

# Analysis of H1N1 Vaccine based on Behavioral Factors

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# Process

- Business understanding
- Objectives
- Data understanding
- Exploratory Data Analysis
- Modelling
- Findings
- Recommendations



## BUSINESS UNDERSTANDING

**As has previously struggled to vaccinate the global population against COVID-19, an understanding of how people's backgrounds, opinions, and health behaviors are related to their personal vaccination patterns can provide guidance for future public health efforts. I aim to predict whether people got H1N1 vaccines using data collected in the National 2009 H1N1 Flu Survey.**

# BUSINESS OBJECTIVES

- To build a classification model to predict whether an individual will presumably get H1N1 vaccine or not.

# Specific objectives

- To import and clean the dataset to prepare the data for analysis and modeling.
- Model the data using Decision trees, Random Forest, and Logistic Regression.
- To perform feature selection of our dataset.
- To validate our model using different metrics.

# Data understanding

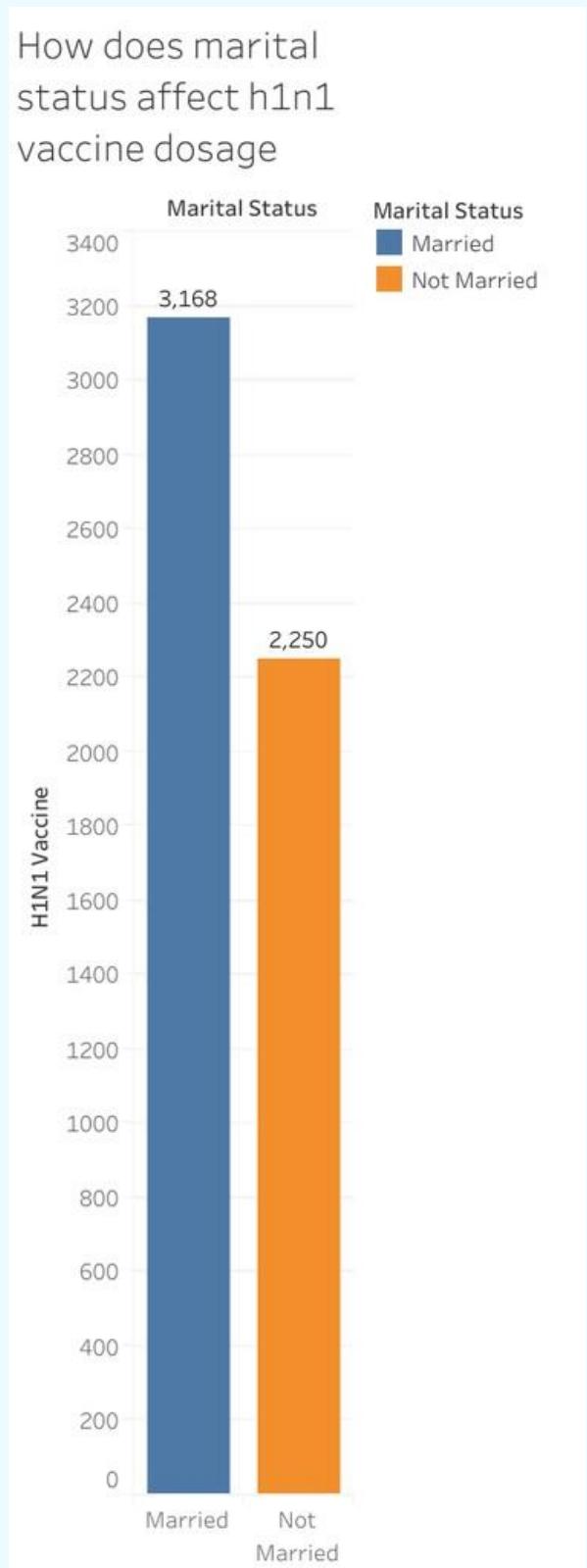
**For this project, we are using the available dataset in Kaggle.**

**The dataset is the H1N1 and seasonal flu vaccines.  
The link is attached in the CRISP - DM report**

# **Exploratory Data Analysis**

# **Social factors that affect the h1n1 vaccine dosage**

- RACE
- INCOME POVERTY
- HOUSE
- OWNERSHIP
- GENDER
- EMPLOYMENT
- STATUS
- AGE GROUP
- MARITAL STATUS

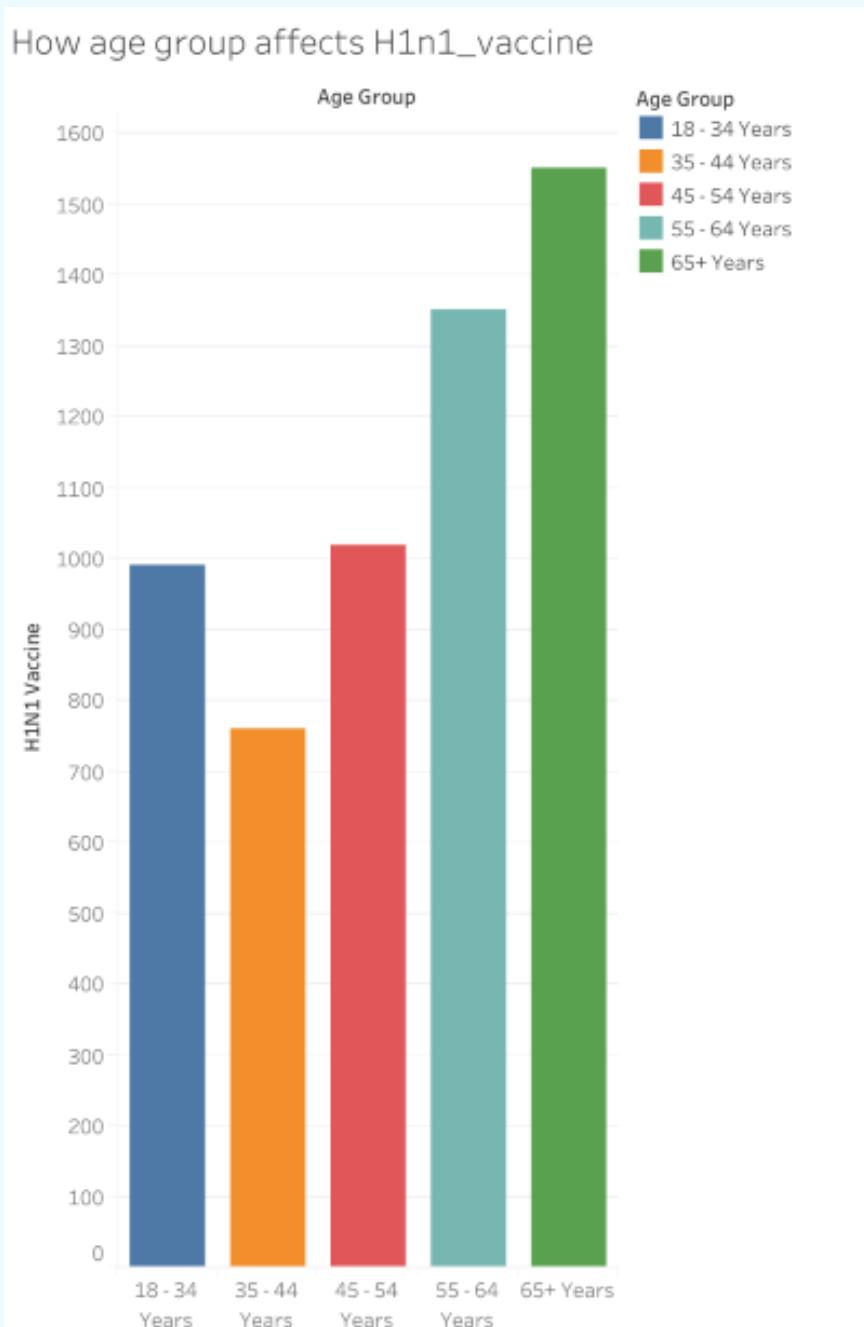


# Marital status

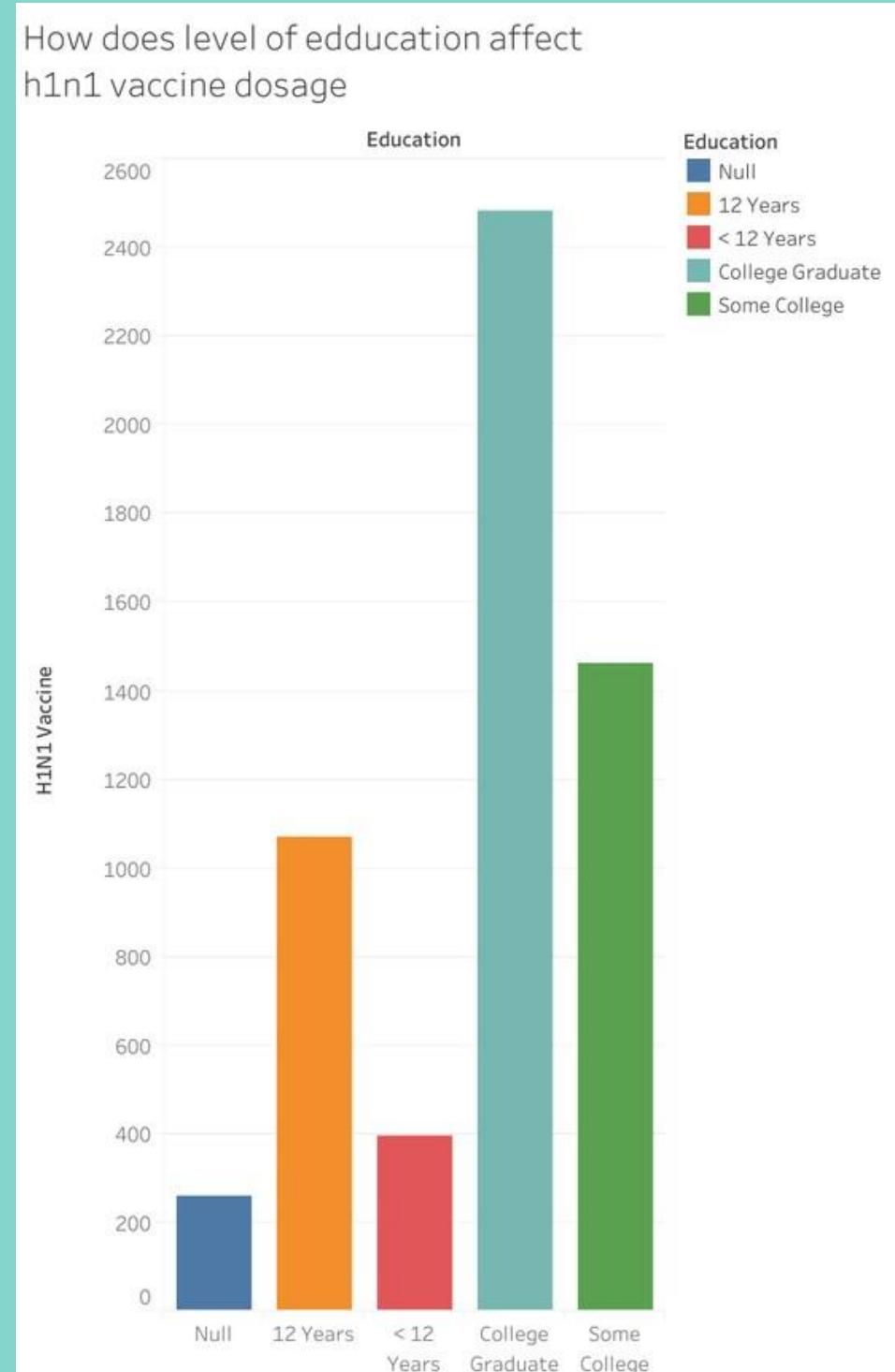
Most people who took the vaccine are married

# Age group

From this we can see that the people in the age group 65 and above years took the most vaccine



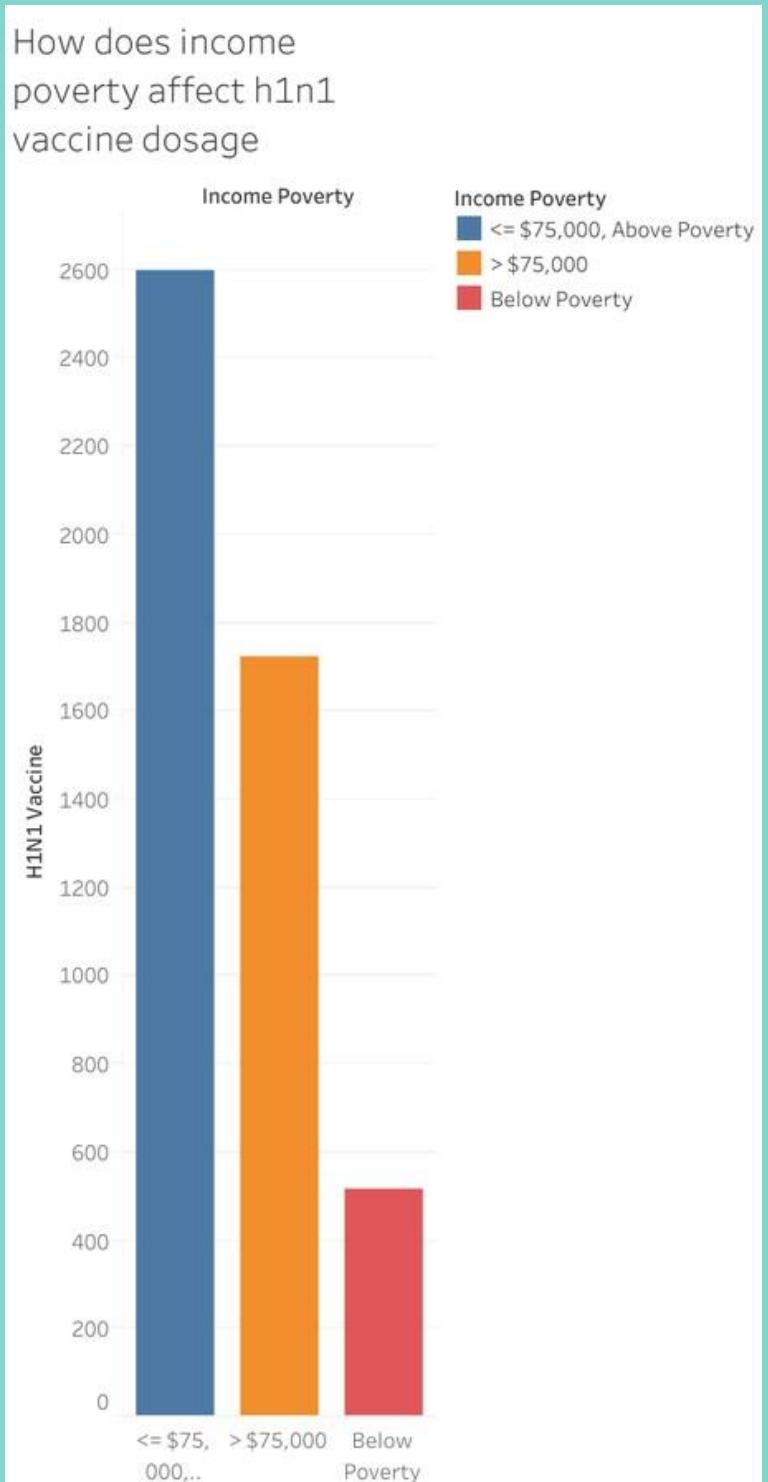
# Level of education

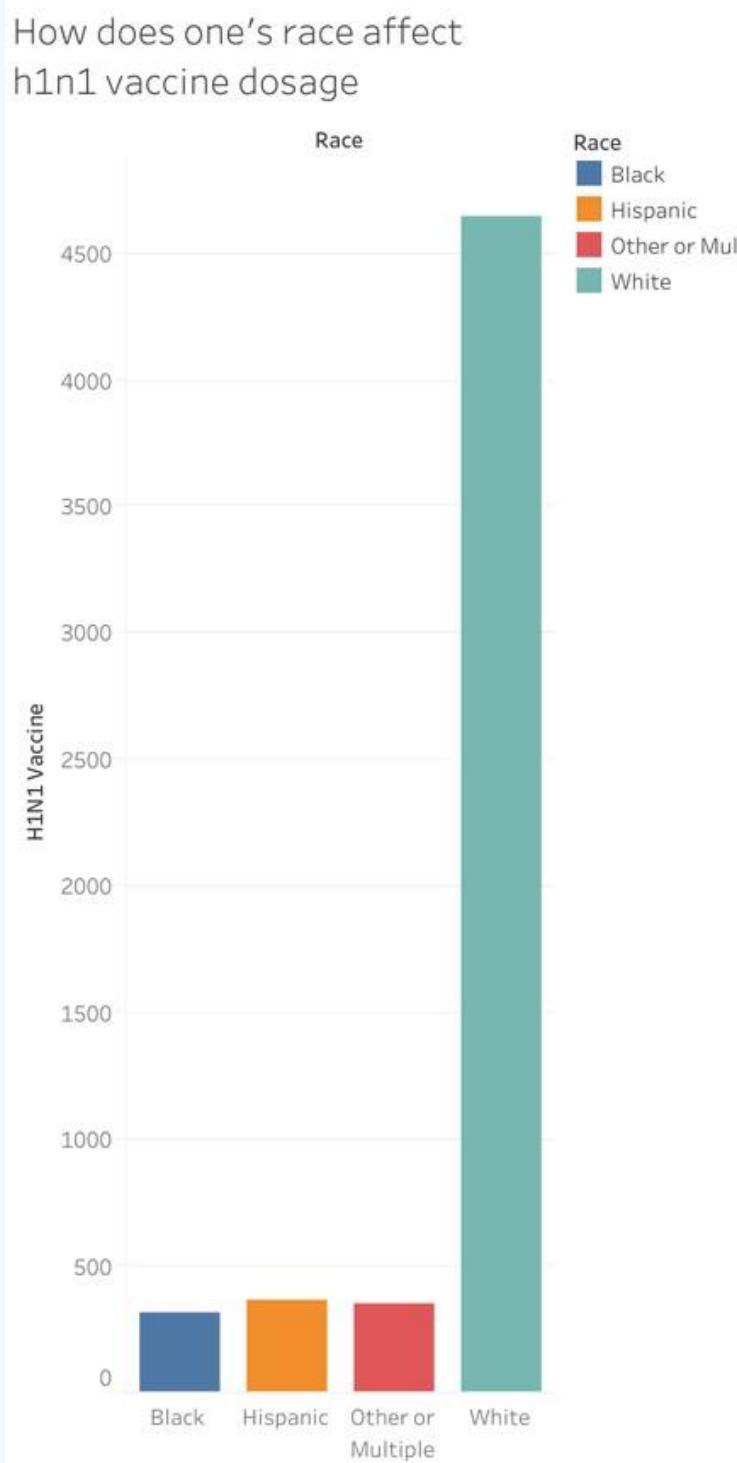


From this we can see that the people whose education level was college had the highest number of people who took the vaccines

# Income poverty

We can see that those with an income of above 75000 had the highest number of people who took the vaccine



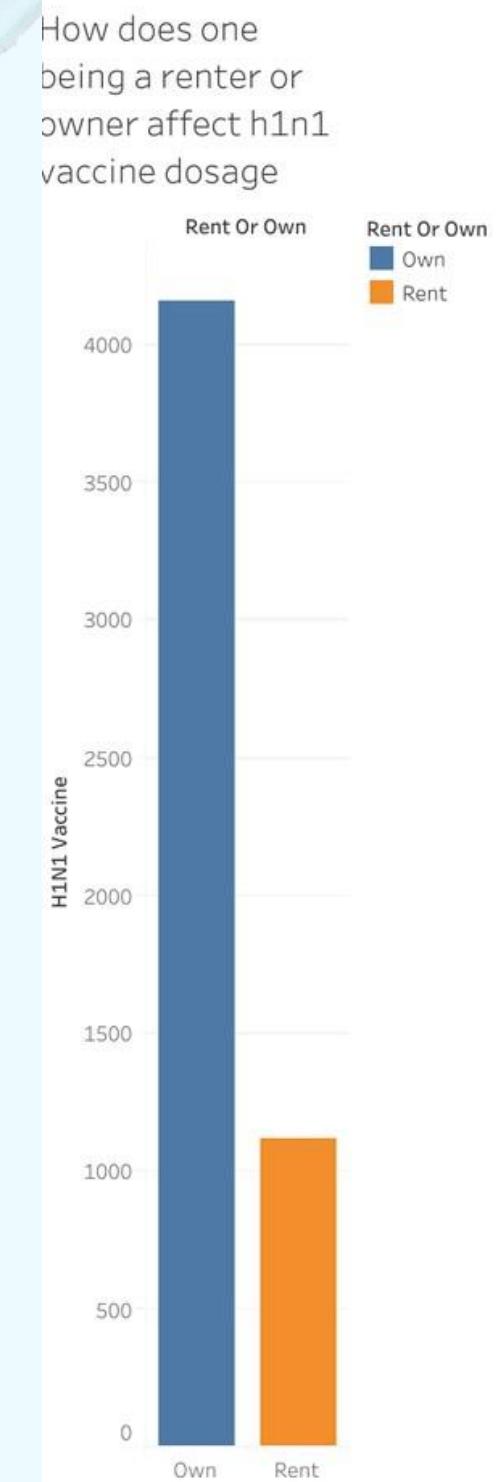


# Race

From the plot ,we can see that the whites took the vaccines in a very large amount compared to other races.

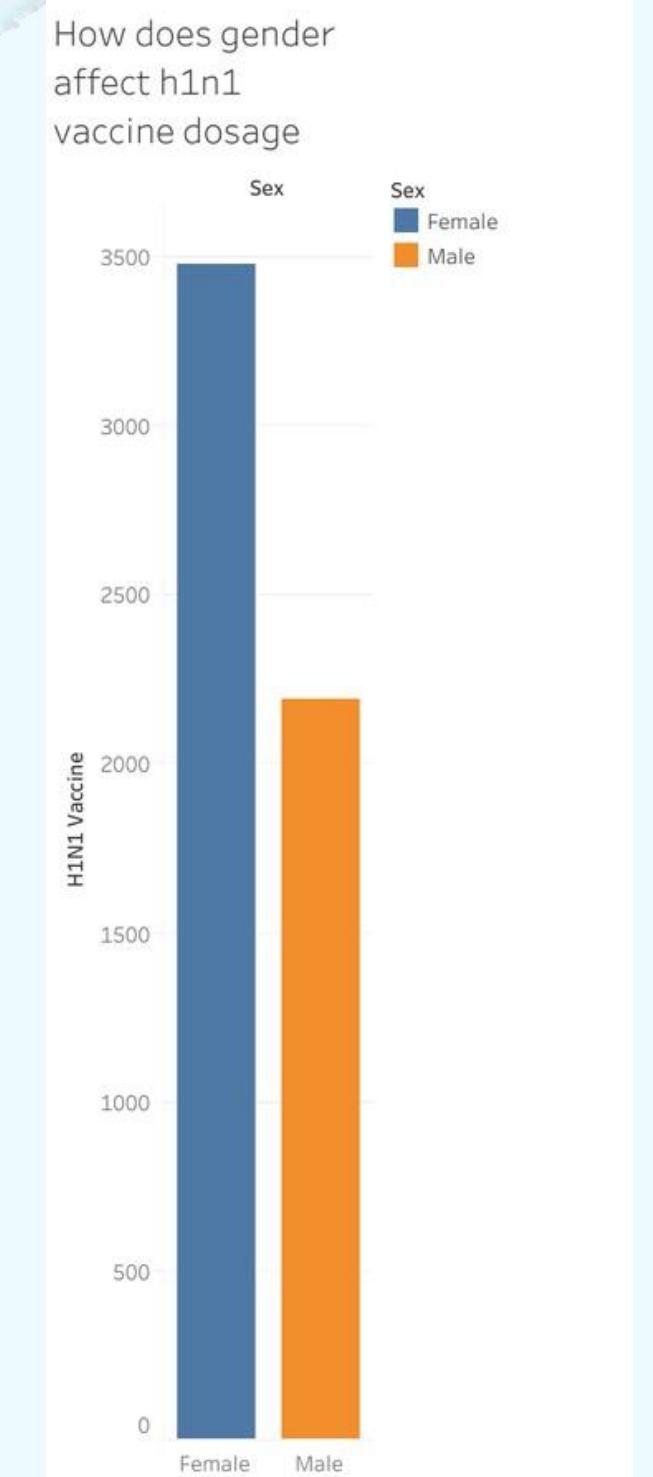
# House ownership

We can see that home owners had the highest number of people who took the vaccine.

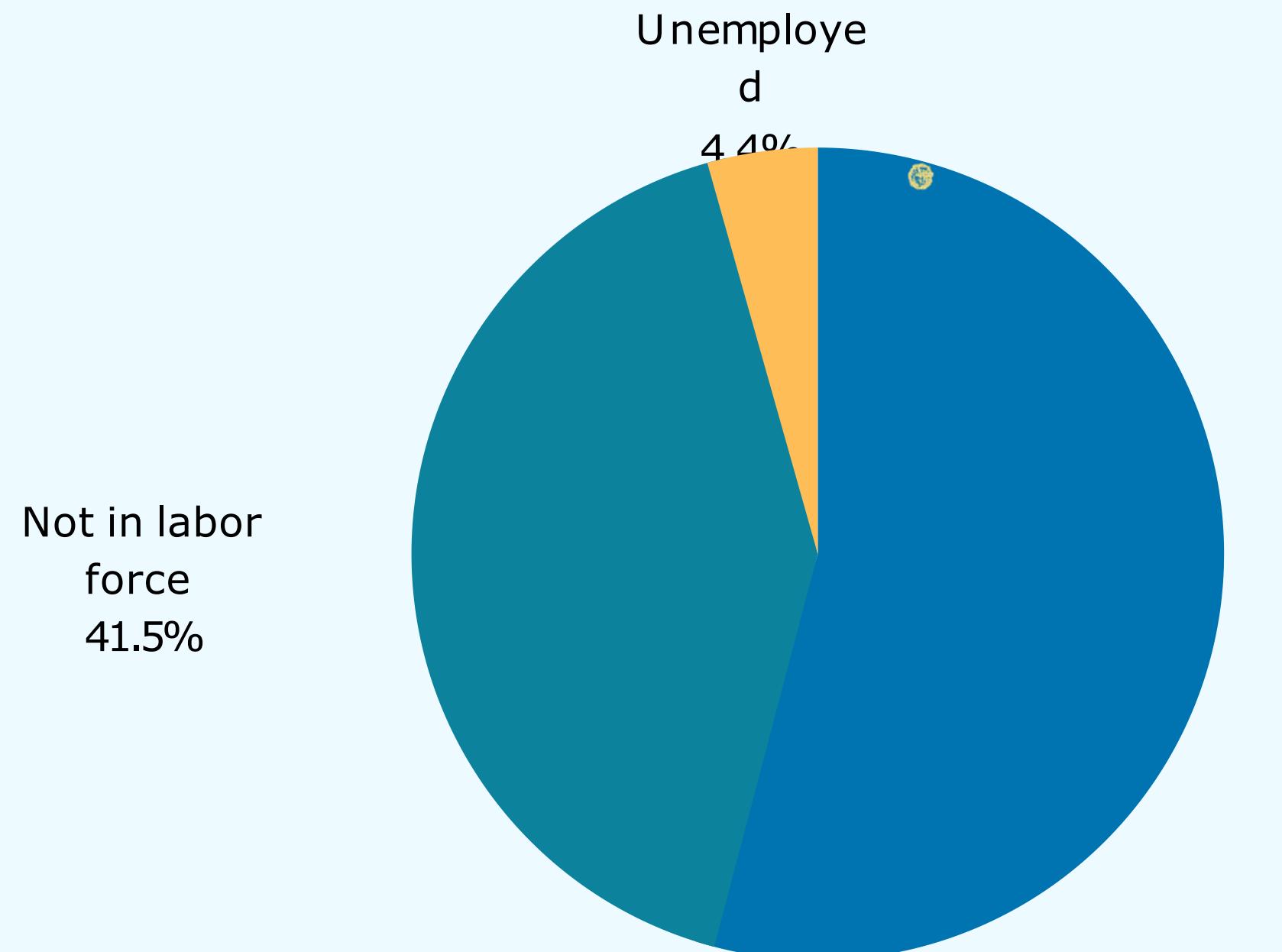


# Gender

We can see that the female gender had the highest number of people who took the vaccines.



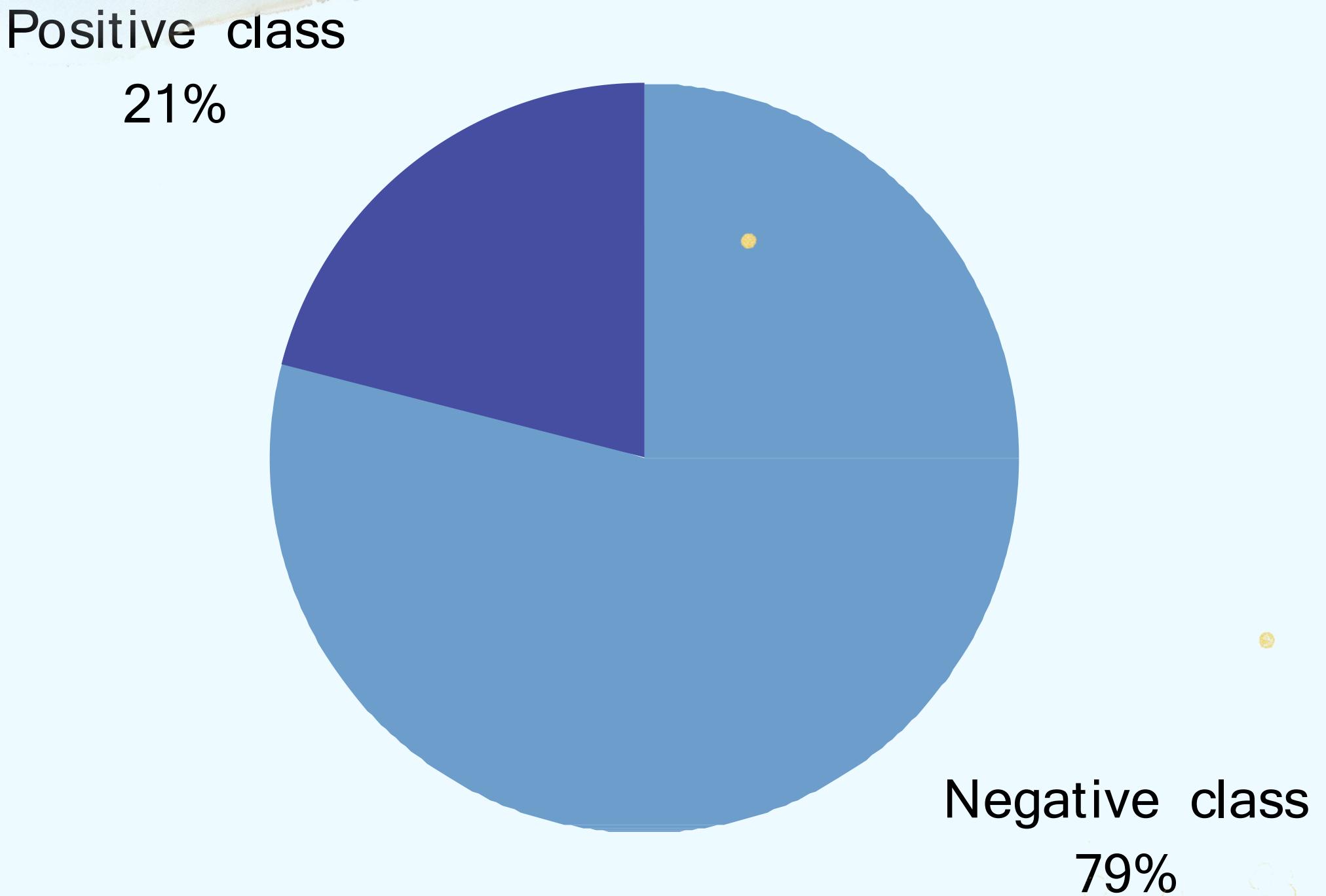
# Employment status

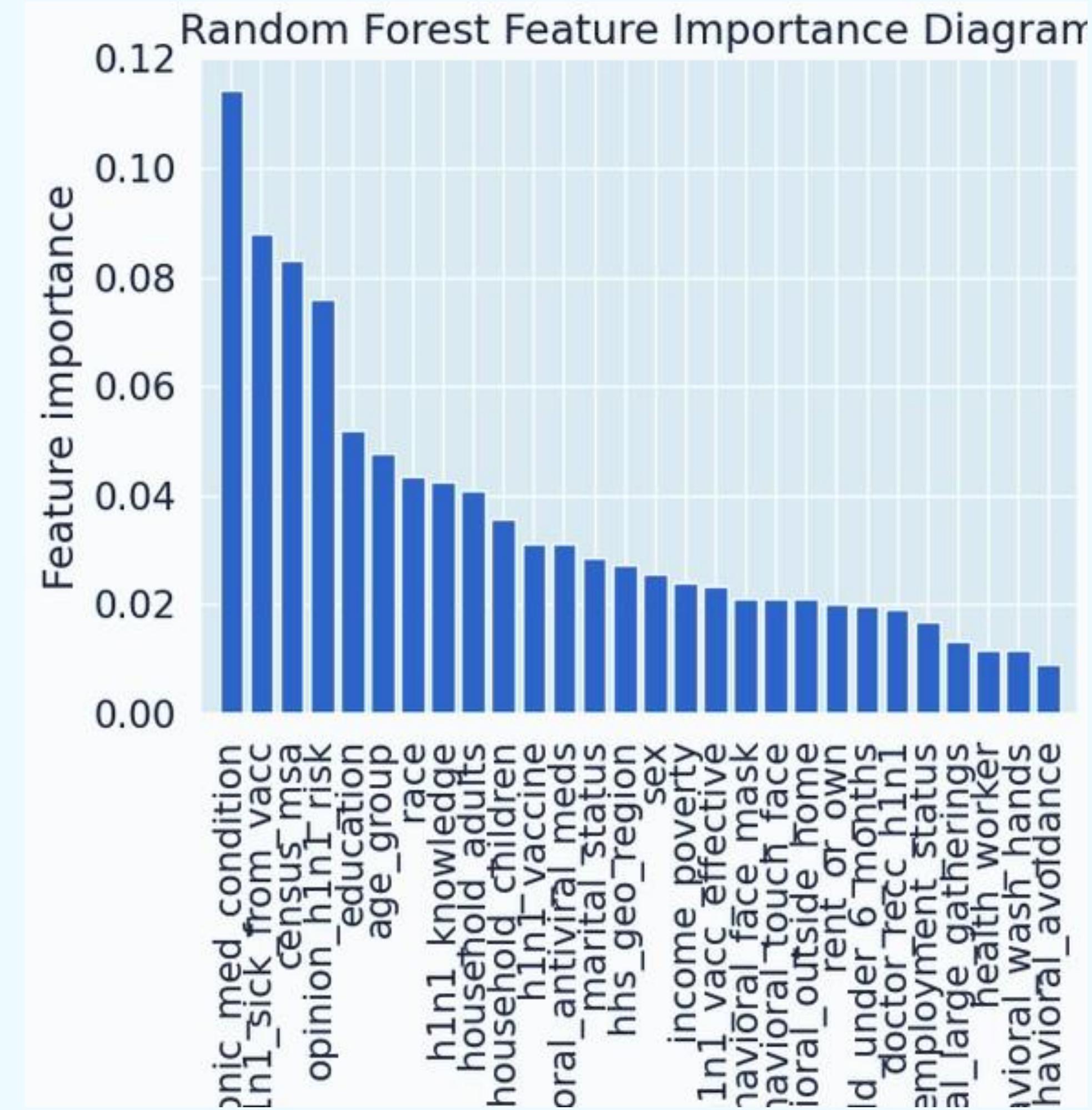


From this plot we can see that the number o employed people who took the vaccine is more than those who are unemployed and not in labor force.

# Pie plot showing the imbalanced distribution

From the pie chart, we have the negative class having the biggest portion followed by the positive class.





# MODELING

We used three modeling techniques  
namely:

- Logistic Regression
- Decision Trees
- Random Forest

# METRIC PERFORMANCE

## Logistic Regression   Decision Tree

**Test accuracy:**  
0.775797513853527

**Test precision:**  
0.4810964083175803

**Test recall:**  
0.7184191954834157

**Test f1 score:**  
0.5762807812057741

**Train Accuracy:**  
0.8380777277626323

**Test Accuracy:**  
0.8124906395087614

**Train Recall\_score:**  
0.811957141951436

**Test Recall\_score:**  
0.6005645730416372

**Train Precision\_score:**  
0.8567128236002408

**Test precision\_score :**  
0.5536759921925829

## Random Forest

**Train Accuracy:**  
0.8219171243135297

**Test Accuracy:**  
0.8241725325745095

**Train Recall\_score:**  
0.22903453136011276

# FINDINGS

- Age is a significant predictor of H1N1 vaccine uptake, with older adults more likely to get vaccinated compared to younger adults.
- Health behaviors such as wearing a face mask, washing hands frequently, and avoiding crowded places during an outbreak are associated with increased H1N1 vaccination uptake.
- Certain chronic medical conditions such as asthma and diabetes are associated with increased H1N1 vaccination uptake.
- Married individuals were more likely to get vaccinated compared to those who are unmarried.
- The employed were more likely to get vaccinated compared to those who are unemployed or not in the labor force.

# **RECOMMENDATIONS**

- **Use of sensitisation and targeted marketing campaigns to address the specific demographic and socioeconomic factors associated with H1N1 vaccine uptake.**
- **Increasing the geographical access to vaccination by making it more accessible to people in different locations.**
- **Offering incentives such as discounted health insurance premiums to promote the uptake of the vaccine.**
- **Demystifying myths and misinformation that exists concerning the vaccination, that could contribute to hesitancy in uptaking the vaccine.**
- **Partnering with public health agencies to develop and implement vaccination programs in areas that are not easily accessible. This could be implemented by the use of mobile vaccination clinics.**



**THAT WAS TOUGH BUT WE DID IT.**