



# PREDICTING HOSPITAL RATING

Exploring the significant factors affecting hospital ratings

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# Why Hospital Ratings Matter?

Patient Decision Making

Quality Assessment

Value-Based Care



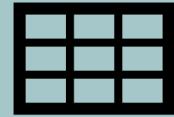
# Agenda



**Objective**



**Introduction**



**Data Overview**



**Models**



**Results**



**Recommendations**



# Objective

## Uncover Insights

Determining factors that significantly impact hospital ratings to target areas for improvement.

## Predict Ratings

Conducting predictive models to estimate hospital ratings based on patient experiences.

## Enhance Quality

Use the findings to improve hospitals quality and patient satisfaction across healthcare.



# Introduction

- CMS ensures access to quality medical treatments nationwide.
- CMS assigns a five-star rating to hospital services based on patient satisfaction.
- A CMS-approved survey called HCAHPS assesses important factors like cleanliness and communication.
- **Over 4,000** hospitals participate in HCAHPS survey and **over 3.0 million** patients complete it each year.
- HCAHPS survey provides insights to enhance healthcare standards.



# Data Overview

- Historical data 2016-2020
- 43 variables and about 1.6M observations
- Captures about patient's care experience
- Factors comparing to national benchmark



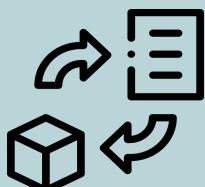
# Data Preprocessing



**Data Cleaning**



**Data Extraction**

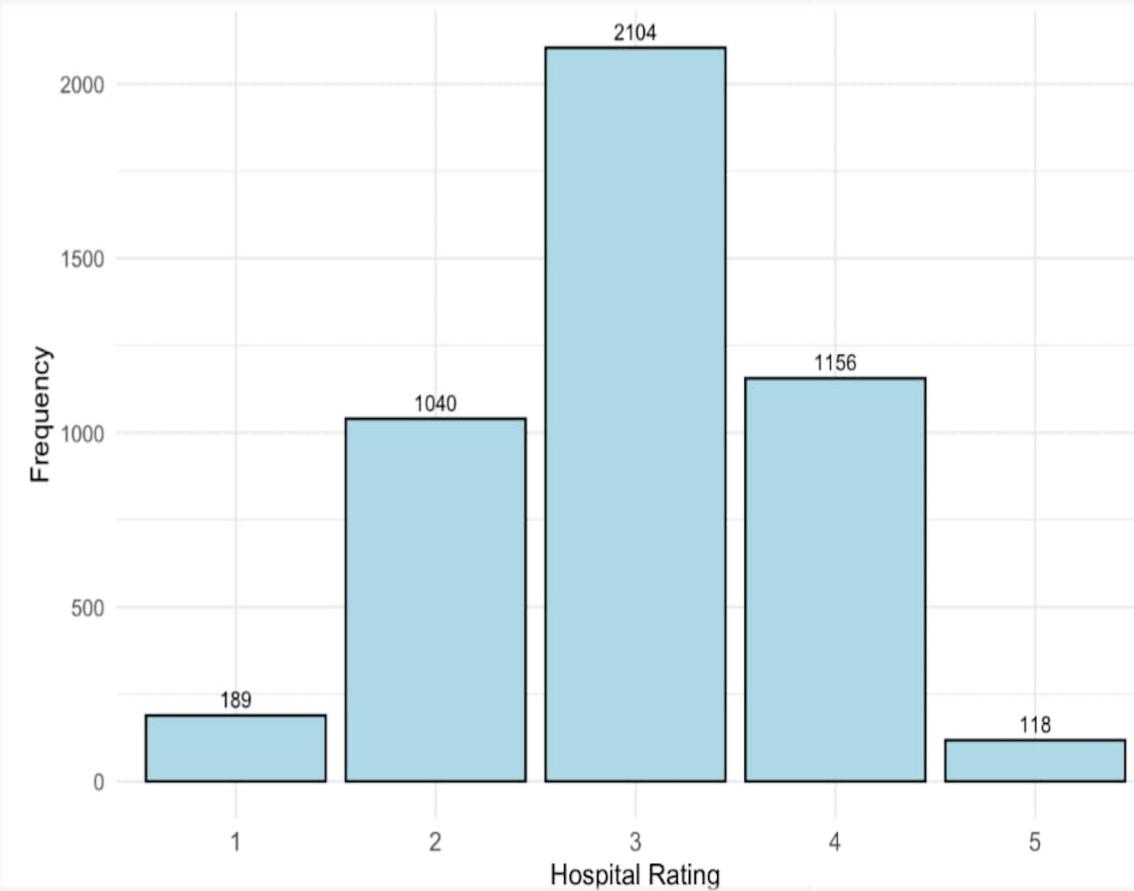


**Feature Selection**

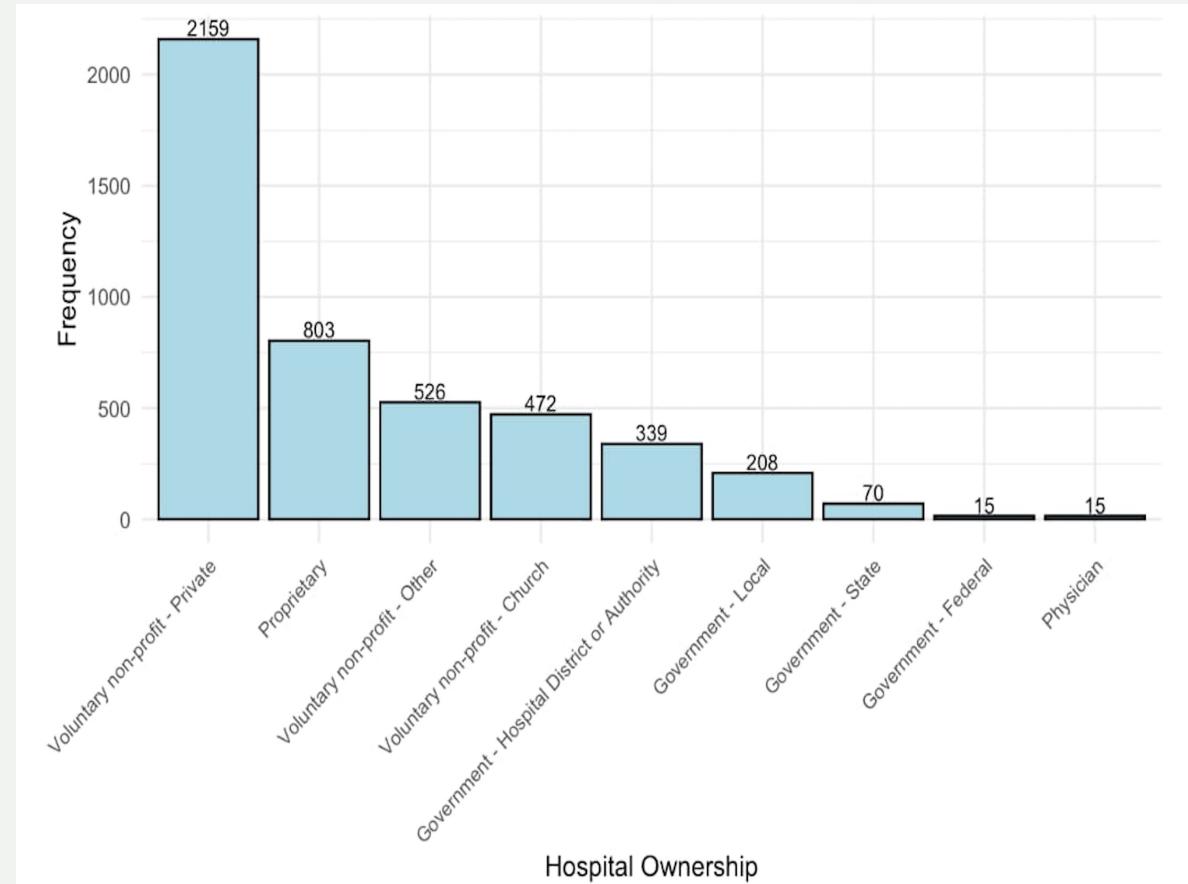
# Exploratory Data Analysis



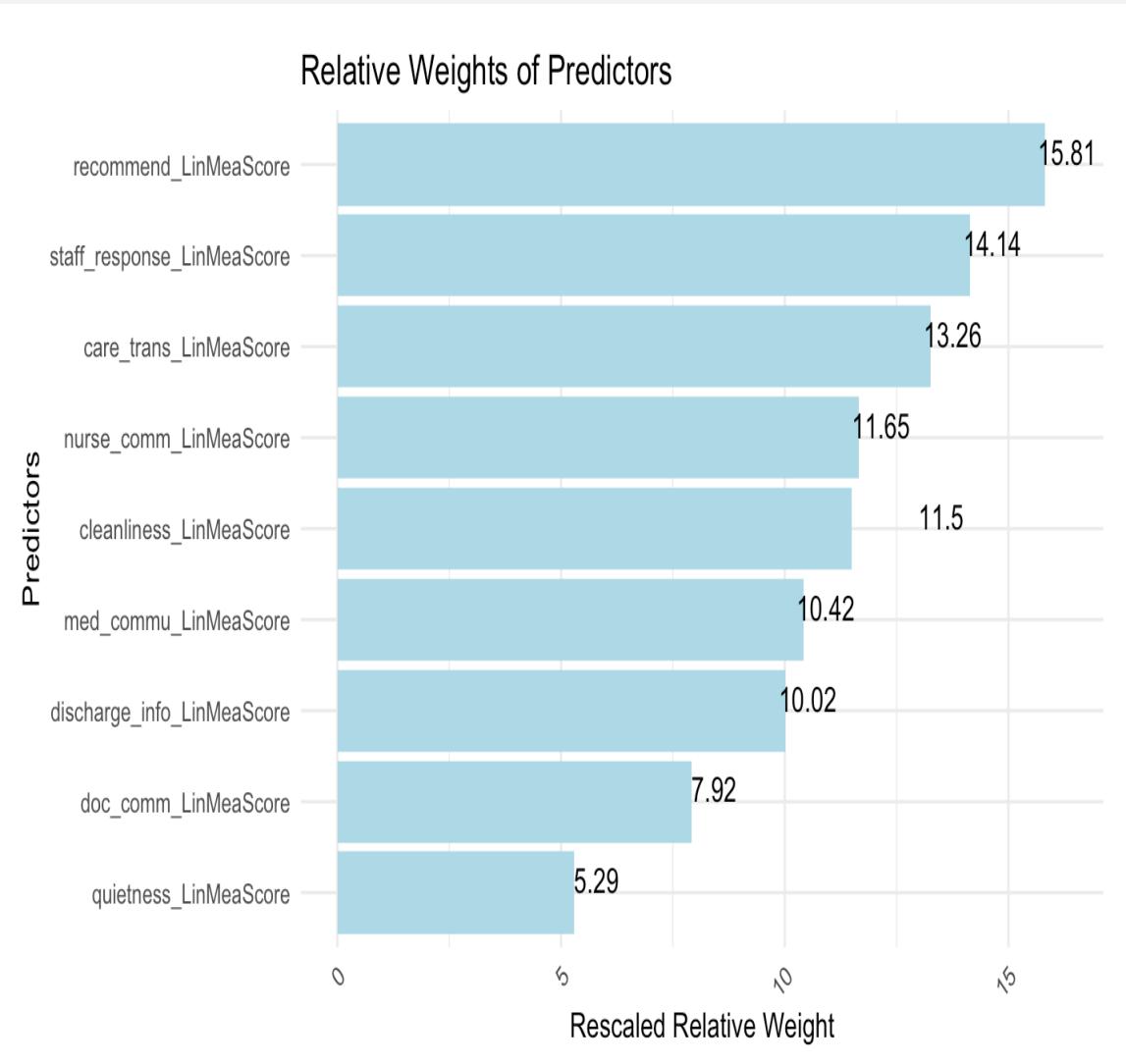
Distribution of Hospital Ratings



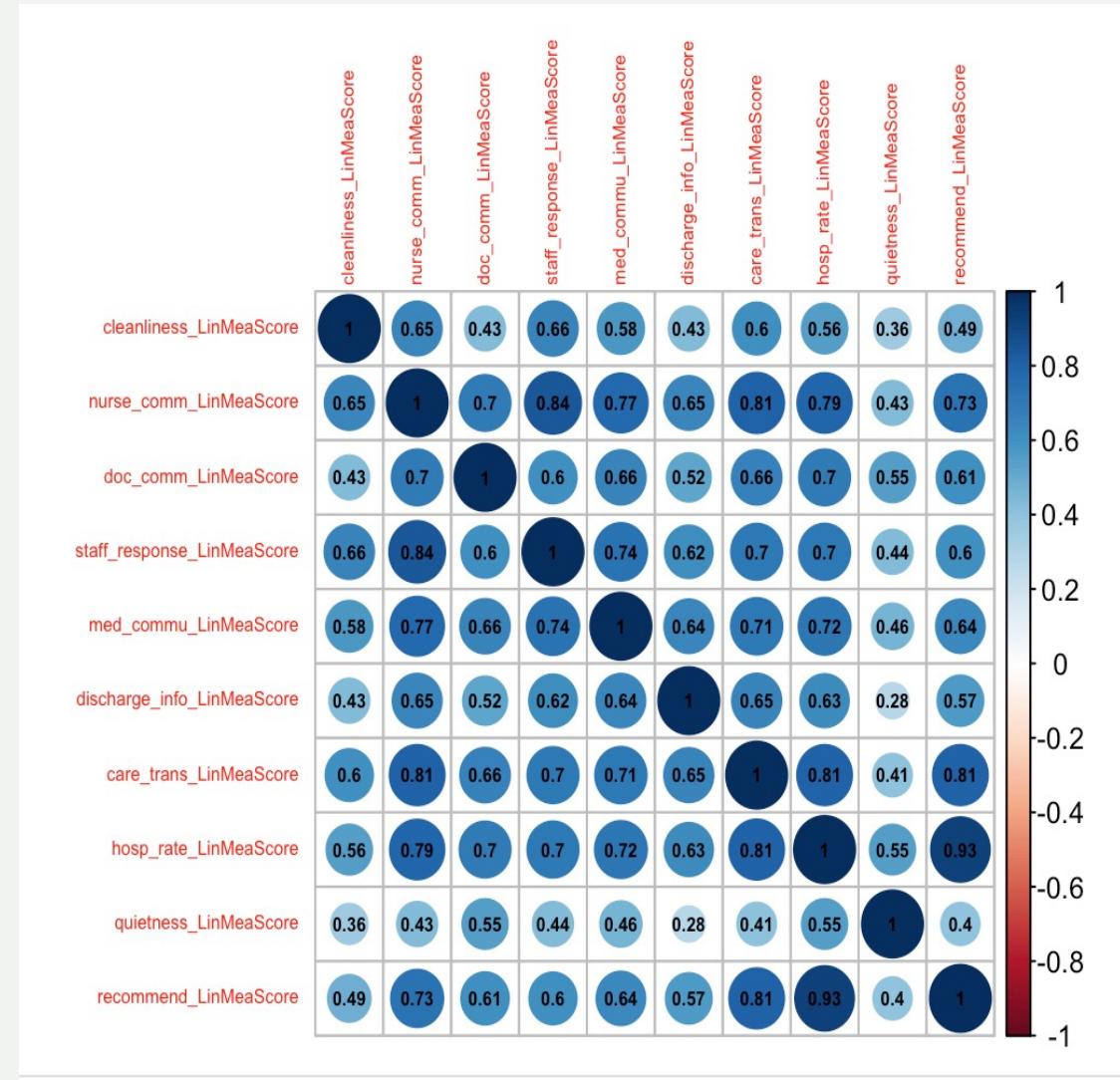
Distribution of Hospital Ownerships



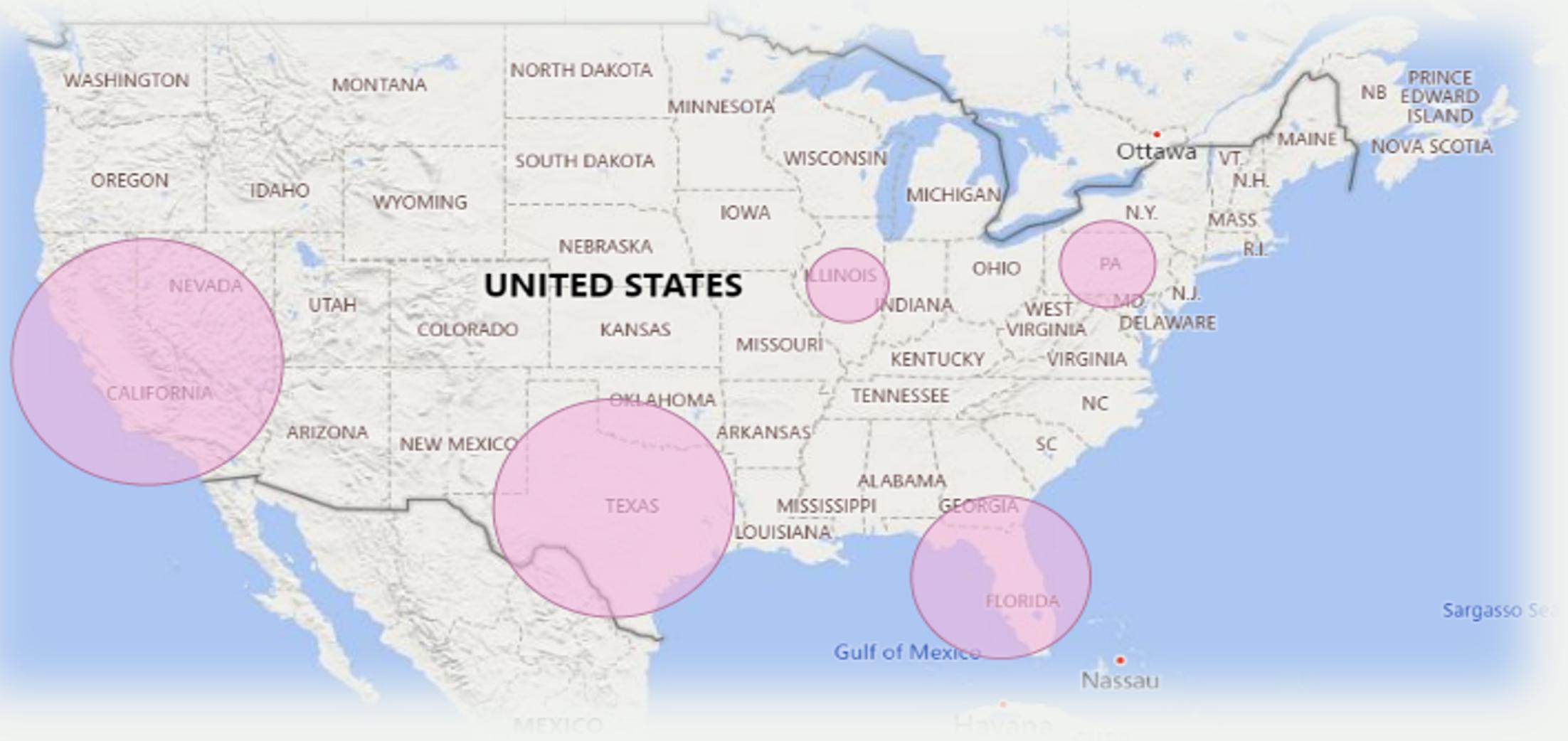
# Relative Weight Analysis



# Correlation Analysis

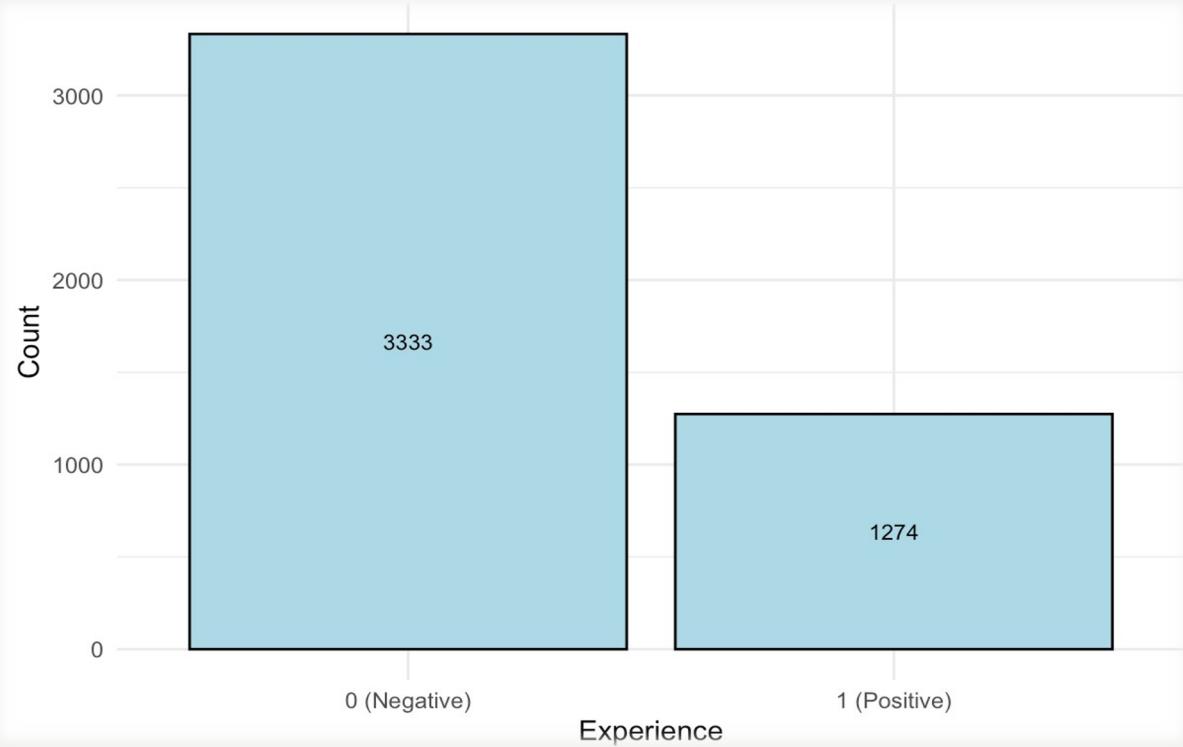
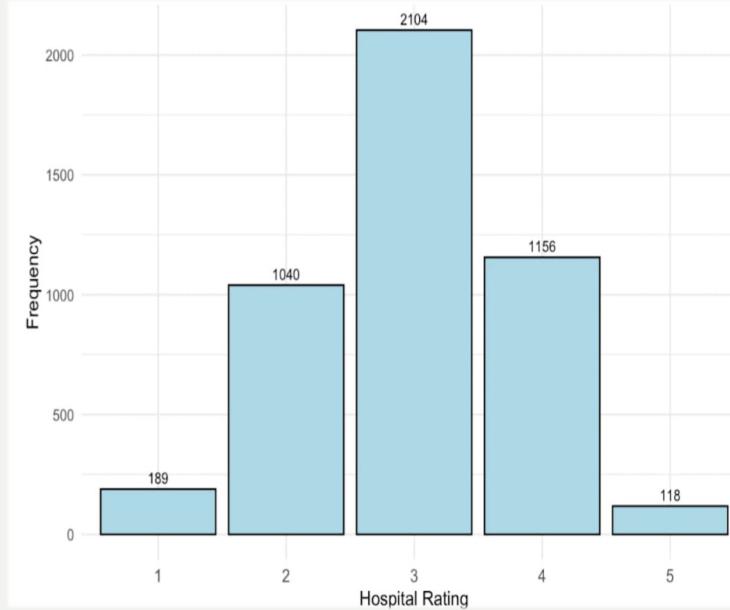


# Top 5 States with Highest Hospital Ratings





# Target Variable Transformation



Hospital Rates above 3 is considered **Positive Rate** and below **Negative Rate**

- ✓ Industry Benchmark
- ✓ Patient Satisfaction Survey
- ✓ Public Perceptions and Reputations



# Predictive Approach



*LOGISTIC REGRESSION*

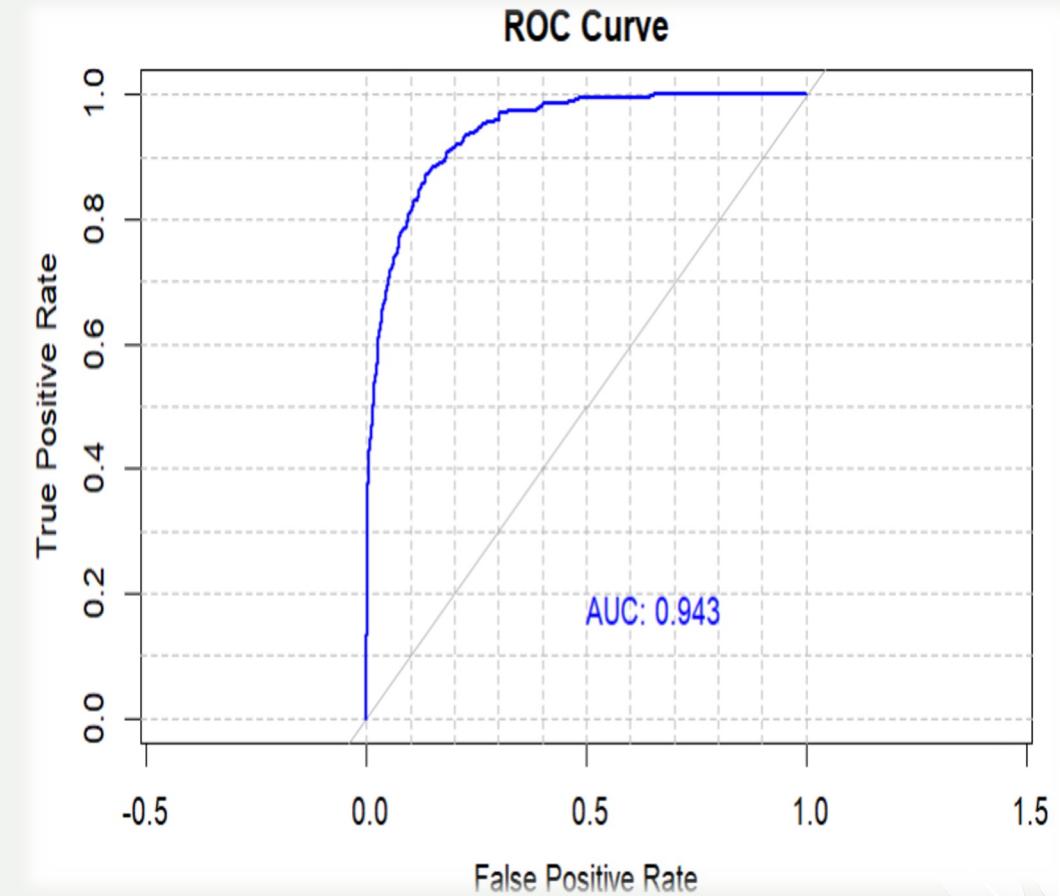
*RANDOM FOREST*

*SUPPORT VECTOR MACHINE (SVM)*

# Model Evaluation



Models	Logistic Regression	Random Forest	SVM
Accuracy	<b>0.88</b>	<b>0.87</b>	<b>0.87</b>
Sensitivity	<b>0.9</b>	<b>0.93</b>	<b>0.92</b>
Specificity	<b>0.8</b>	<b>0.73</b>	<b>0.76</b>
Precision	<b>0.92</b>	<b>0.89</b>	<b>0.9</b>



# Recommendations

- **Investing Training Programs for Patient Services:** Cleanliness, Staff responsiveness, Doctor and Nurse Communication.
- **Meeting Industry Standards:** Mortality, Readmission, Safety.
- **Timeliness Issue:** Optimizing Patient Flow, Reducing waiting time.
- **Transparency & Communication:** Open and Honest Exchange of. Information



MEDICARE  
ADVANTAGE

