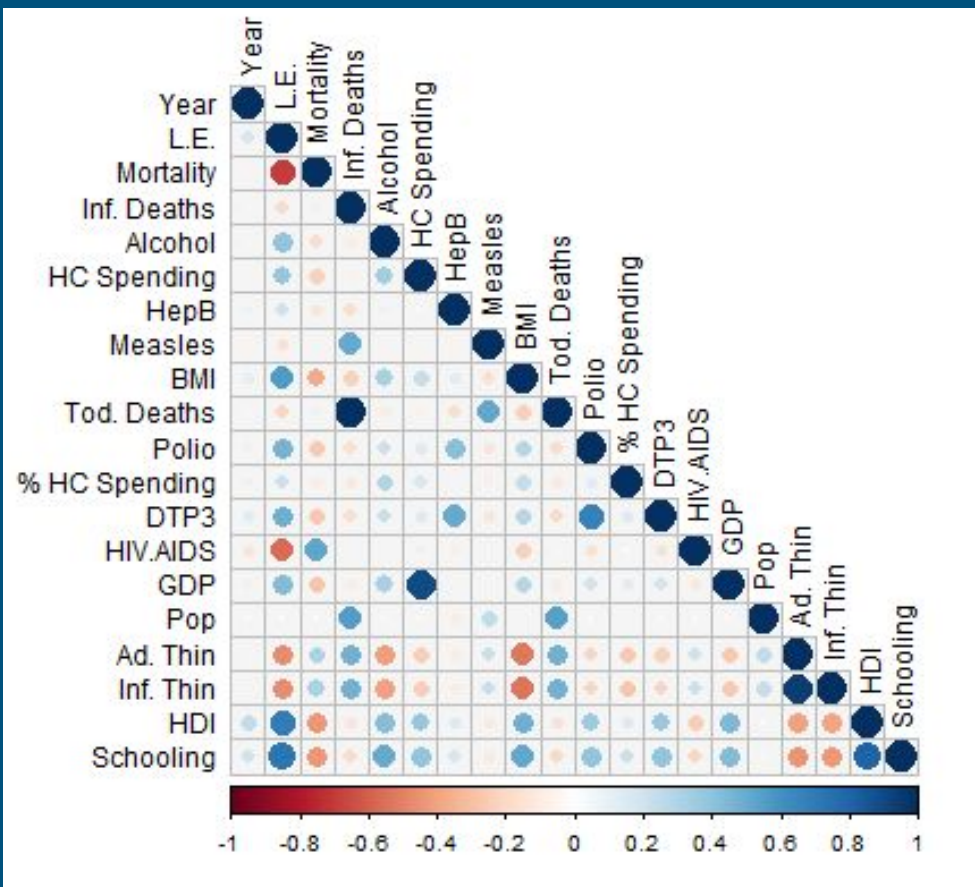
Using World Health Organization Data  
to Maximize Value



# Data Exploration

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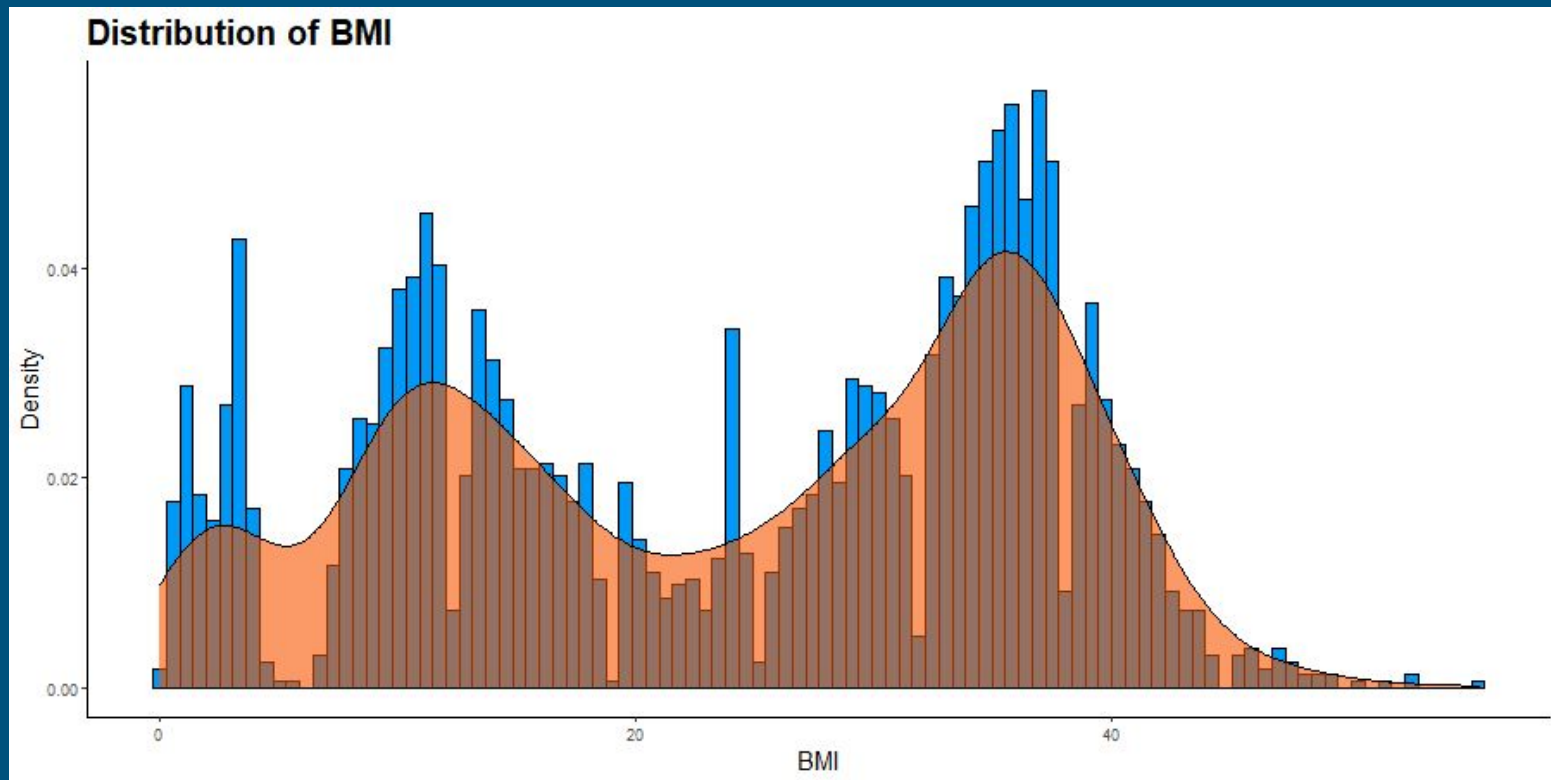
# Correlation of Observations



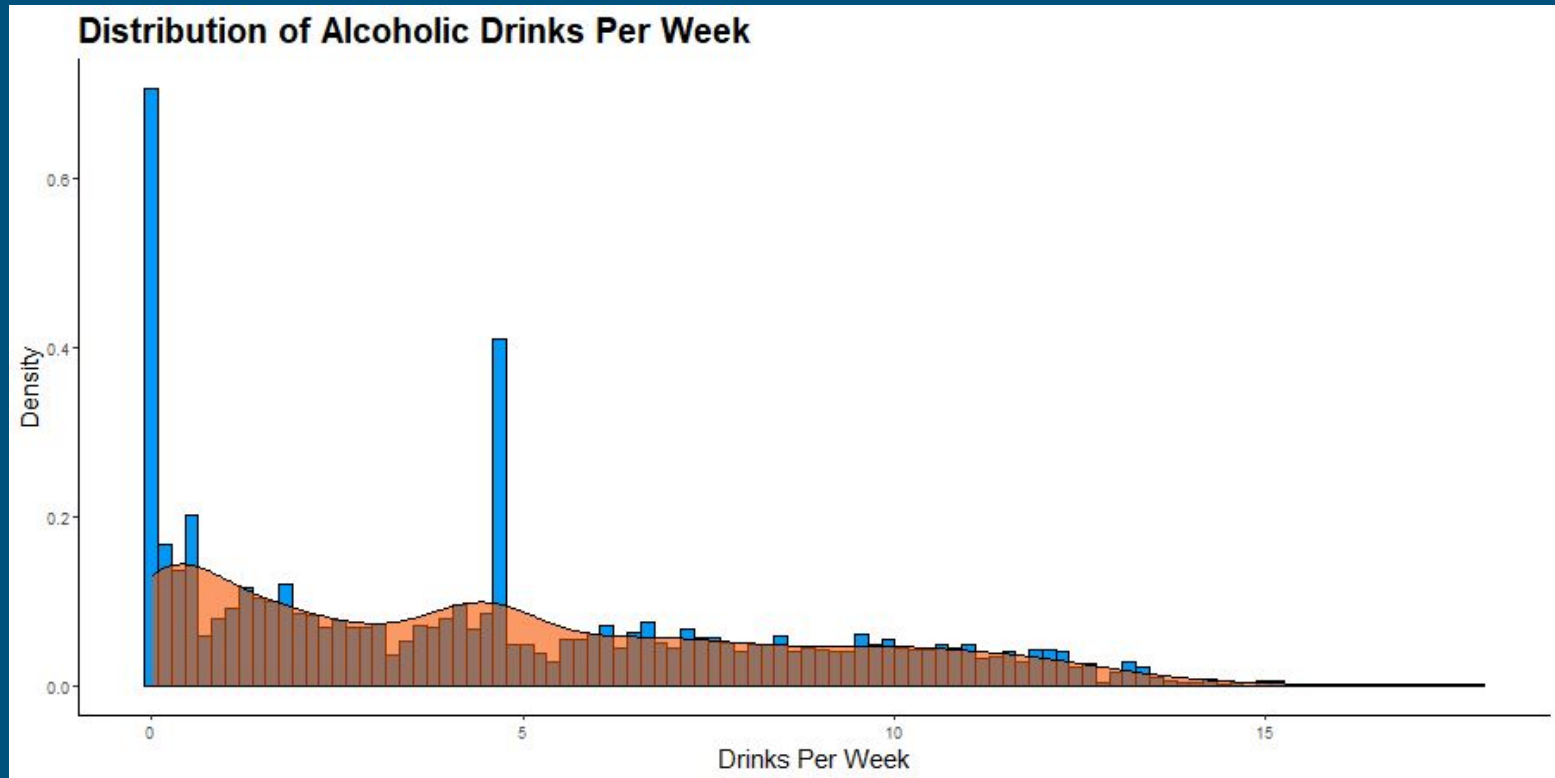
## Variables with High Collinearity:

- GDP ~ Healthcare Spending
- Toddler ~ Adolescent Underweight
- Adult Mortality ~ Life Expectancy
- HDI ~ Education

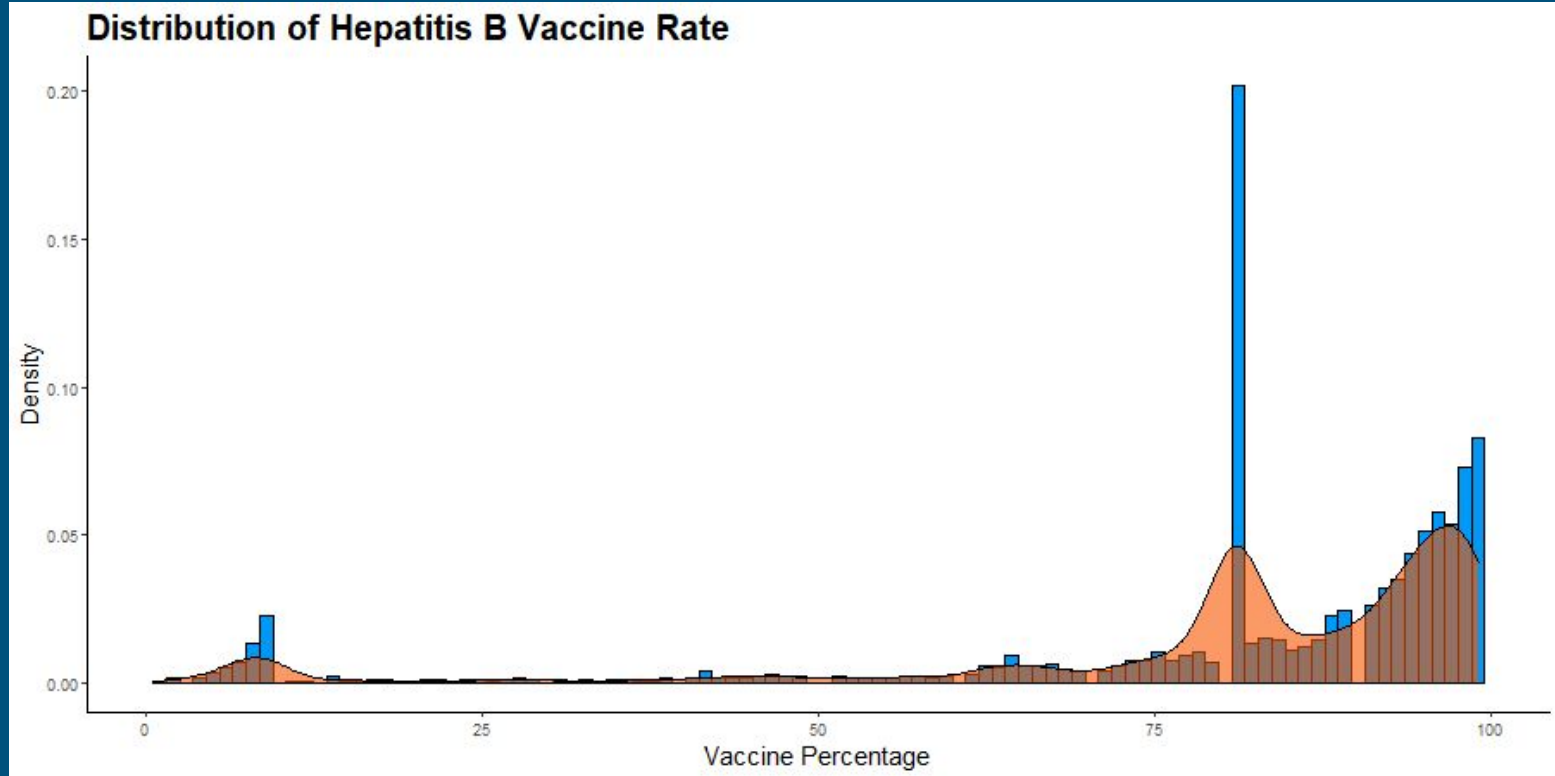
# EDA: BMI



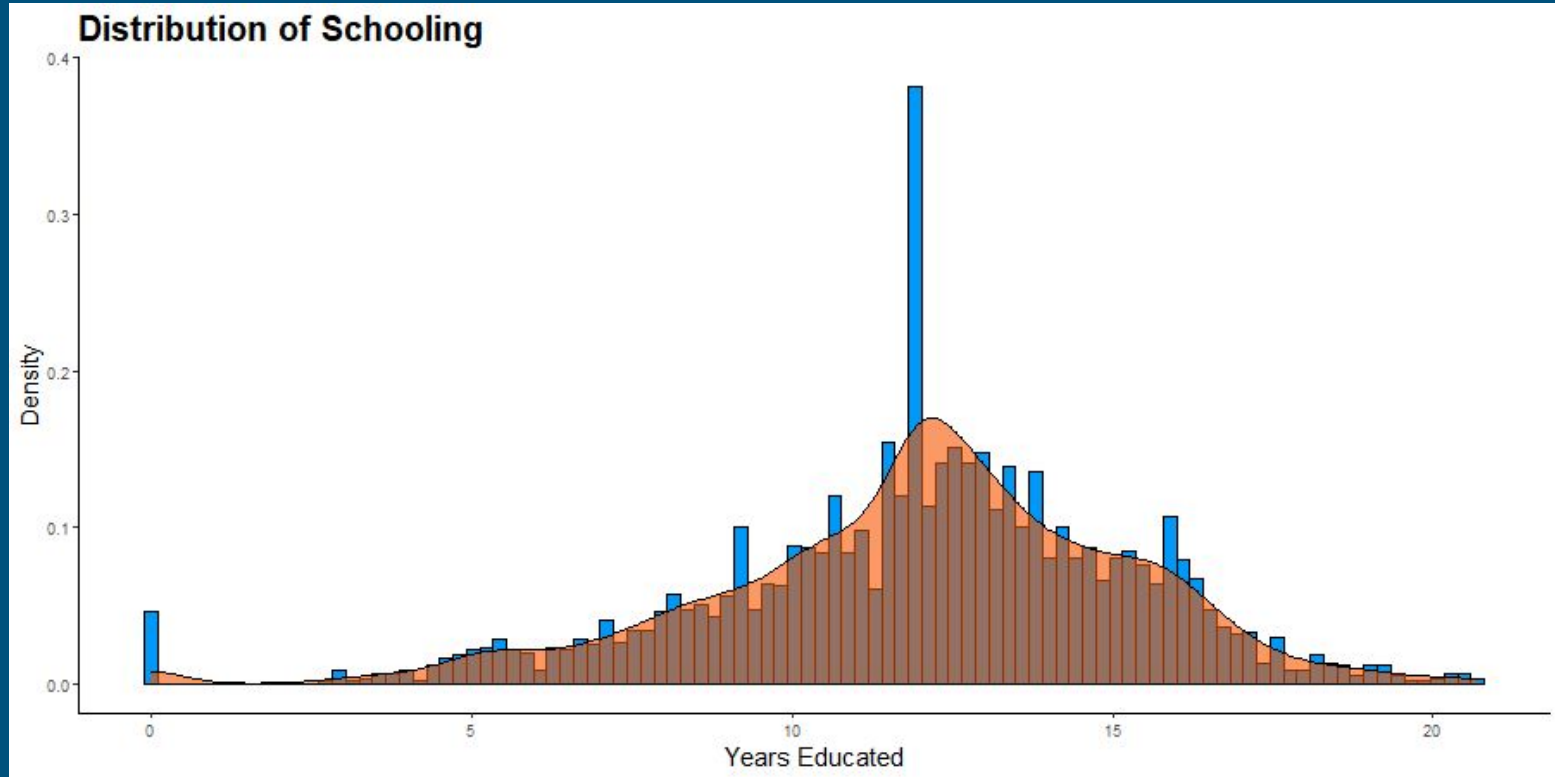
# EDA: Alcohol



# EDA: Hepatitis B Vaccine

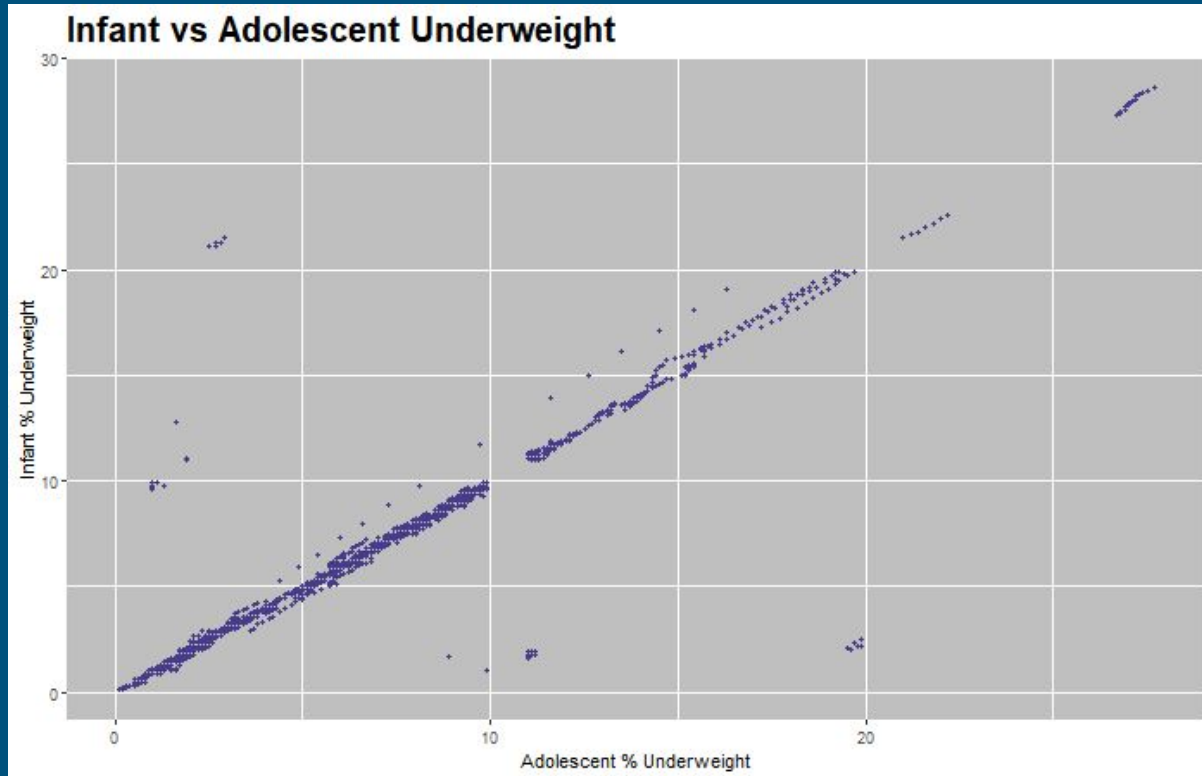


# EDA: Schooling



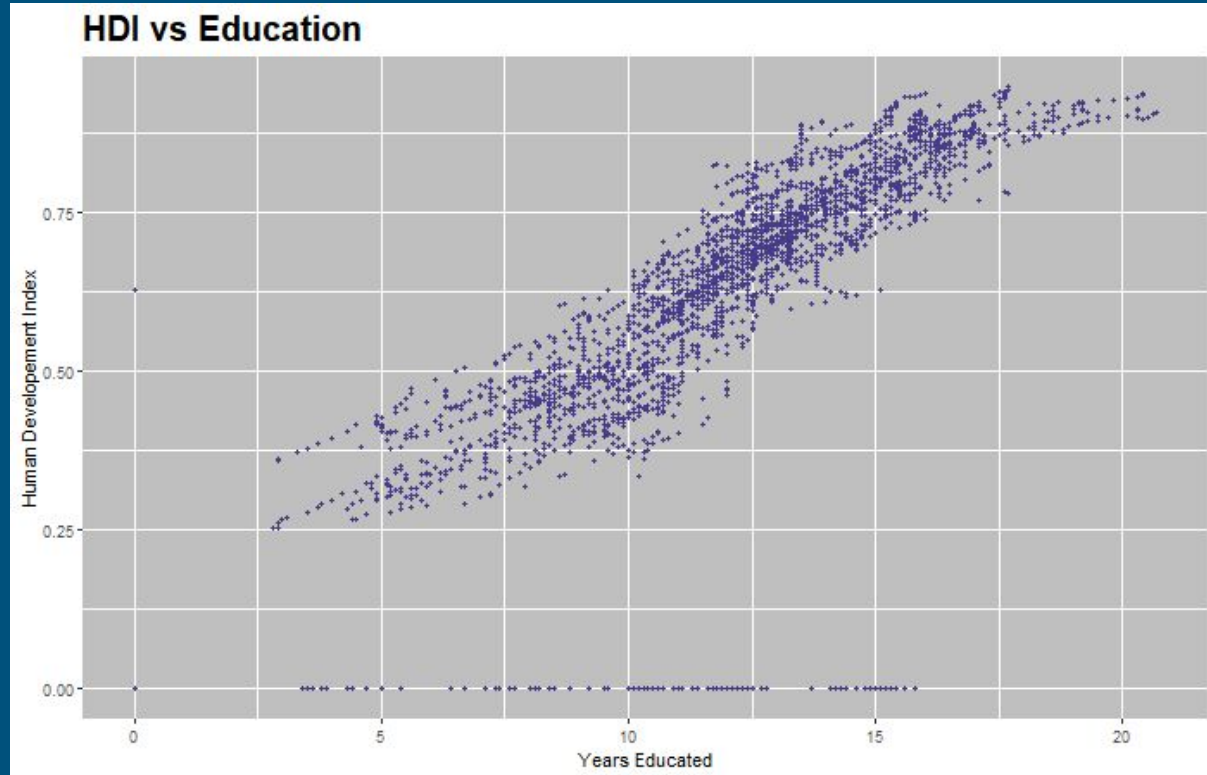
# 'Underweight' Variables

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# HDI and Education

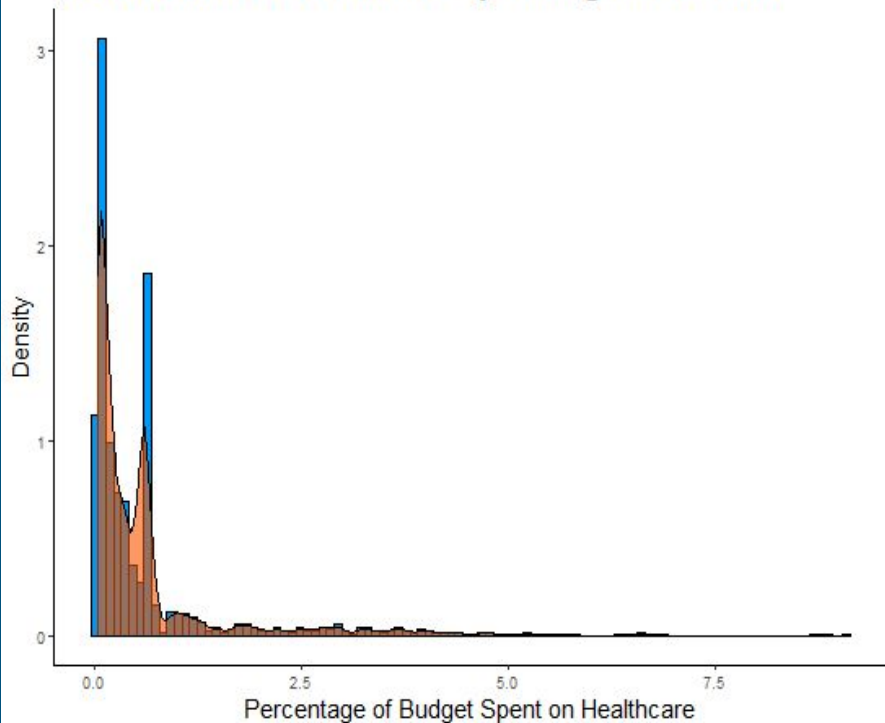


# Training a Model

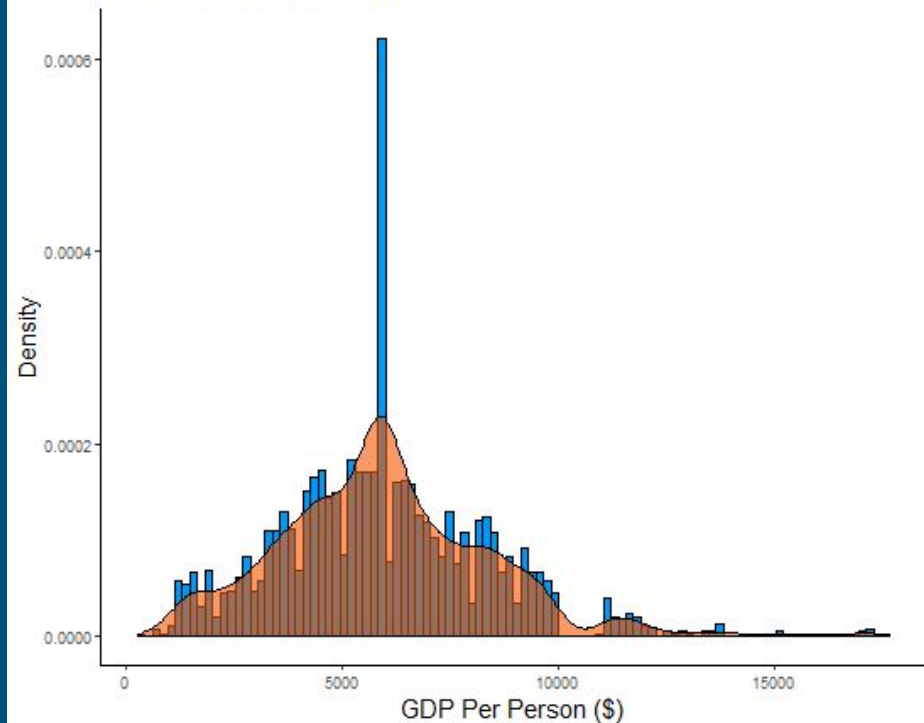
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# Which GDP Variable to Keep?

**Distribution of Healthcare Spending Per Person**



**Distribution of GDP**



# Using Reason to Simplify Model

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Redundant Variables and Direct Observations of Target:

- Adult Mortality
- Infant Thinness
- Human Development Index
- Infant Mortality

# Stepwise Variable Selection

Year

Drop

Toddler Underweight

Drop

Status

Drop

Measles Cases

Drop

Infant Deaths

Drop

Healthcare Spending (\$)

Drop

Health Spending % of Budget

Drop

Development Index

Drop

Country

Drop

Alcohol Consumption

Drop

Adult Mortality

Drop

Population

P = 0.0037, VIF = 1.15

Hepatitis B Vax Rate

P = 0.00024, VIF = 1.36

Adolescent Underweight

P = 0.00013, VIF = 1.62

Toddler Mortality

P = ~ 0, VIF = 1.39

Schooling

P = ~ 0, VIF = 1.93

Polio Vax Rate

P = ~ 0, VIF = 1.92

Infant HIV/AIDS Deaths

P = ~ 0, VIF = 1.10

GDP

P = ~ 0, VIF = 1.36

DTP3 Vax Rate

P = ~ 0, VIF = 2.16

BMI

P = ~ 0, VIF = 1.64

Adjusted R-Squared

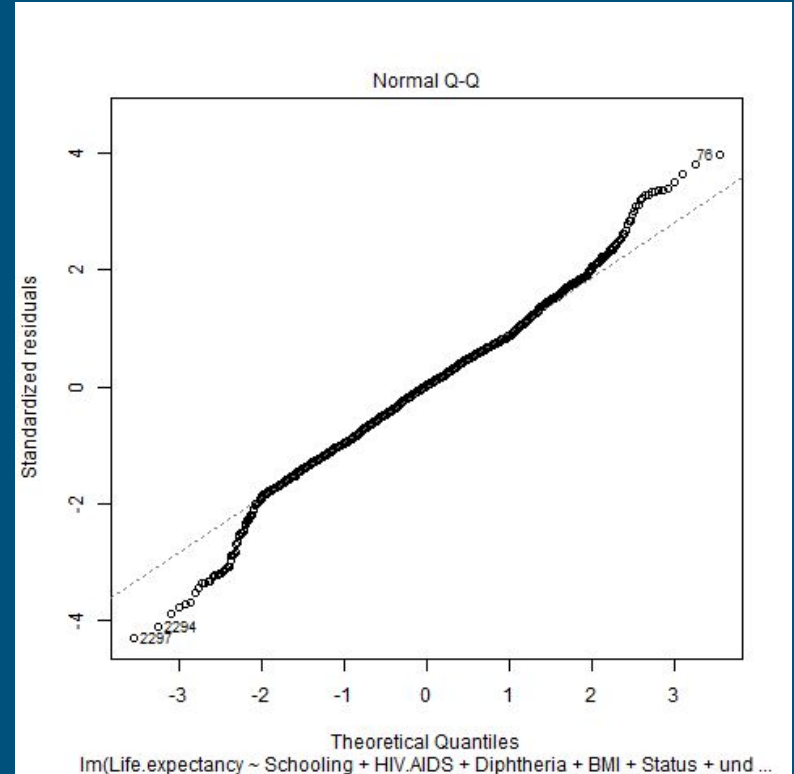
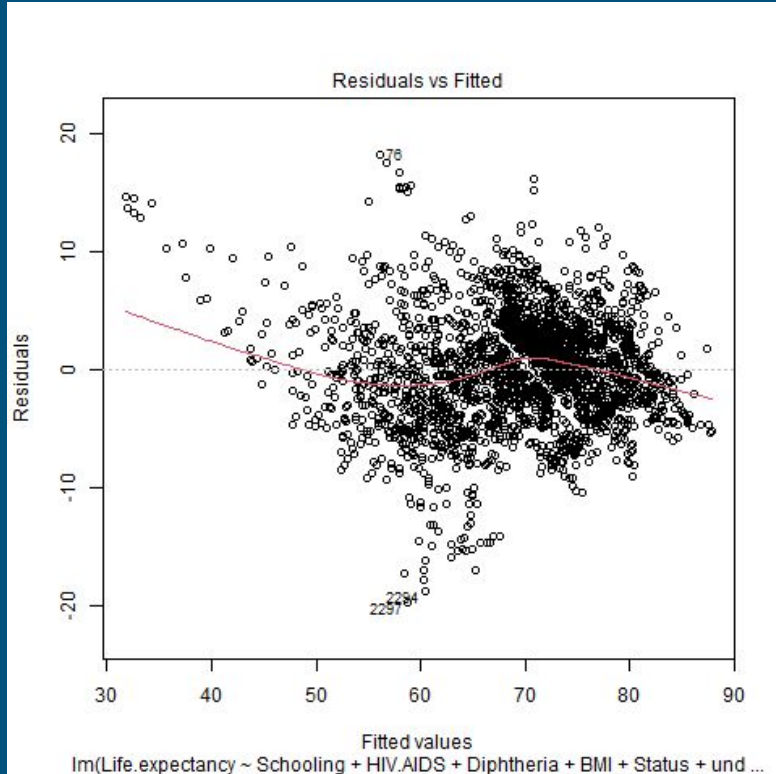
0.765

F-Statistic

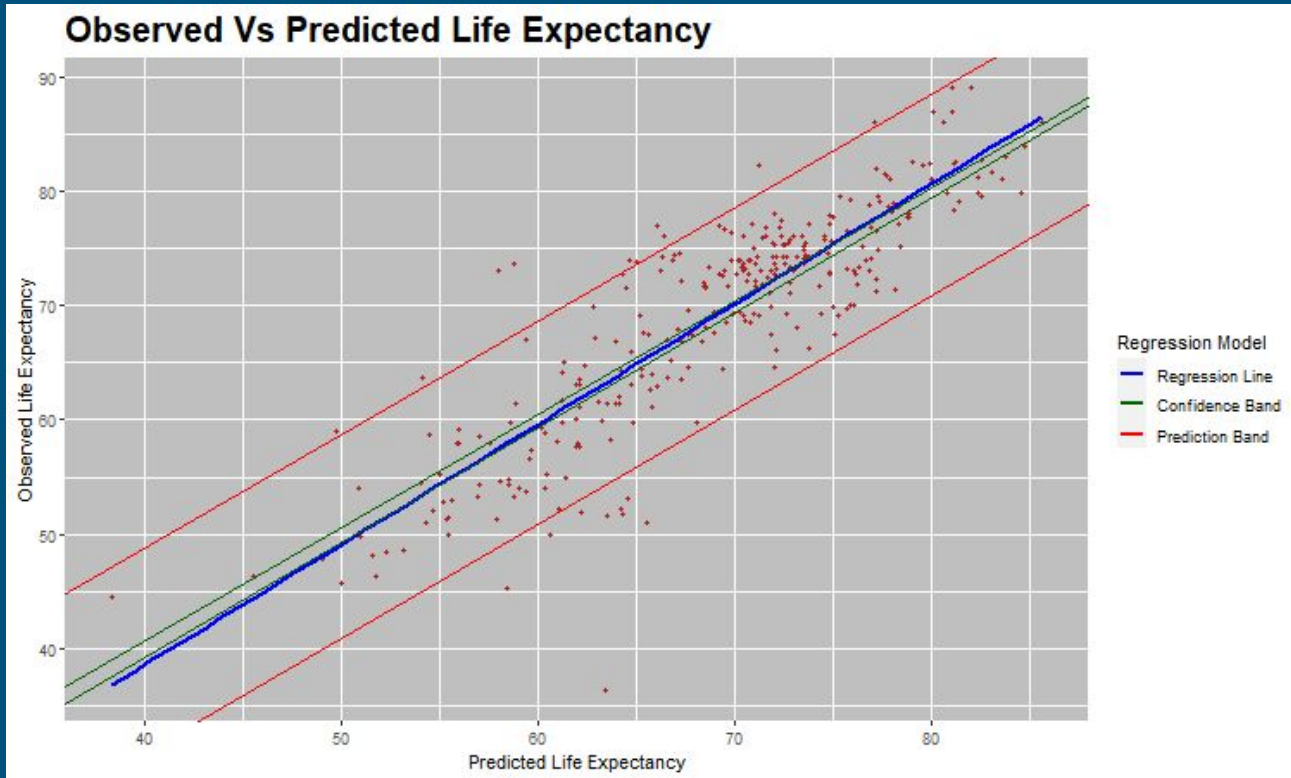
776.3

Relative Weight of Variable (Not to Scale)

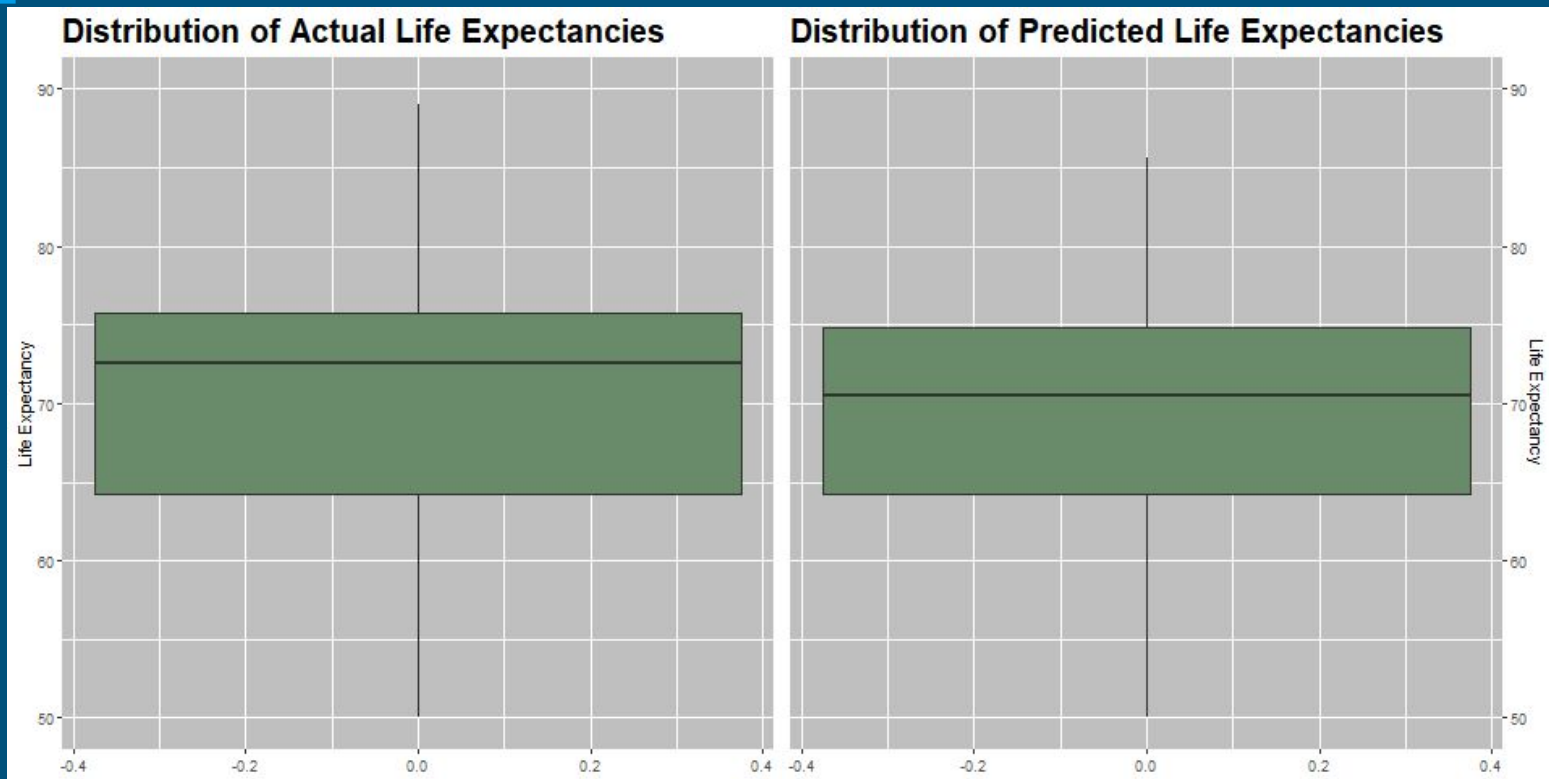
# Further Analyzing Fit of Model



# Train and Test



# More Testing

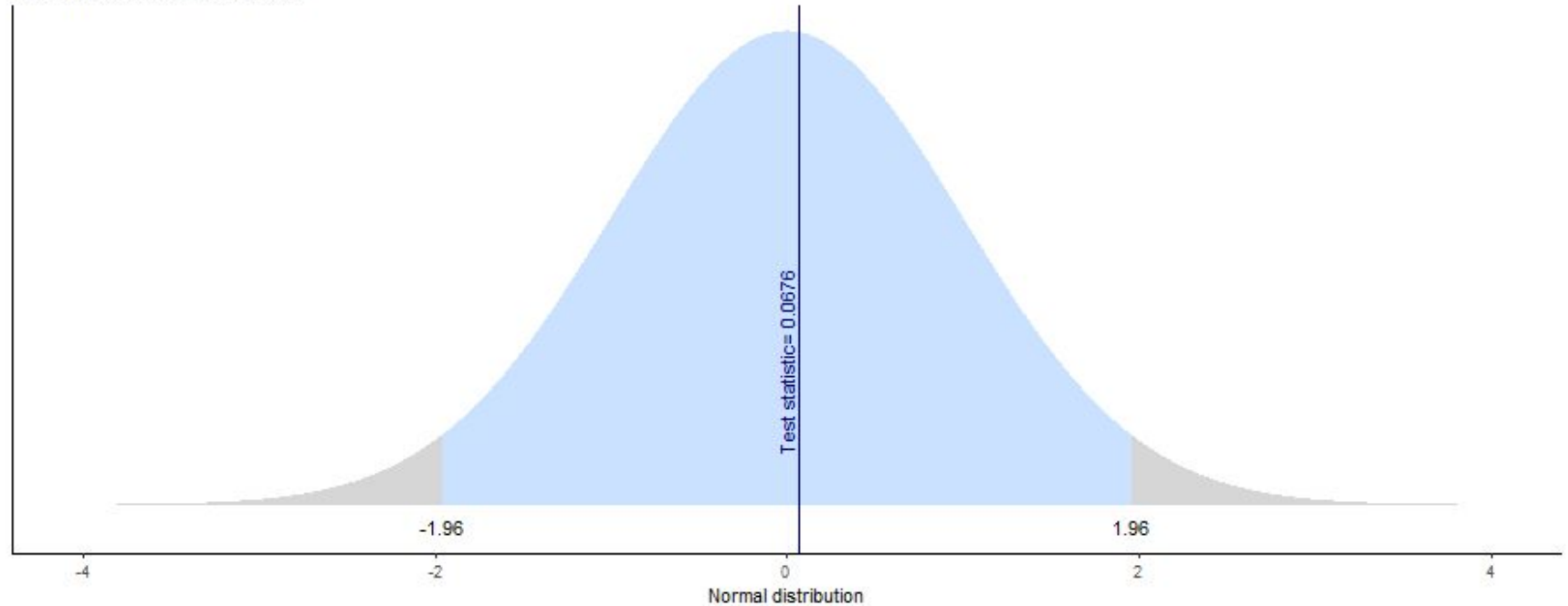




# 2 Sample T-Test

Normal distribution Vs test statistic

Alternative hypothesis: two.sided



alpha = 0.05

# Business Example

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Finding Potential Markets for Health Insurance

# What are we looking for?

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Attributes of best countries for this

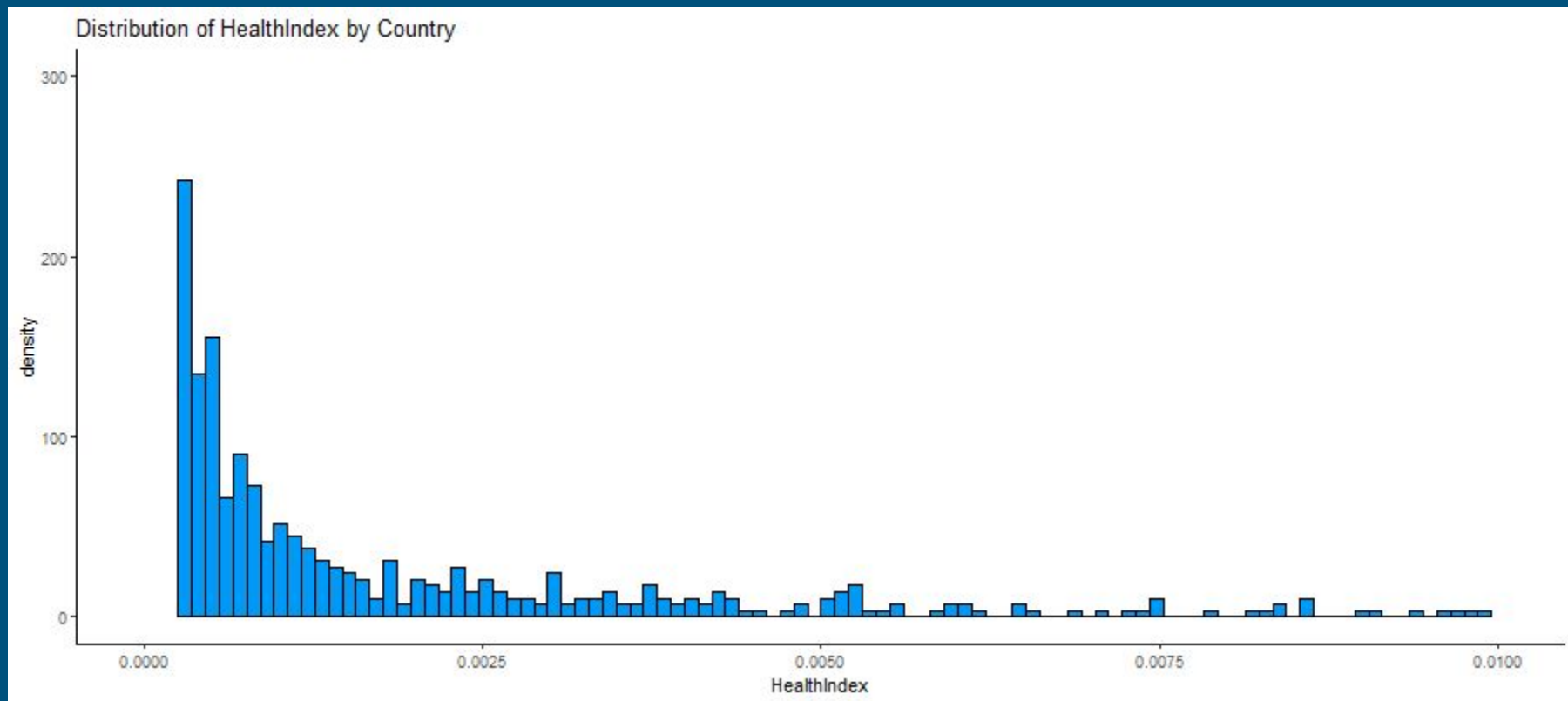
- High Life Expectancy
- Low government expenditure on health
- High vaccination rates
- Low alcohol consumption

# How to do this

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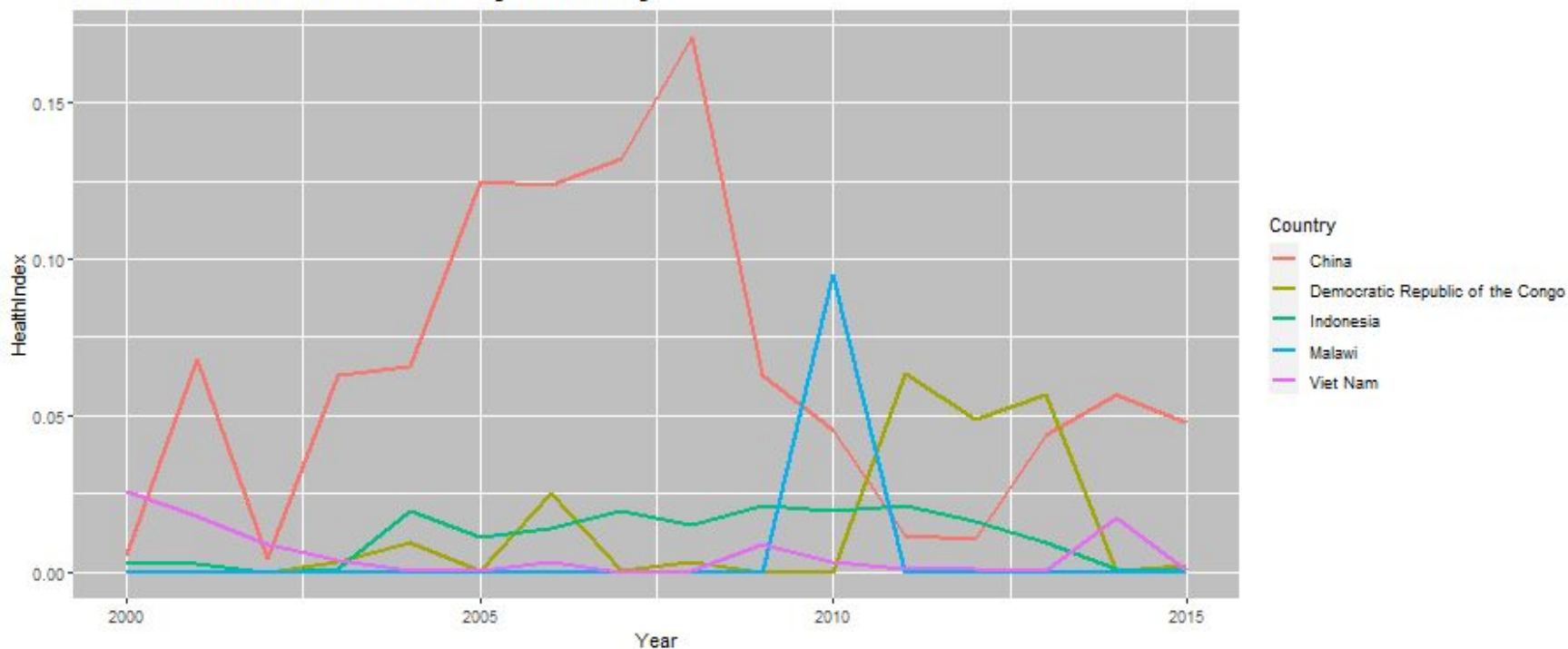
- Engineer a feature: Health Metric 0-1
- Scale all Relevant Variables
- Multiply All Variables

# Health Metric Distribution



# Top 5 Highest Average Health Index

Health Index Over Time by Country



# Using a Predictive Model to Guage Life Expectancy

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# With More Time...

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- Incorporate Variable Weight to Health Index Metric
- Include Health Index Metric into Shiny App
- Add more Predictor Variables to Shiny App
- Add a table to compare different countries' demographics in Shiny App