

# **PREDICTING H1N1 FLU Vaccination Status**

## **USING MACHINE LEARNING**

**Phase-3 Final Project**

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# Outline

**Public Health Perspective**

**Objectives**

**Data**

**Methods**

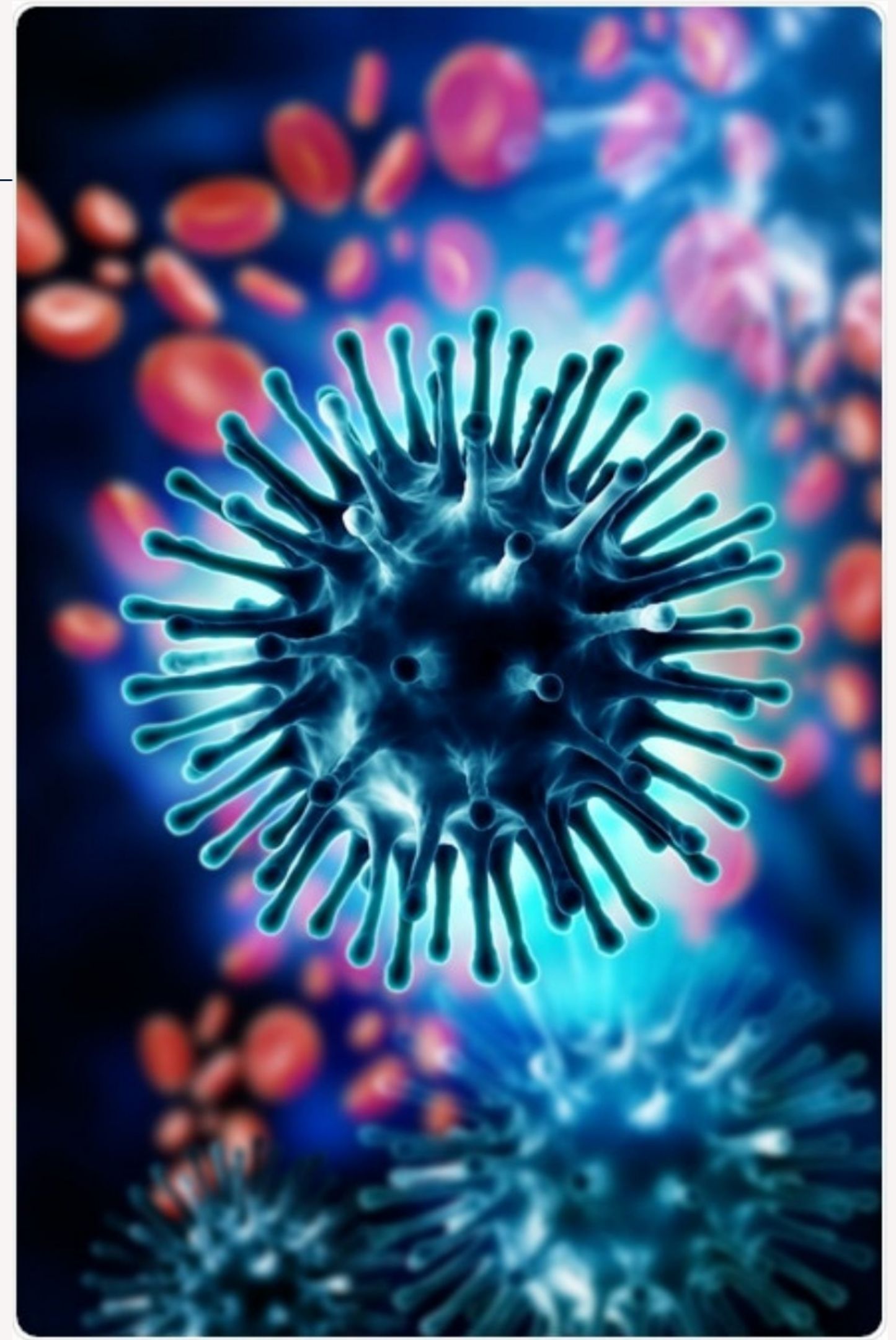
**Results**

**Recommendations**

**Future Works**

# Public Health Perspective

- The personal factors that underlie vaccination behavior
- Understanding vaccination patterns from past pandemics can improve future vaccination
- Decrease outbreaks





# OBJECTIVES

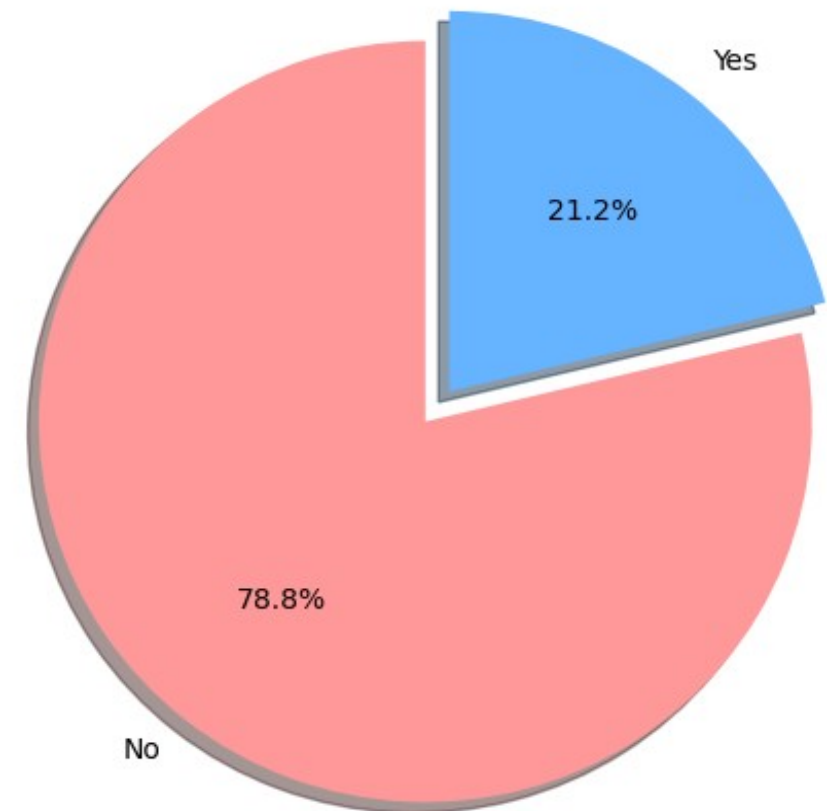
- **Build an accurate H1N1 vaccination prediction model**
- **Find most important demographic, behavioral, and health features affecting vaccination status**



# The Data

The National Flu Survey  
(NHFS, 2009)

Less than 25% people received the H1N1 vaccine



**79%**

**Did not Get the Vaccine**

**26,000**

**Respondents**

**36**

**Unique Factors**

# Modeling Context

FALSE POSITIVE:  
PREDICTING THAT  
PEOPLE GOT THE  
VACCINE WHEN  
THEY ACTUALLY DID  
NOT

Big Problem

FALSE NEGATIVE:  
PREDICTING THAT  
PEOPLE DID NOT GET  
THE VACCINE WHEN  
THEY ACTUALLY DID

Not a Big Problem

# Model & Results

Gradient  
Boosting  
Score

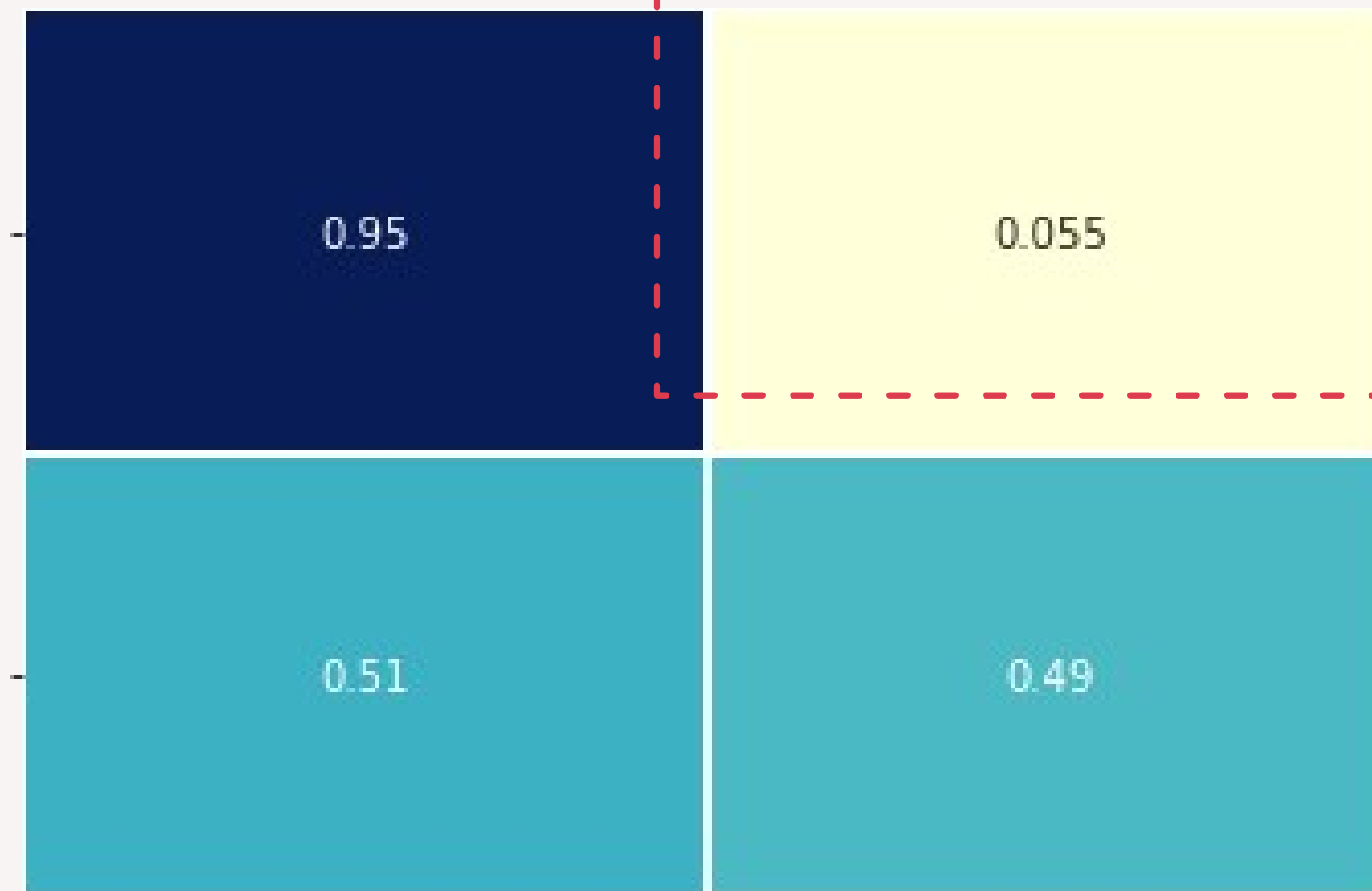
84% Accuracy

Actuals

Not Vaccinated

Vaccinated

Confusion Matrix



False Positive

Not Vaccinated

Vaccinated

Predictions

# Top 4 Important Features

**Doctor Recommendation  
of H1N1 Vaccine**

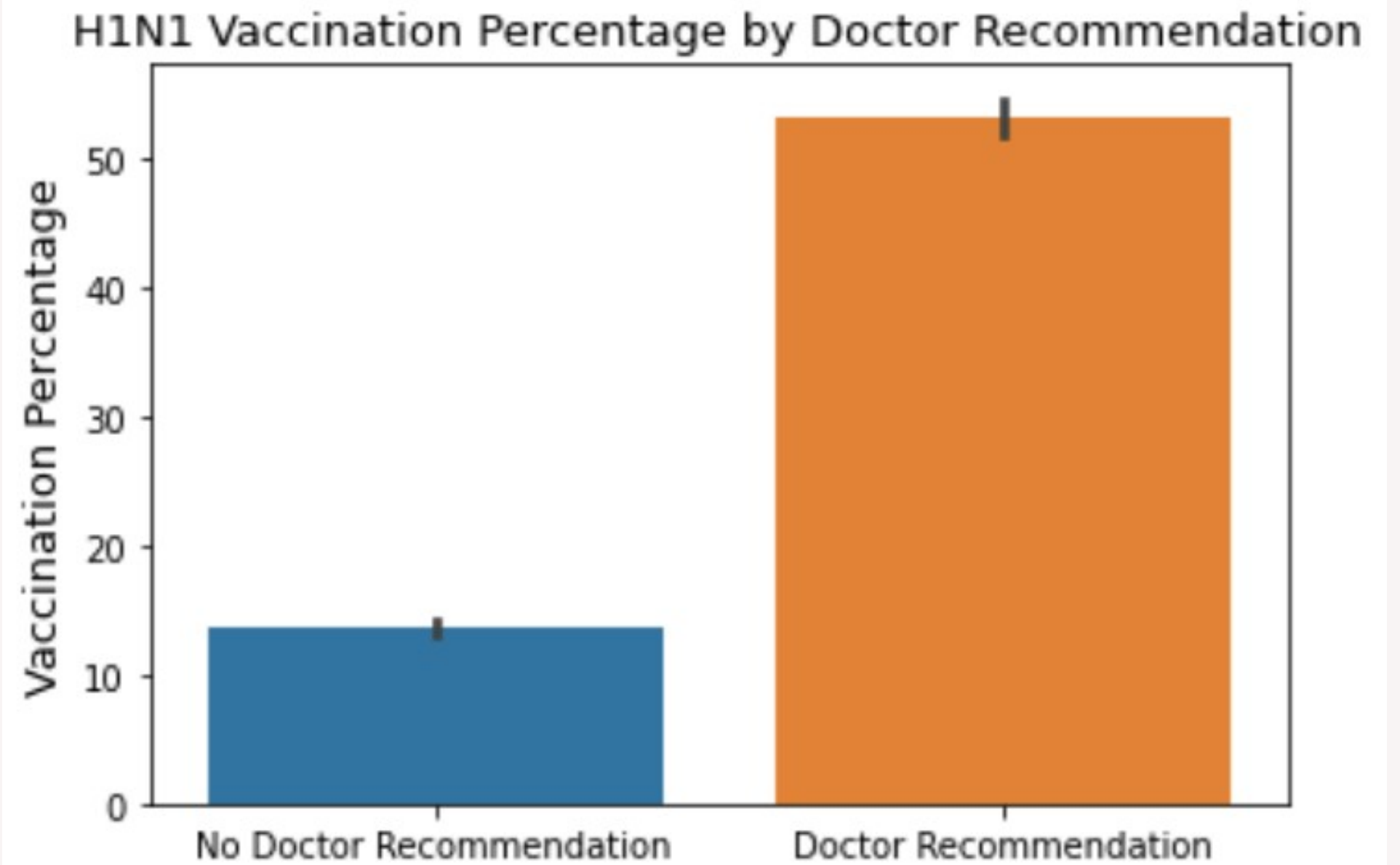
**Health Insurance**

**Opinion on H1N1 Vaccine  
Effectiveness**

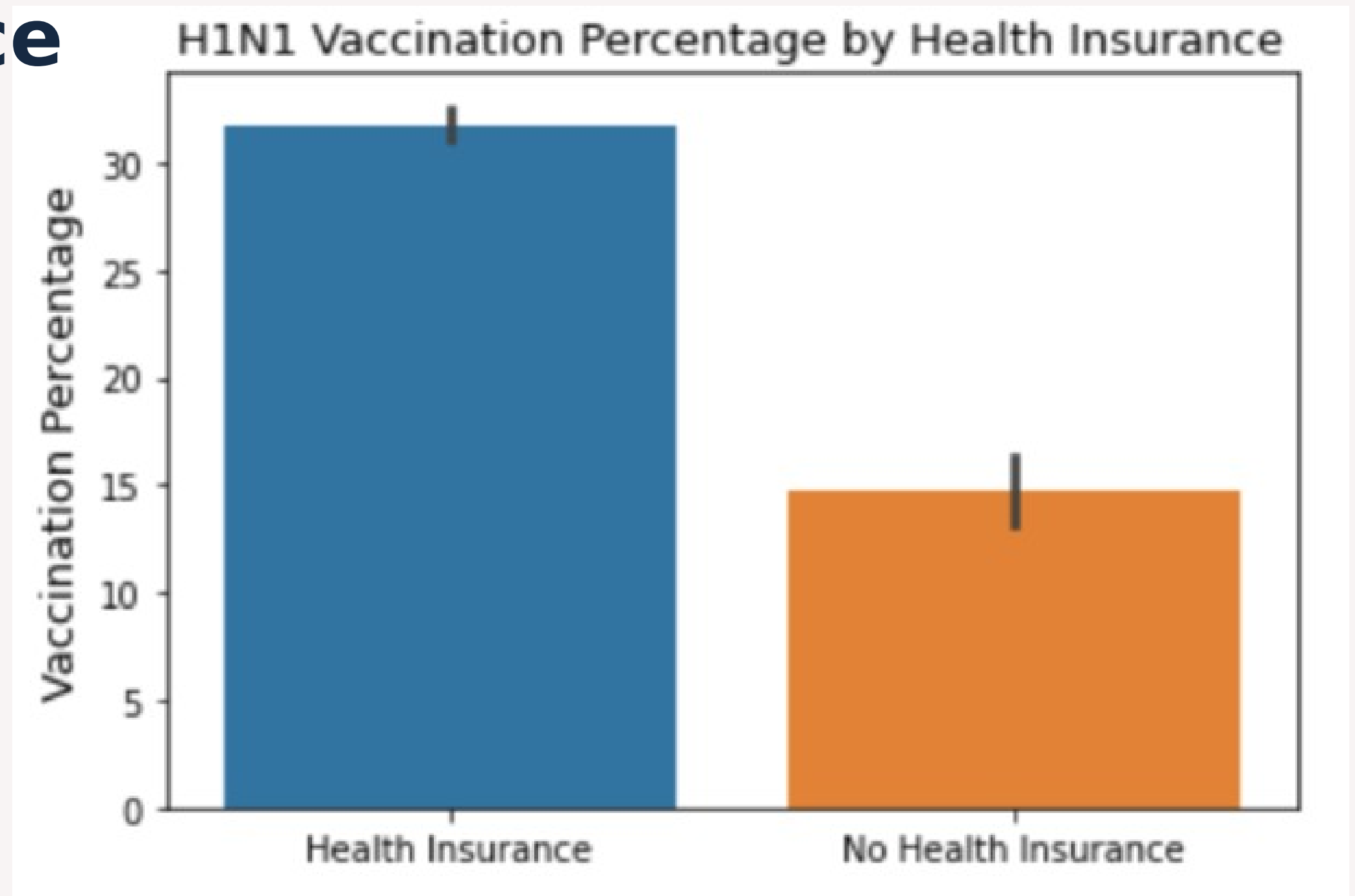
**Opinion on H1N1 Risk**



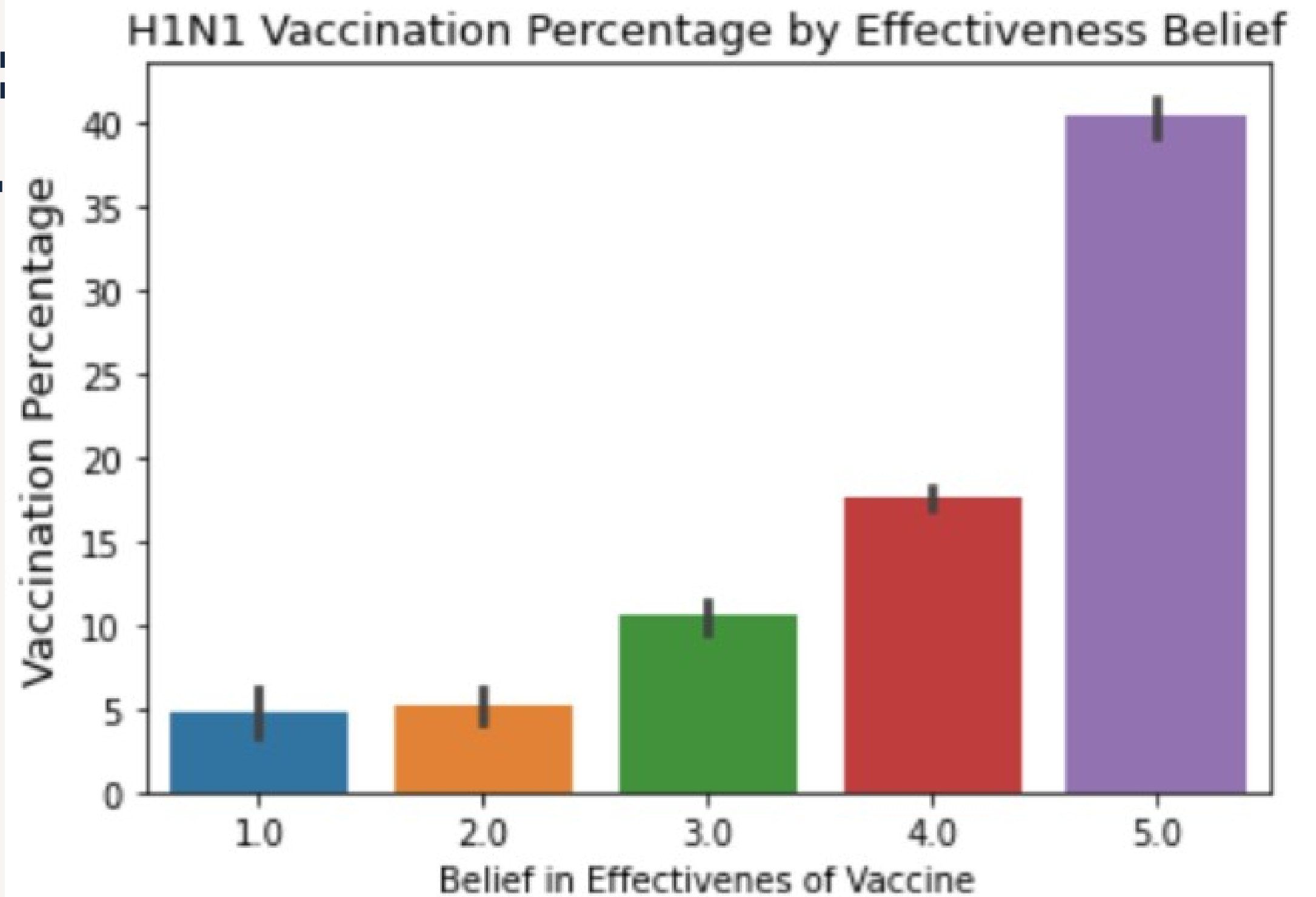
# Data Visualizations: Doctor Recommendation



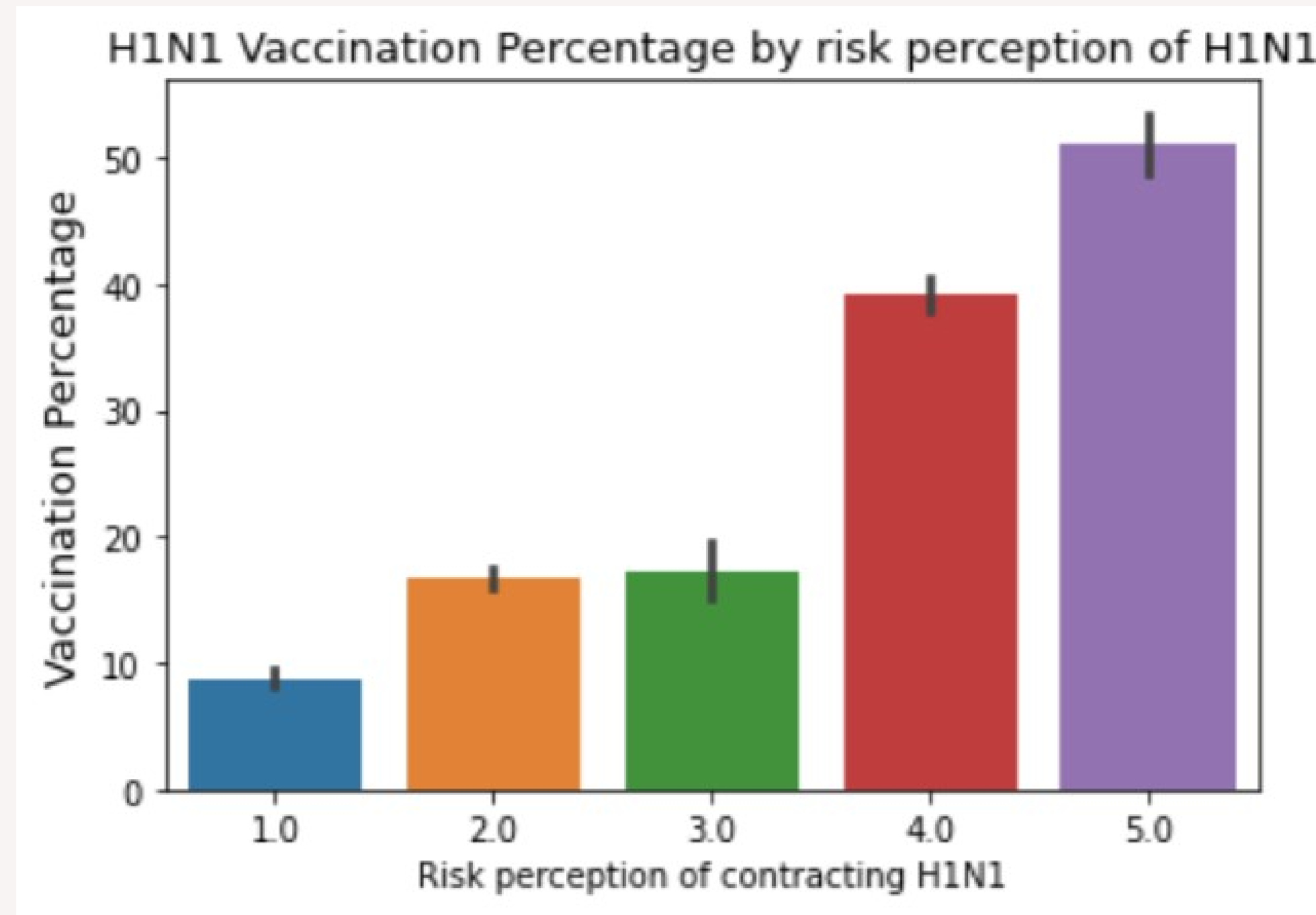
# Data Visualizations: Health Insurance



# Data Visualizations: Belief in H1N1 Vaccine Effectiveness



# Data Visualizations: H1N1 Risk Perception





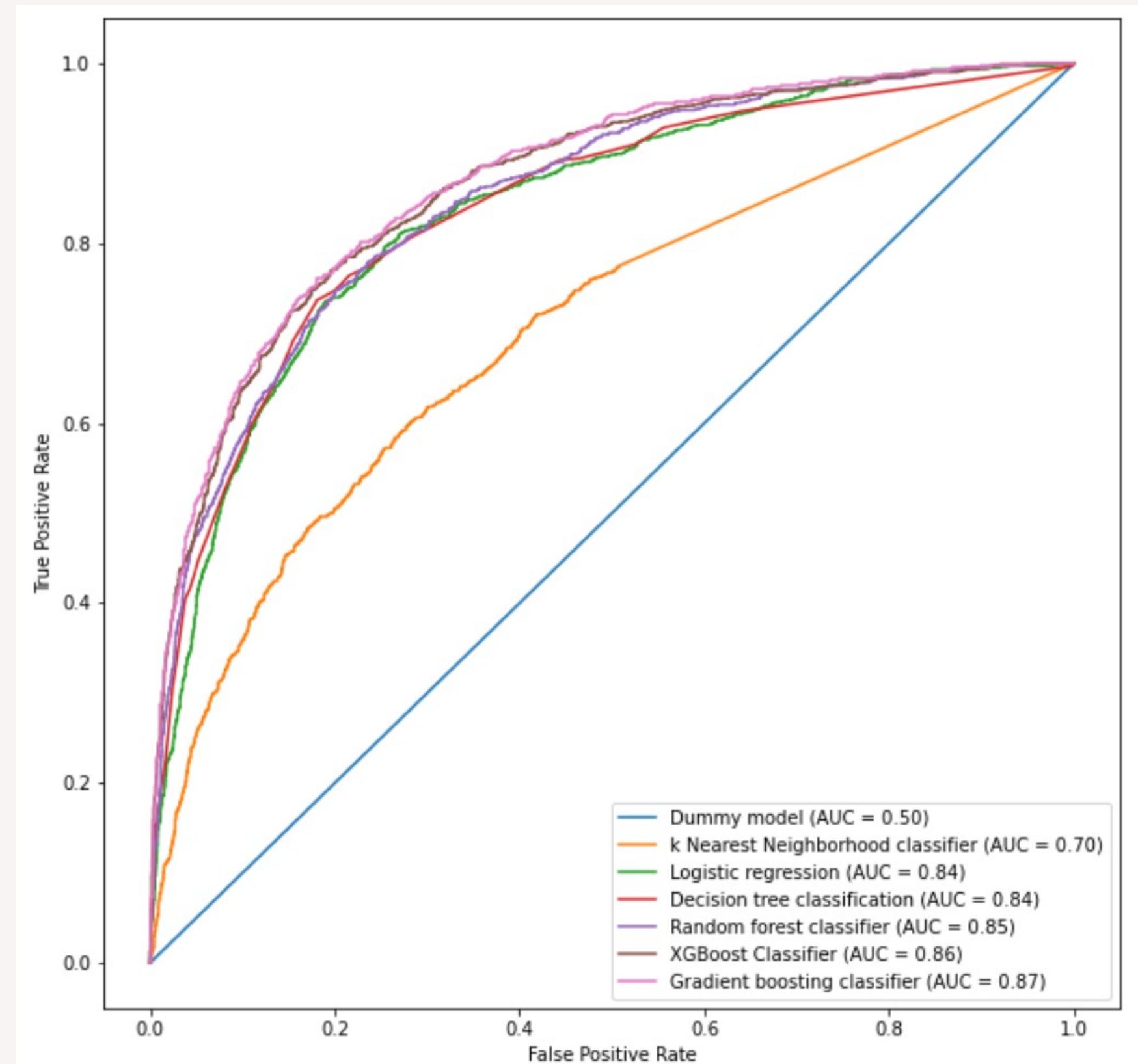
# Recommendations

**Doctor  
Recommendations**

**Health  
Insurance**

**Educational  
Outreach**

# Comparison of Multiple Model Results





# BEST MODEL

Data Source



# FUTURE WORKS

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## Recent Survey Data

Pre/After Covid-19 Difference

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## More Feature Engineering

Improve Accuracy

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## Seasonal Vaccine Prediction

Enhance and Generalize Model

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**What to do**



# Thank you!