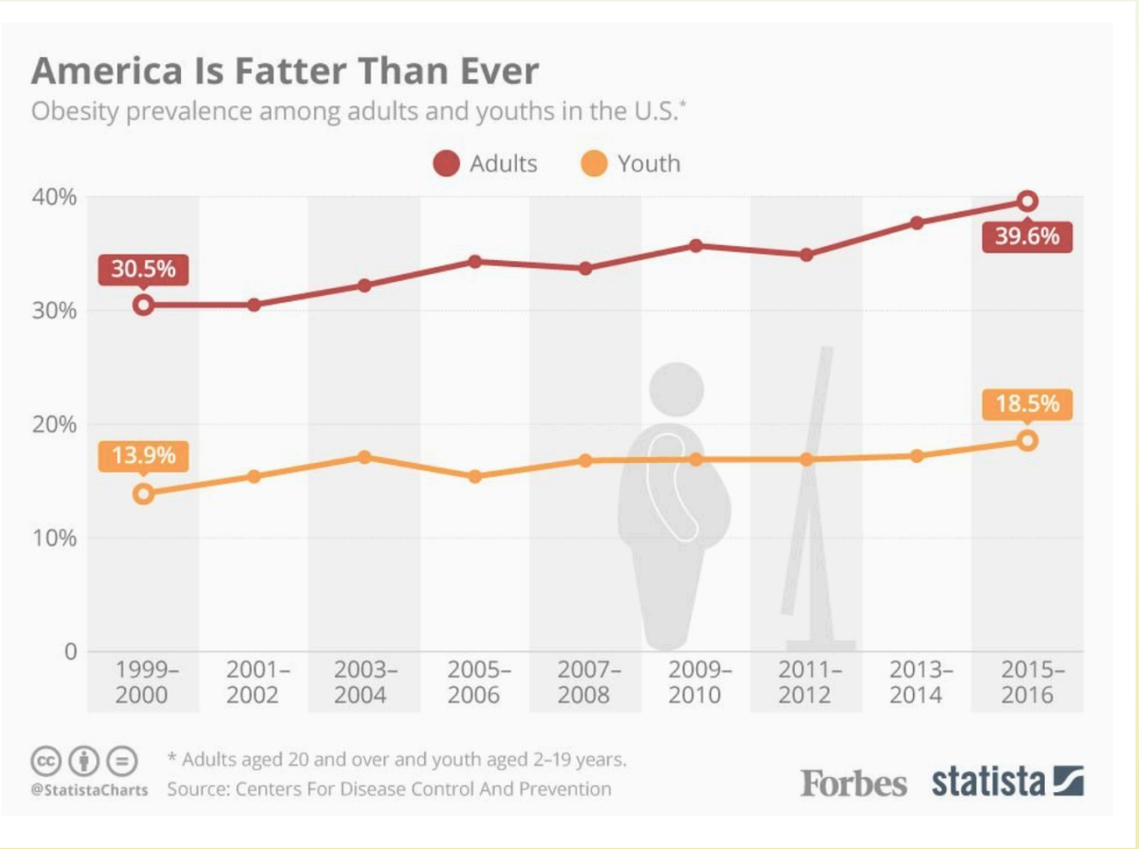
Obesity in the United States

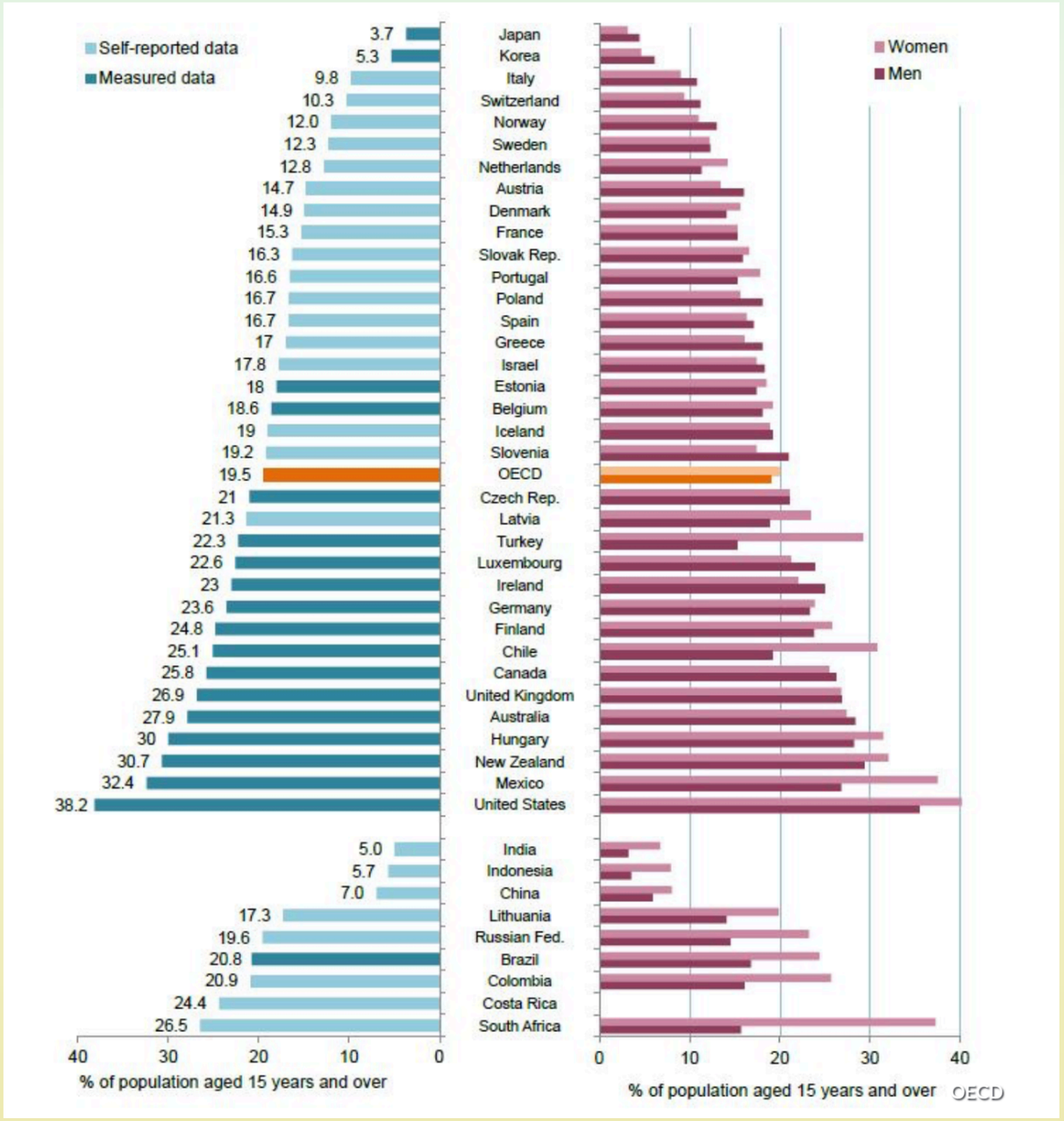
Kalina & Joe

Facts:

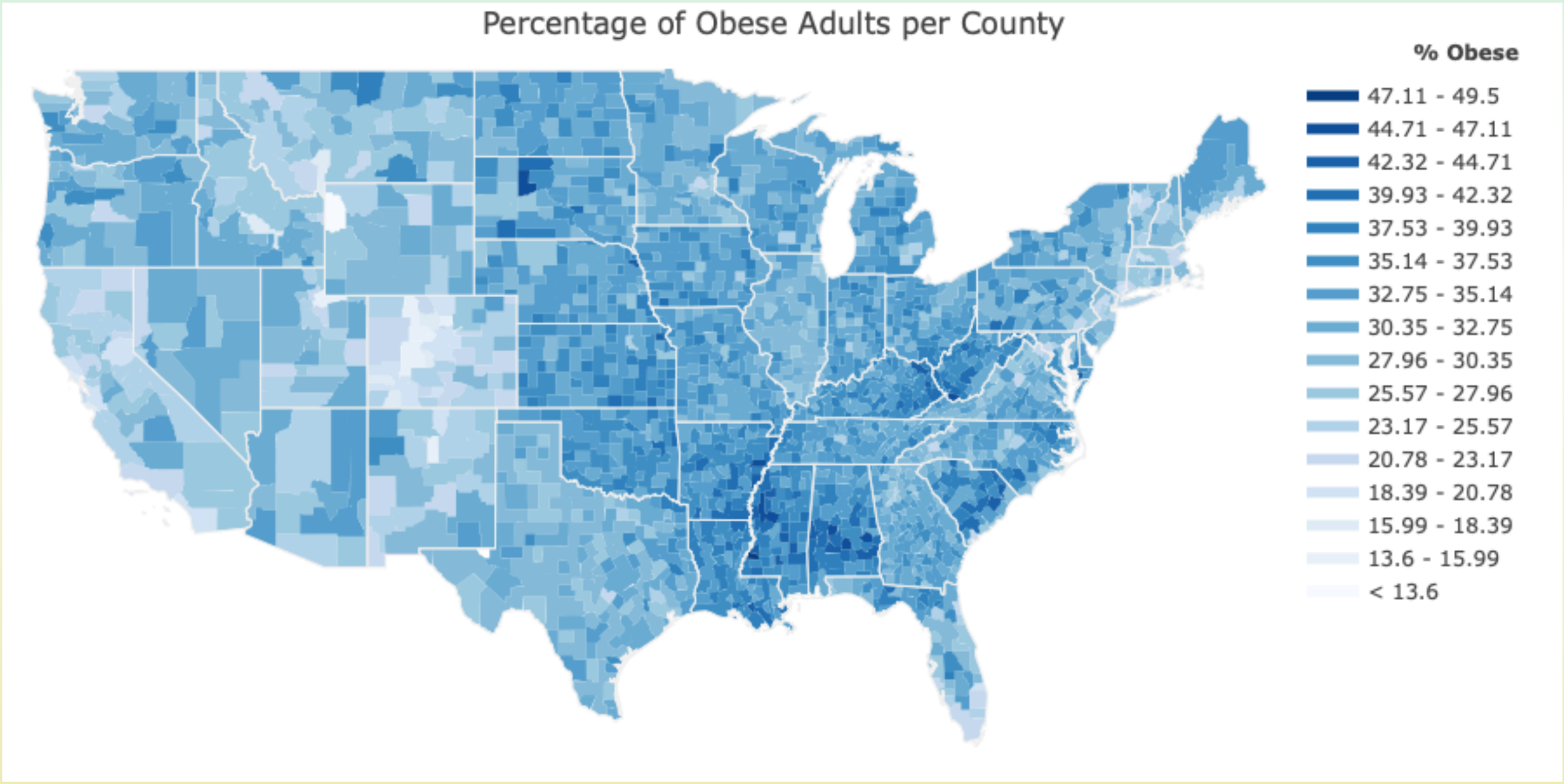
Still increasing number of obese adults



The United States at the top of the ranking-



The worlds average ~ 12%



How can we help society?

Can we predict obesity using available data?

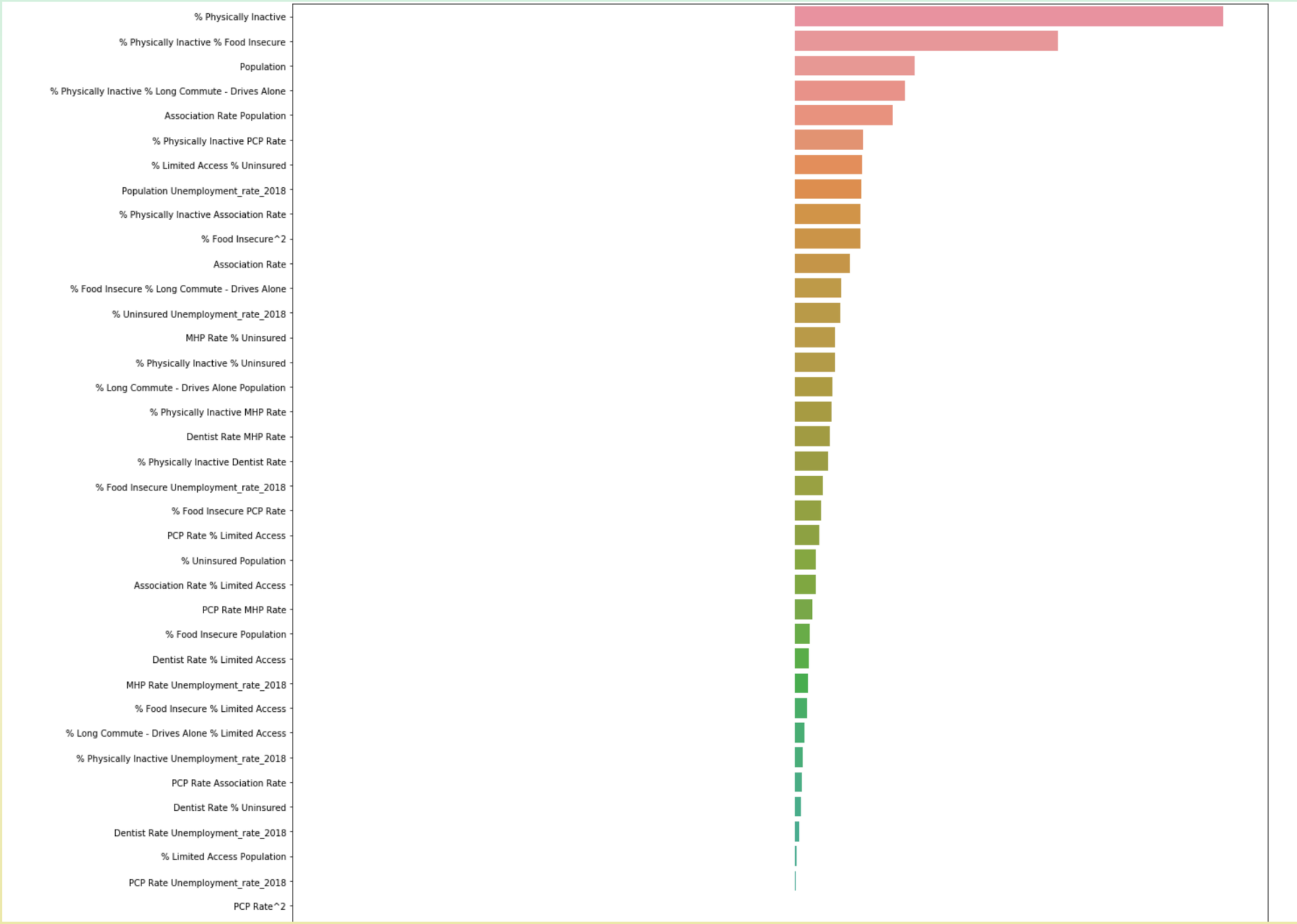
How can we reduce obesity?

Which factors can help stop increasing numbers of obese adults?

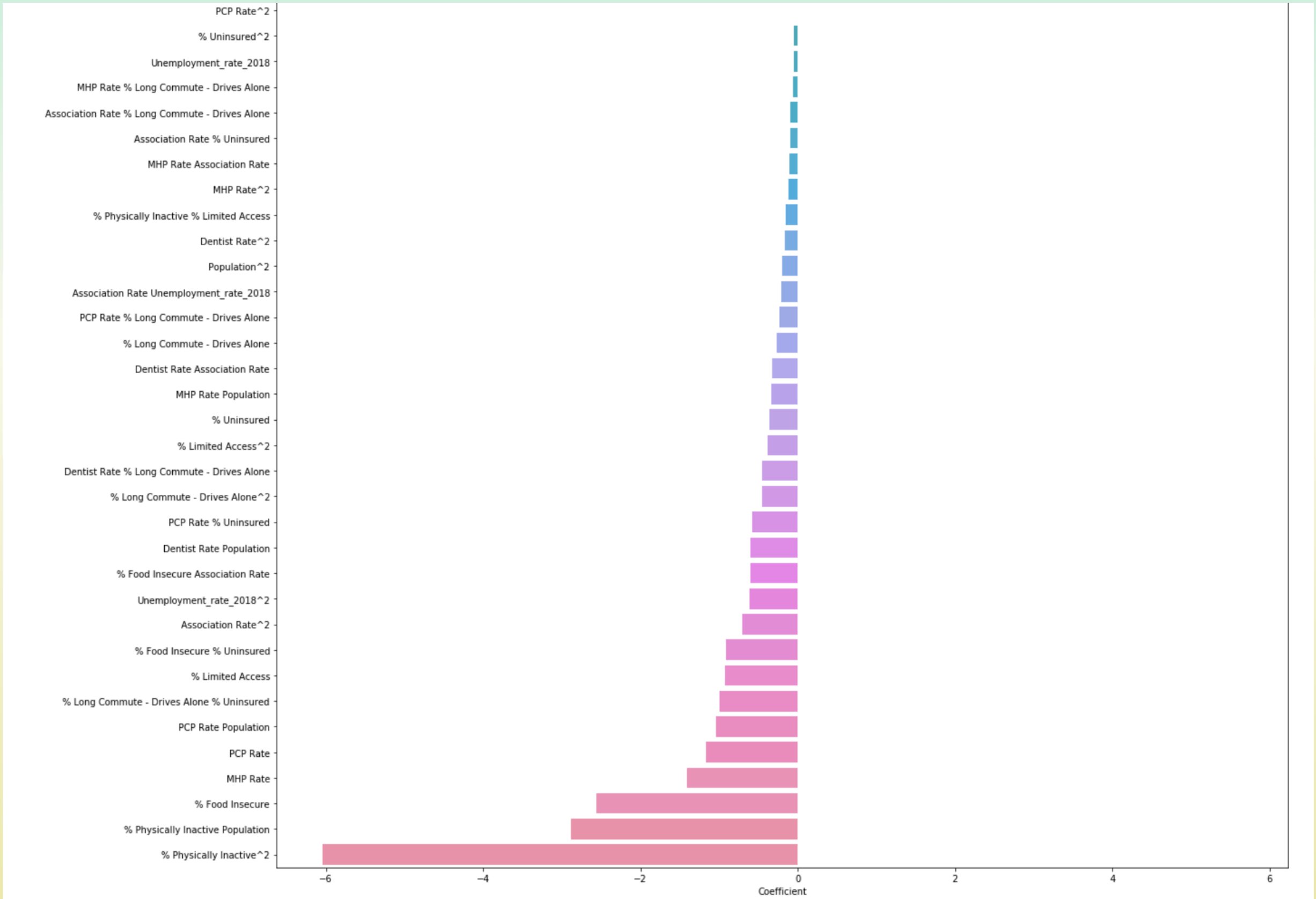
Our factors:

- Percentage of adults that report no leisure-time physical activity
- Food insecurity
- Primary Care Physicians per 100,000 population
- Dentists per 100,000 population
- Mental Health Providers per 100,000 population
- Social Associations per 10,000 population
- Among workers who commute in their car alone (the percentage that commute more than 30 minutes)
- Percentage of Limited access to healthy foods
- Percentage of Uninsured adults
- Population
- Unemployment rate in 2018

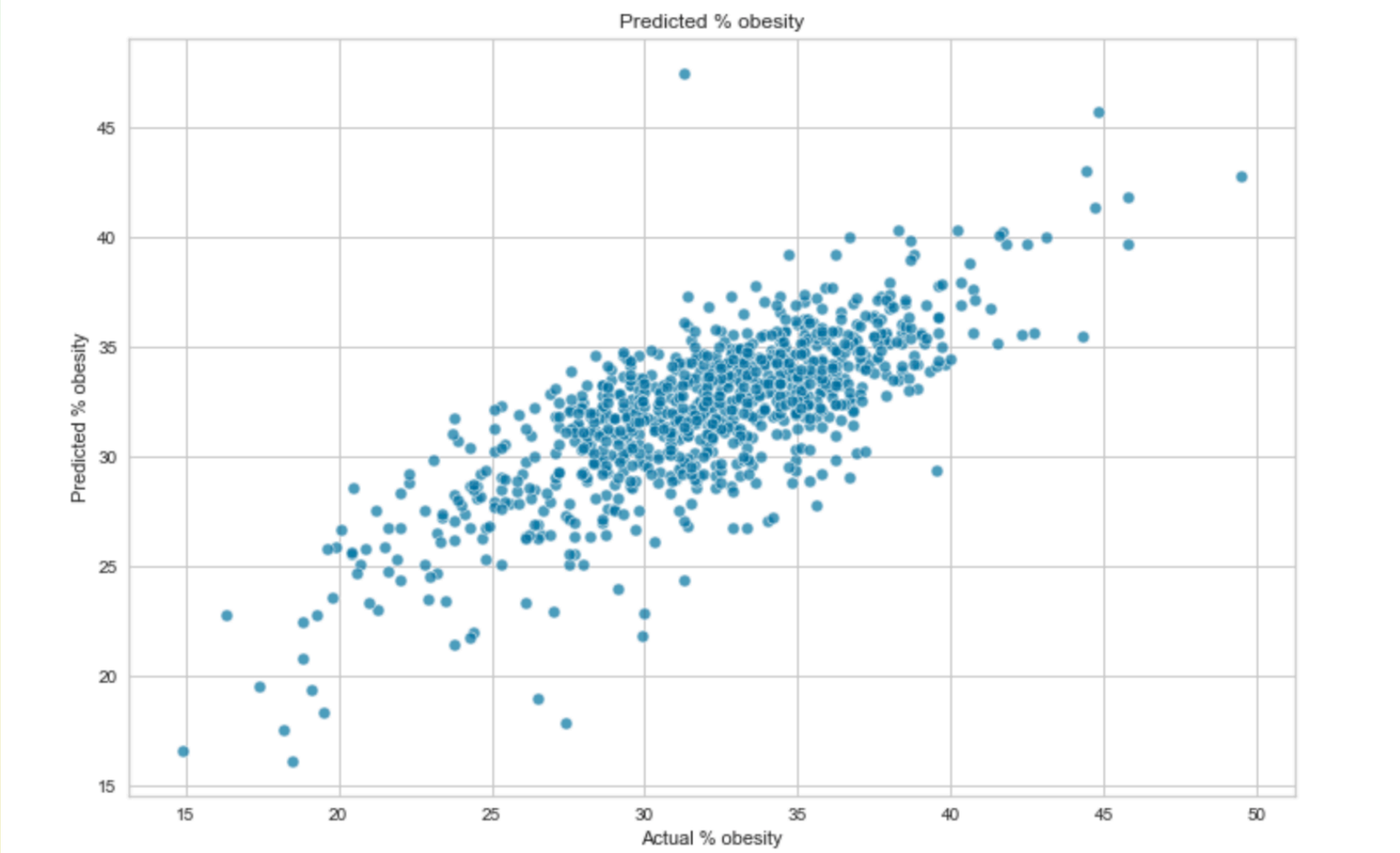
Positive coefficients:

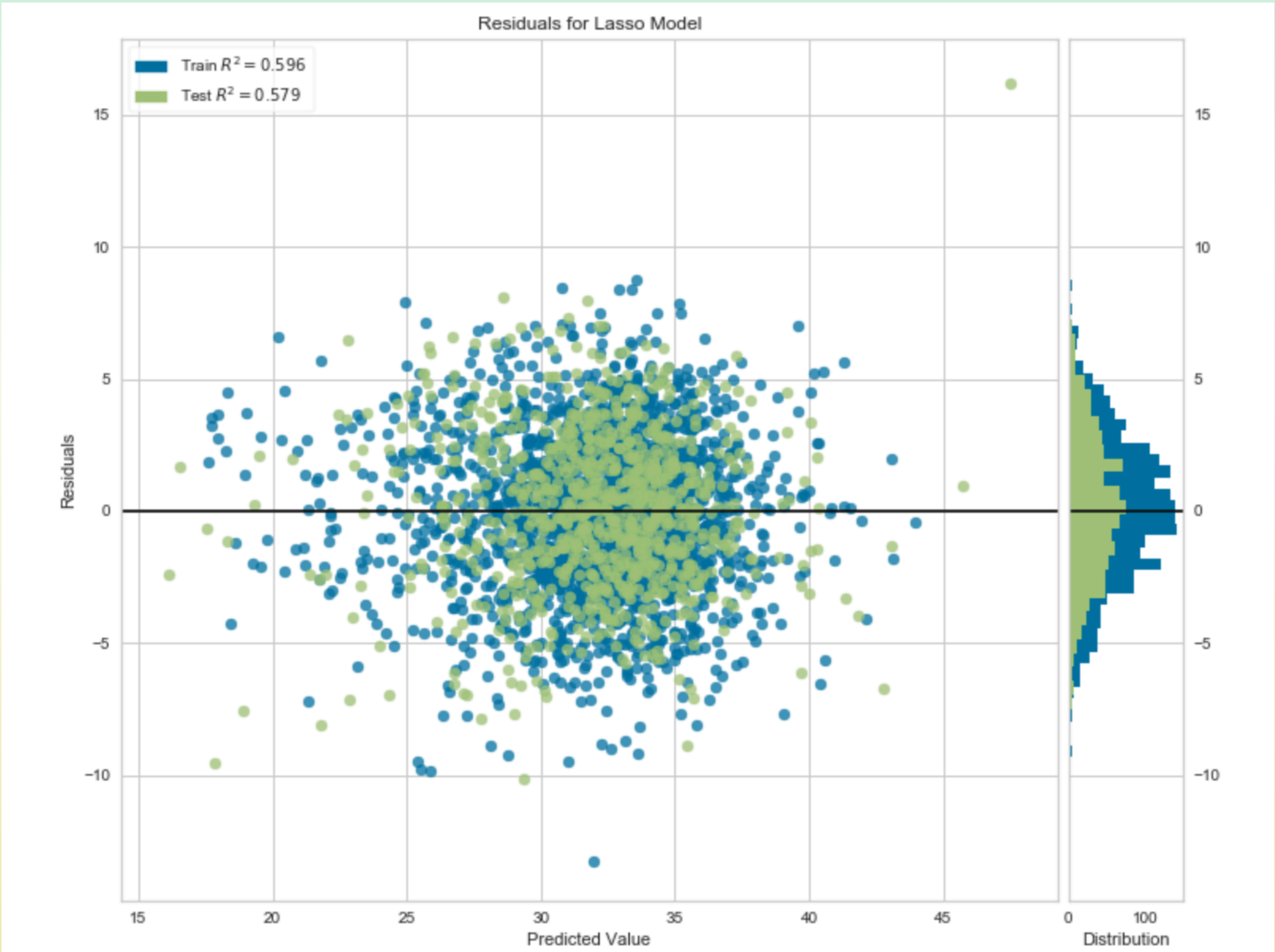


Negative coefficients:



Final predictions:




Residuals for Lasso Model
Train $R^2 = 0.596$
Test $R^2 = 0.579$
Residuals
Predicted Value
Distribution
15
10
5
0
−5
−10
15
20
25
30
35
40
45
0
100

Thank you!

More technical details:

1. Variables to work with
2. Extra data about unemployment
3. Cleaning the data:
   - Replacing null values with state average
   - Dropping small populations with multiple null values
4. Modelling:

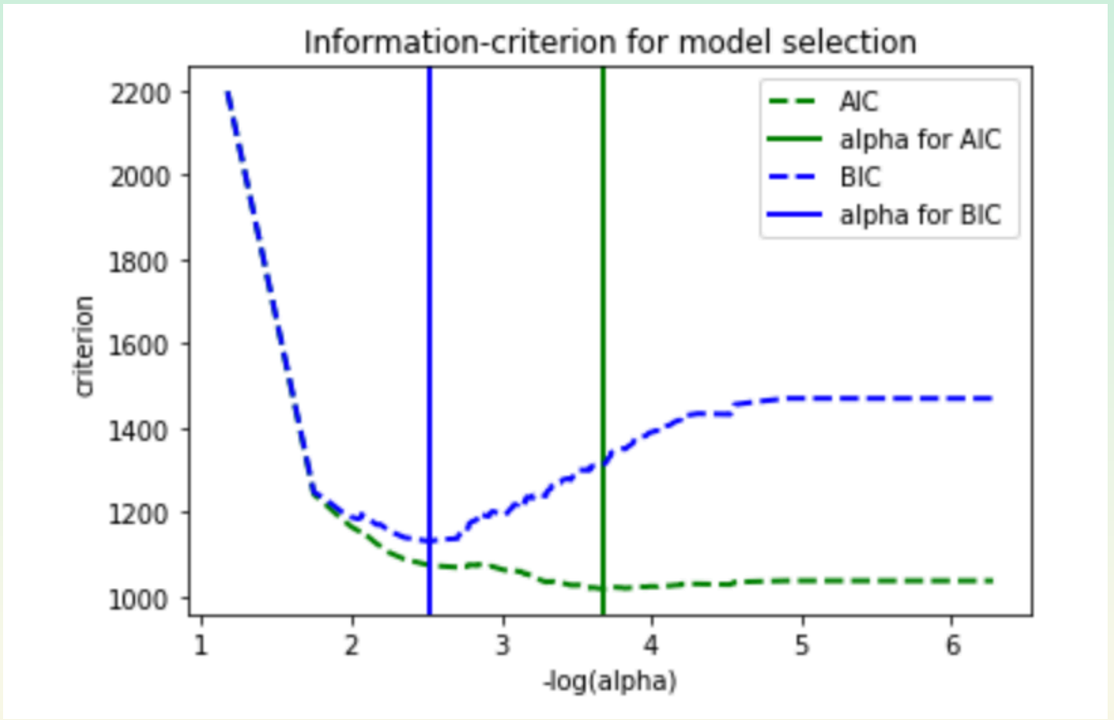
   - Splitting Datasets into Training and Testing
   - Creating baseline model with 5 fold cross validation
     - R2 score ~0.59
     - Not appear to be overfitted
   - Checking for Multicollinearity
     - VIF with a threshold of 10

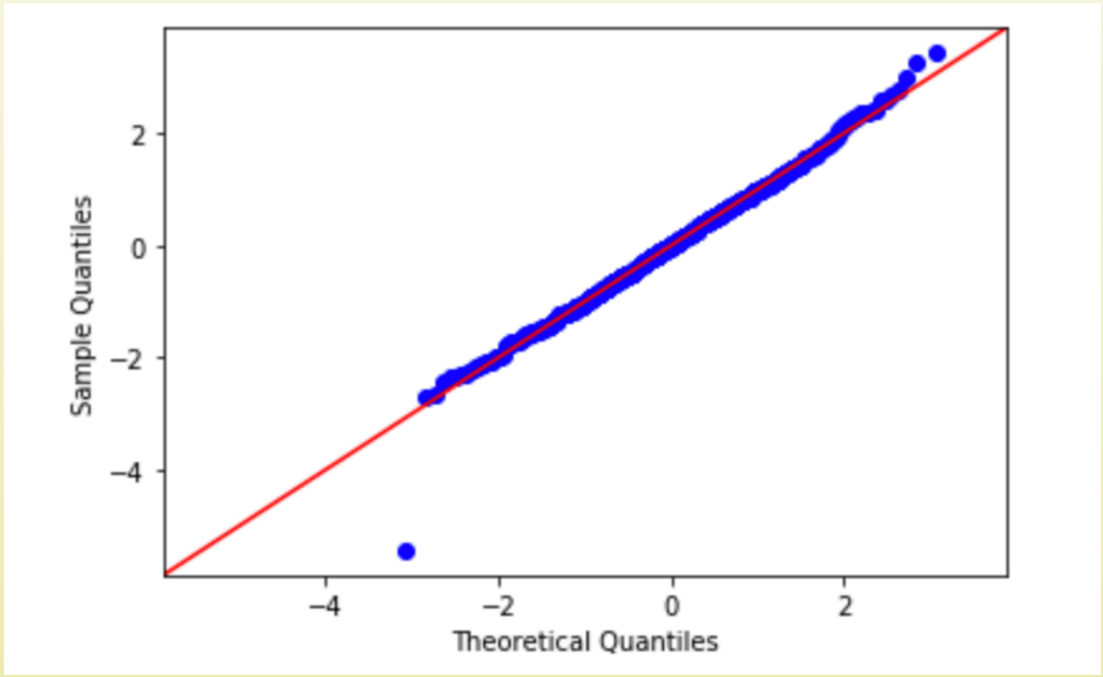
```
Remaining variables
Index(['PCP Rate', 'Dentist Rate', 'MHP Rate', 'Association Rate', '% Long Commute - Drives Alone', '% Limited Acce
ss', '% Uninsured', 'Population', 'Unemployment_rate_2018'], dtype='object')
```

   - VIF returned 9 variables, however will also include % Physically Inactive and % Food Insecure as 'common sense' variables
   - After removing variables, R2 decreases, as expected, and we can see that model is still not overfit
   - Adding second degree polynomial and interaction complexity to model to increase complexity

Evaluation:

- Optimising hyperparameters


Information-criterion for model selection
AIC
alpha for AIC
BIC
alpha for BIC
criterion
2200
2000
1800
1600
1400
1200
1000
1
2
3
4
5
6
-log(alpha)


Sample Quantiles
2
0
−2
−4
−4
−2
0
2
Theoretical Quantiles