# Predicting H1N1 Vaccination Status:
## A Machine Learning Approach

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# Outline

Public Health Perspective

Goals

Data

Methods

Results

Recommendations

Next Steps

# Public Health Perspective

- The personal factors that underlie vaccination behavior

- Understanding vaccination patterns from past pandemics can improve future vaccination

- Decrease outbreaks

# GOALS

- 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)

26,000
Respondents

79%
Did not Get the Vaccine

35
Unique Factors

# Modeling Context

False Positive: Predicting that people got the Vaccine when they actually did not

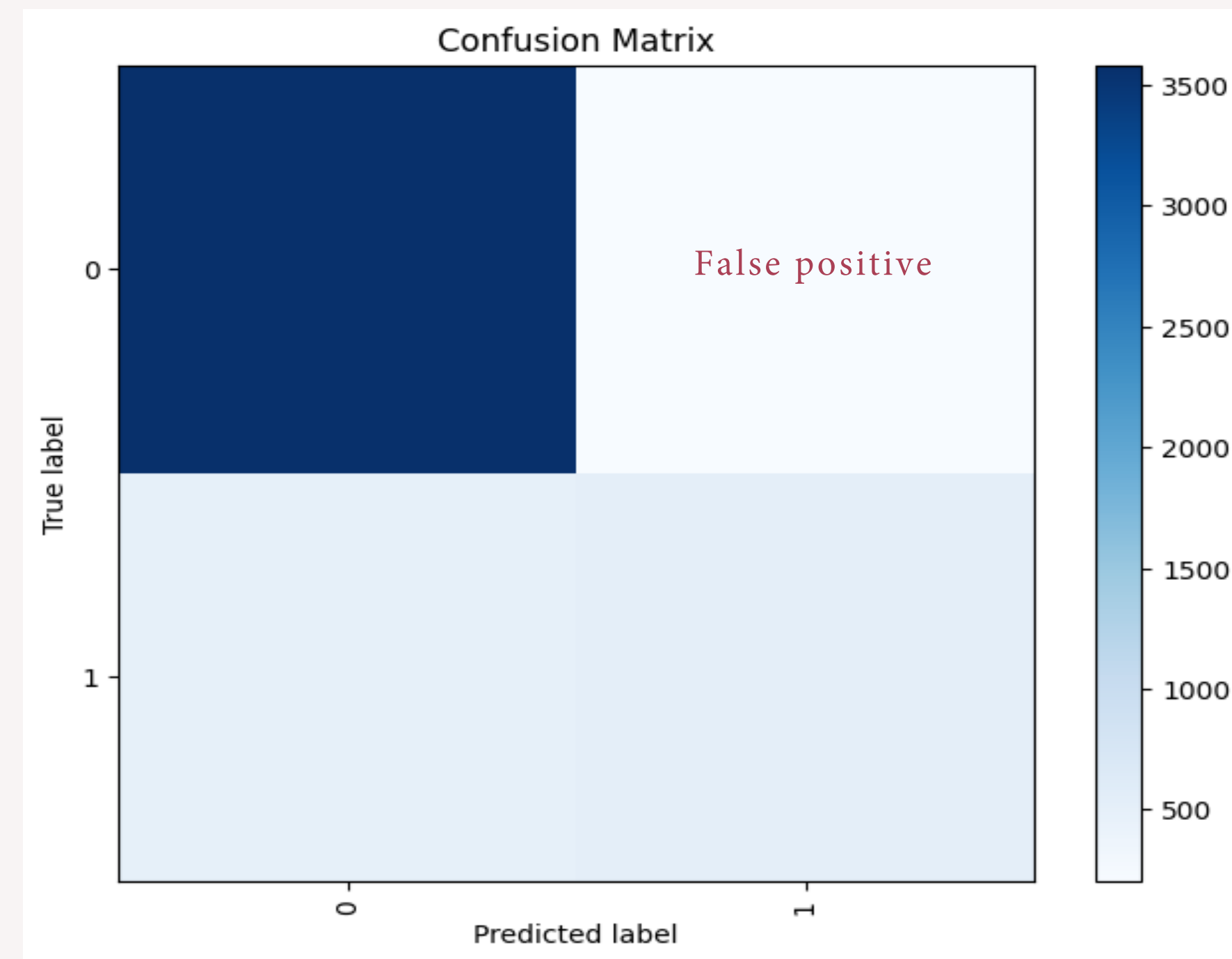False Negative: Predicting that people did not get the vaccine when they actually did

Big Problem

Not a Big Problem

# Model & Results

Gradient Boosting Score

84% Accuracy



Confusion Matrix

# Top 4 Important Features

**Doctor Recommendation of H1N1 Vaccine**

**Health Insurance**

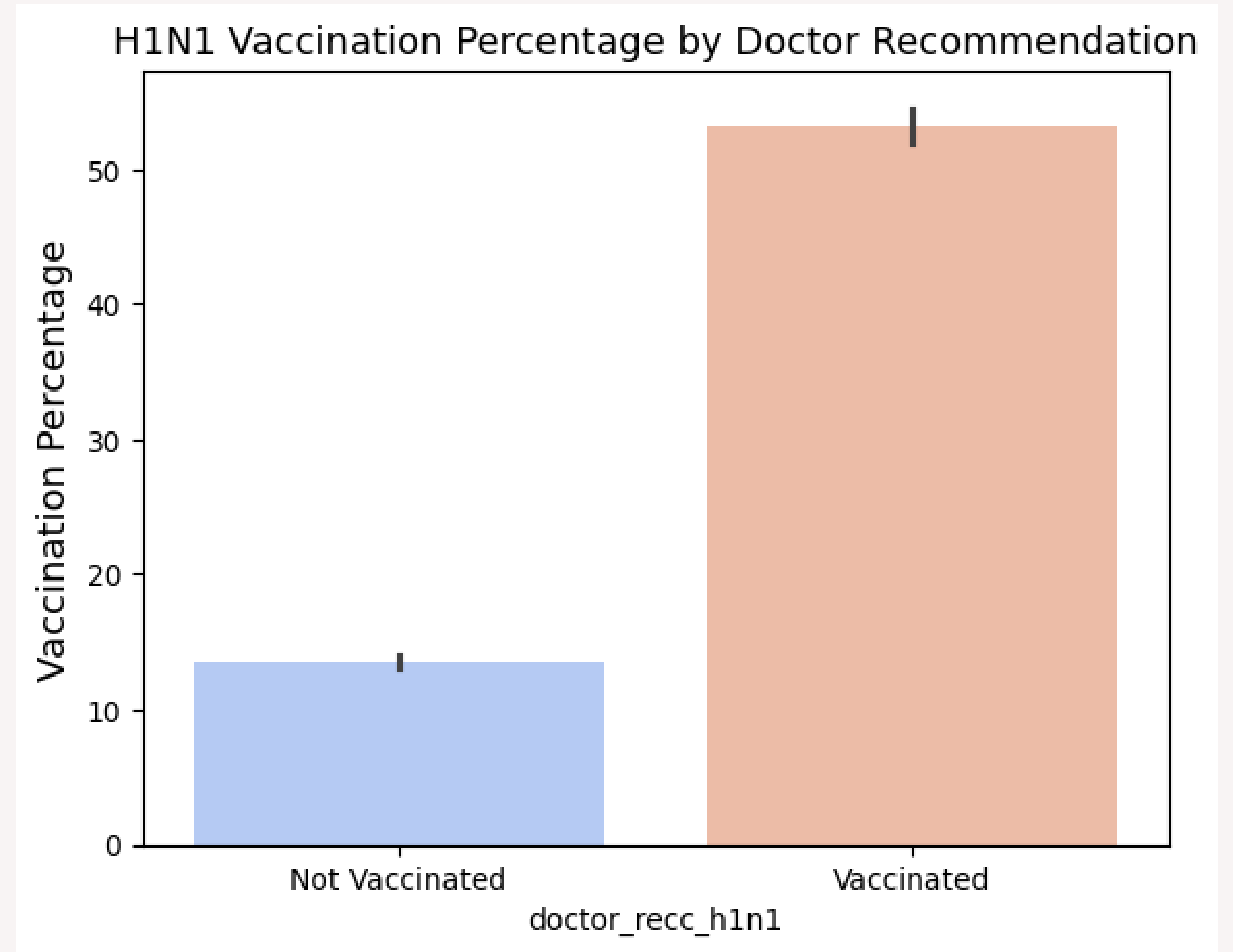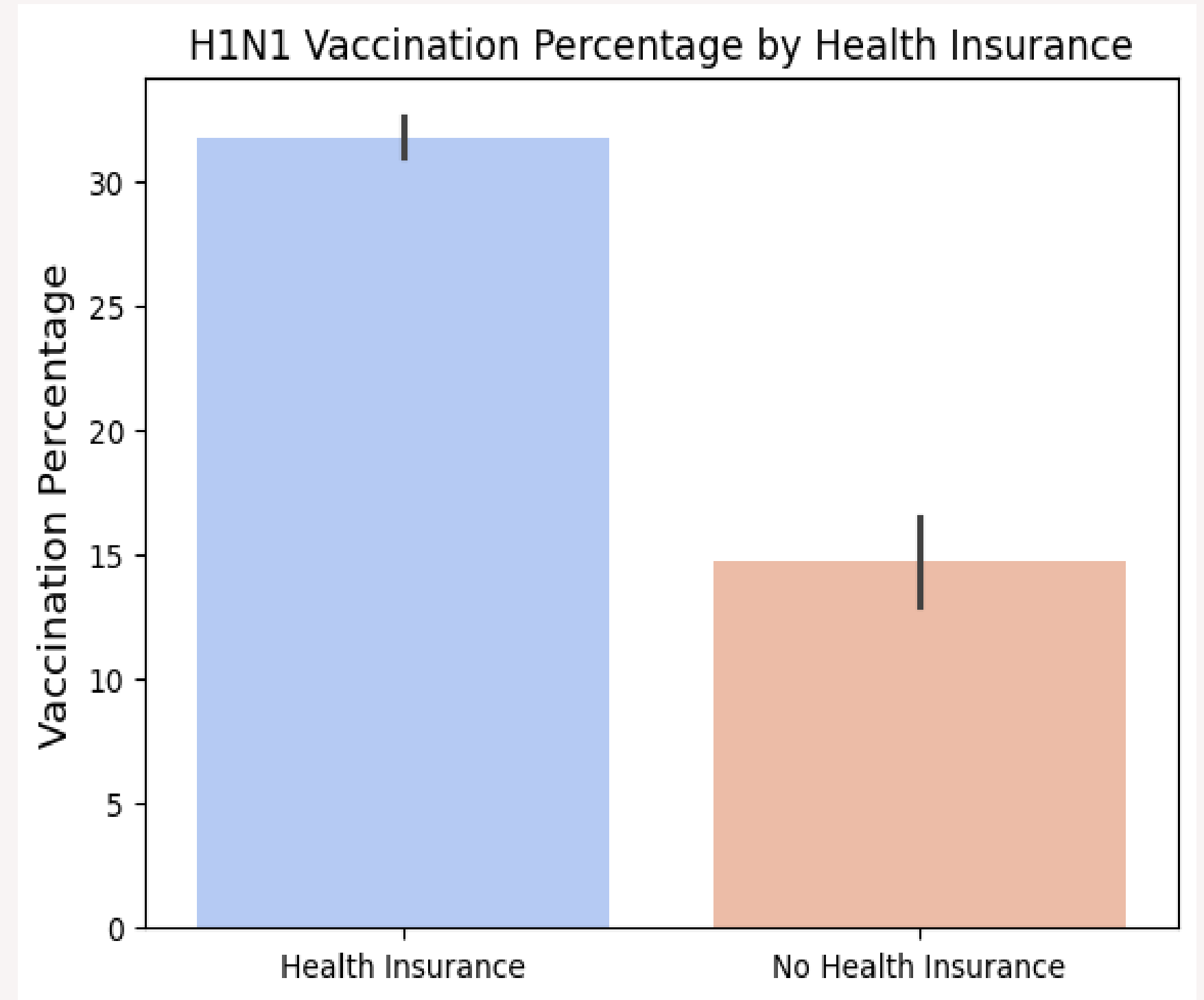**Opinion on H1N1 Vaccine Effectiveness**

**Opinion on H1N1 Risk**

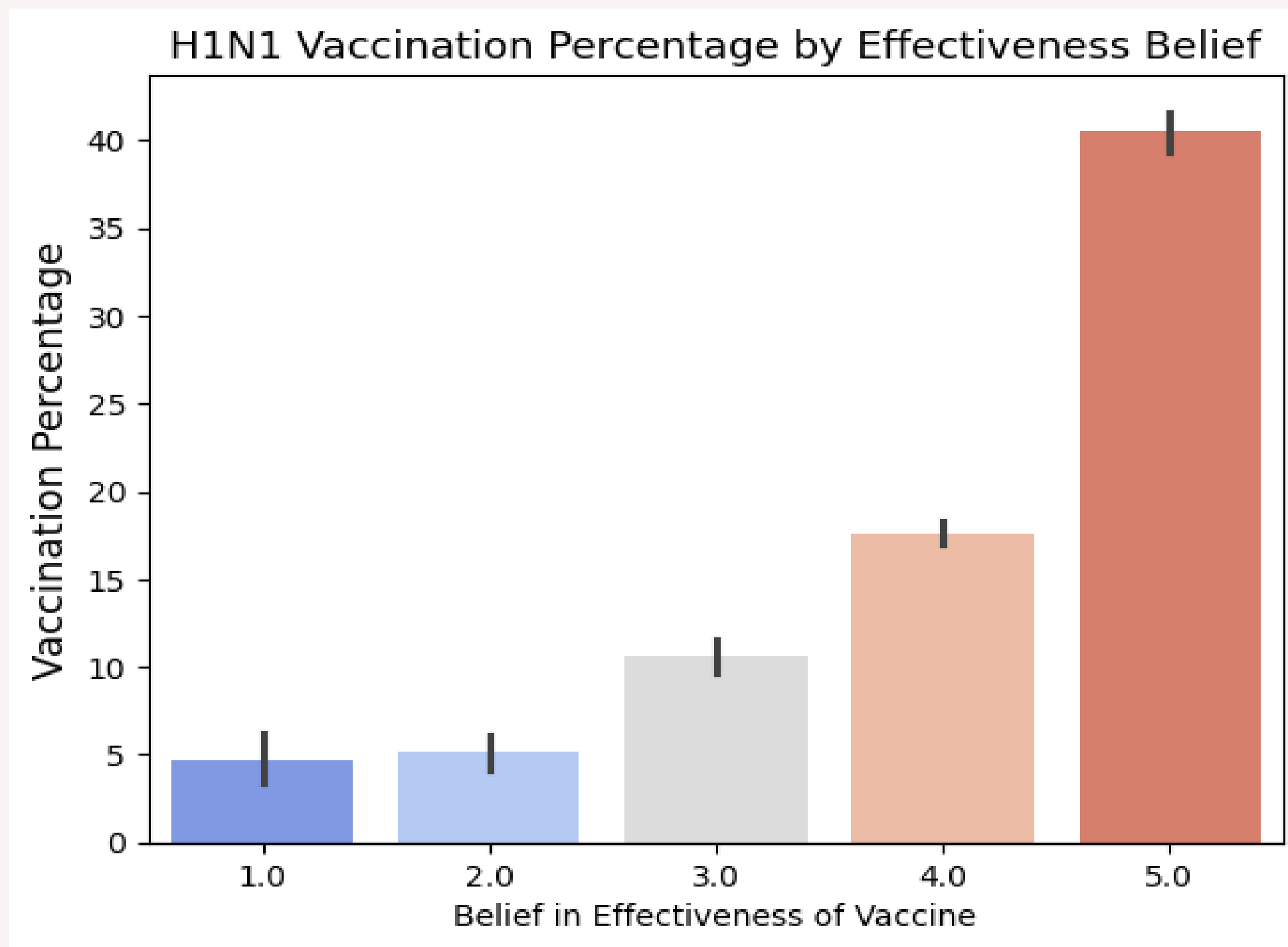# Data Visualizations: Doctor Recommendation

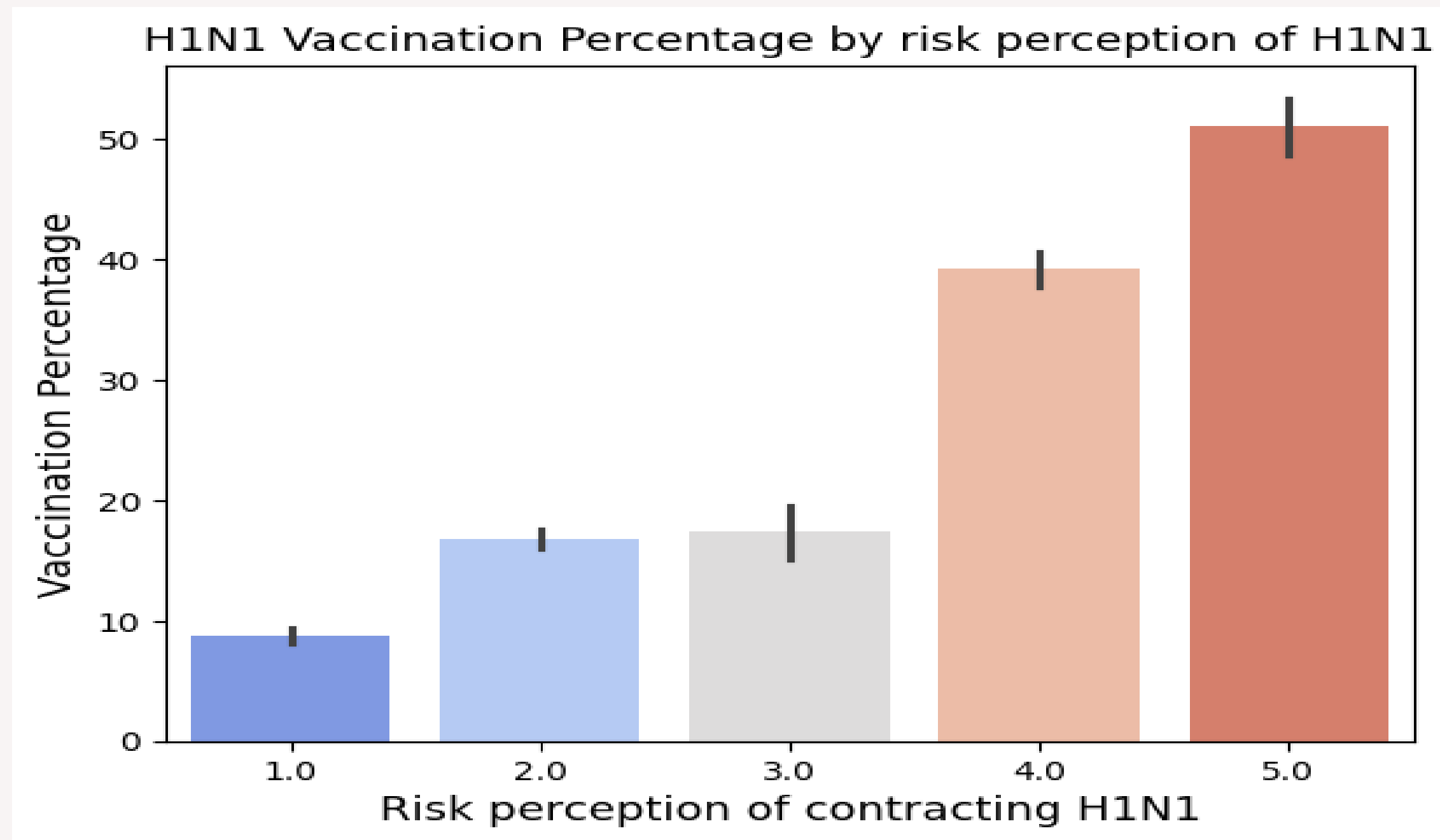H1N1 Vaccination Percentage by Doctor Recommendation

# Data Visualizations: Health Insurance

# Data Visualizations: Belief in H1N1 Vaccine Effectiveness

# Data Visualizations: H1N1 Risk Perception

# Recommendations

### Doctor Recommendations

### Health Insurance

### Educational Outreach

# Connecting with Stakeholder Needs:

My findings directly address the needs of public health stakeholders by providing actionable recommendations to improve vaccination strategies. By leveraging my predictive models, stakeholders can tailor interventions to target specific demographic groups and address vaccine hesitancy effectively.

# Next Steps

What to do

## Recent Survey Data

Pre/After Covid-19 Difference

## More Feature Engineering

Improve Accuracy

## Seasonal Vaccine Prediction

Enhance and Generalize Model

# Thank you!

# **Appendix**

## Comparison of Multiple Model Results



Receiver Operating Characteristic (ROC) Curve