

# Predicting Flu Shot Vaccine Uptake



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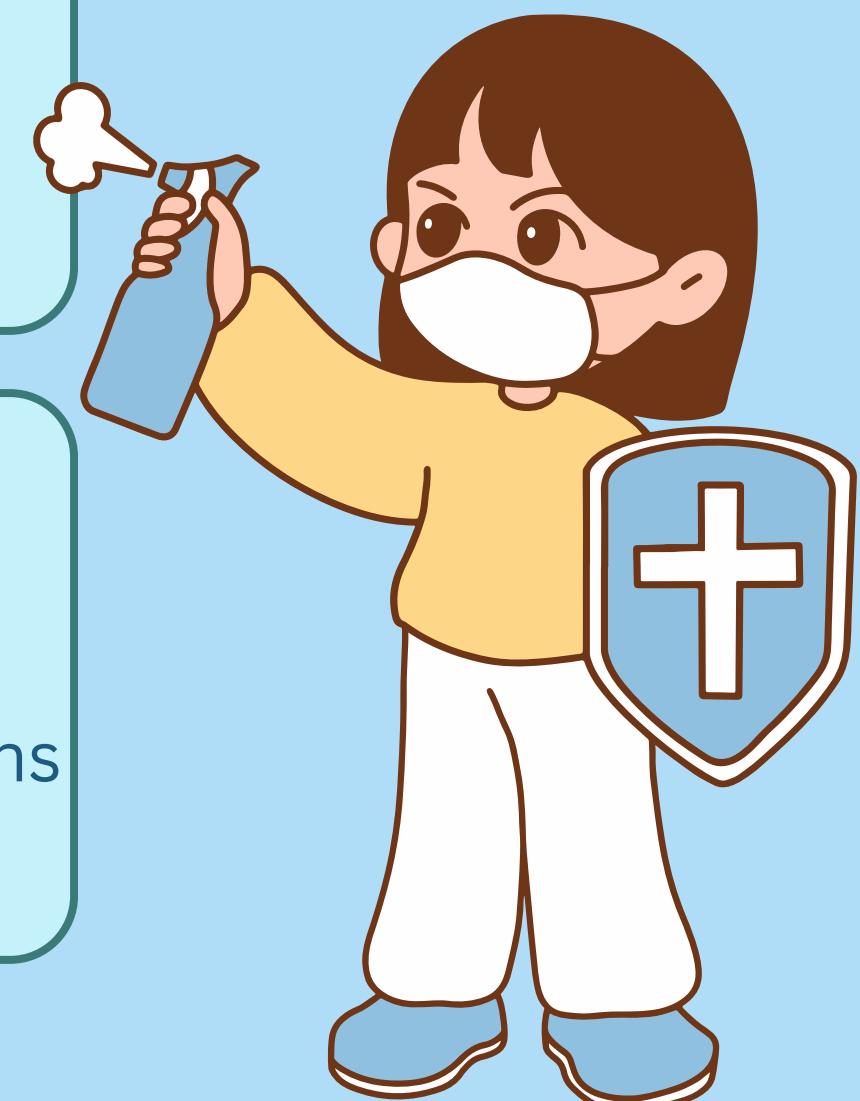
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# Introduction

- Seasonal flu (influenza) is an acute respiratory infection caused by influenza viruses which circulate in all parts of the world.
- Most people with the flu get better on their own. But flu and its complications can be deadly.
- The seasonal flu vaccine can help protect against the H1N1 flu and other seasonal flu viruses.



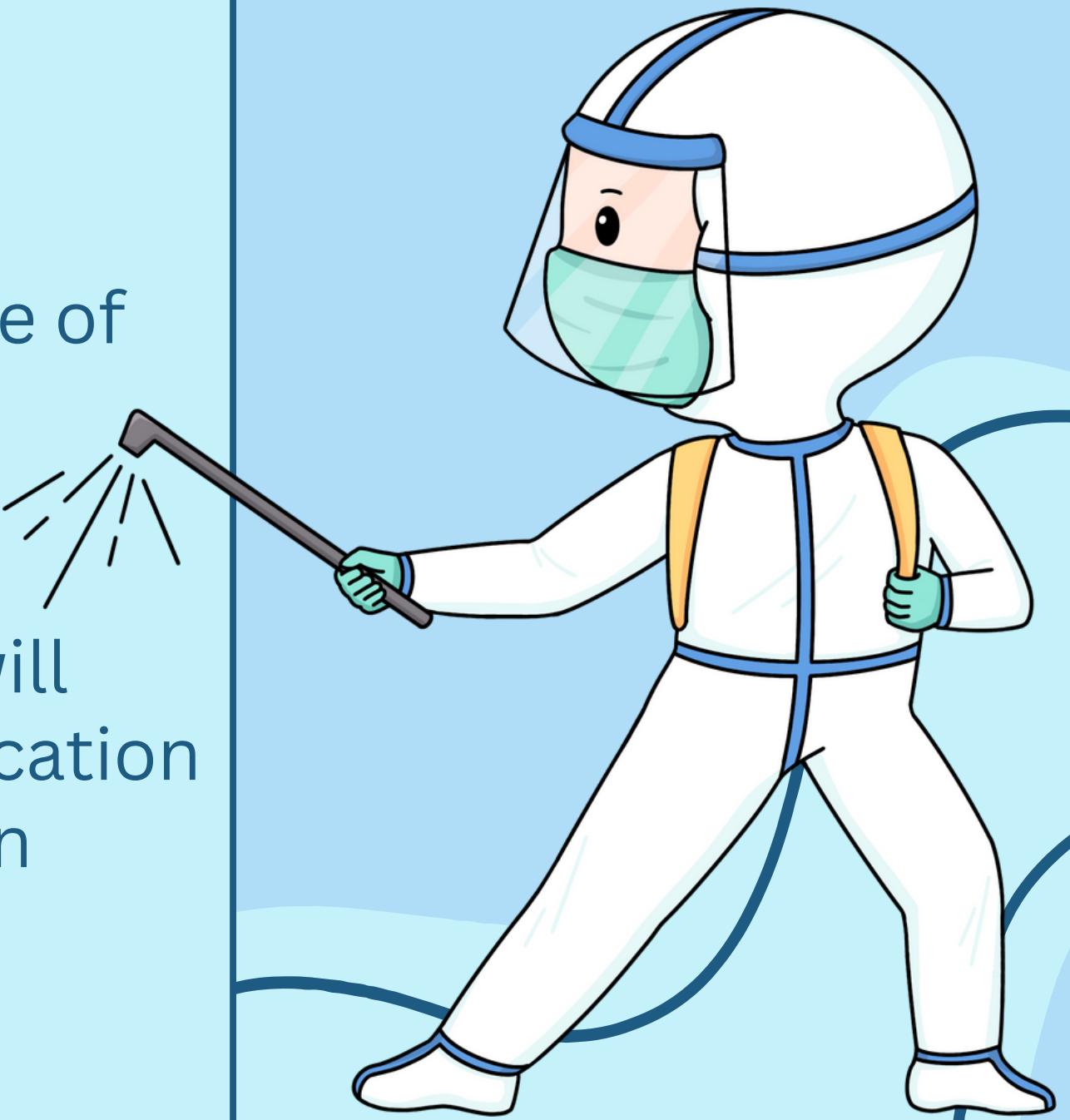


# Introduction

- Despite the success of immunization in saving lives globally, a significant challenge persists: vaccine hesitancy.
- It is influenced by various factors such as religious beliefs, personal philosophies, safety concerns, and inadequate information.
- This reluctance undermines public health efforts to control preventable diseases.

# Problem Statement

- This project aims to develop a predictive model capable of forecasting vaccine uptake by analyzing an individual's background information and behavioral patterns.
- Understanding the reasons behind vaccine hesitancy will better enable healthcare personnel to provide the education that individuals need to make responsible immunization choices.



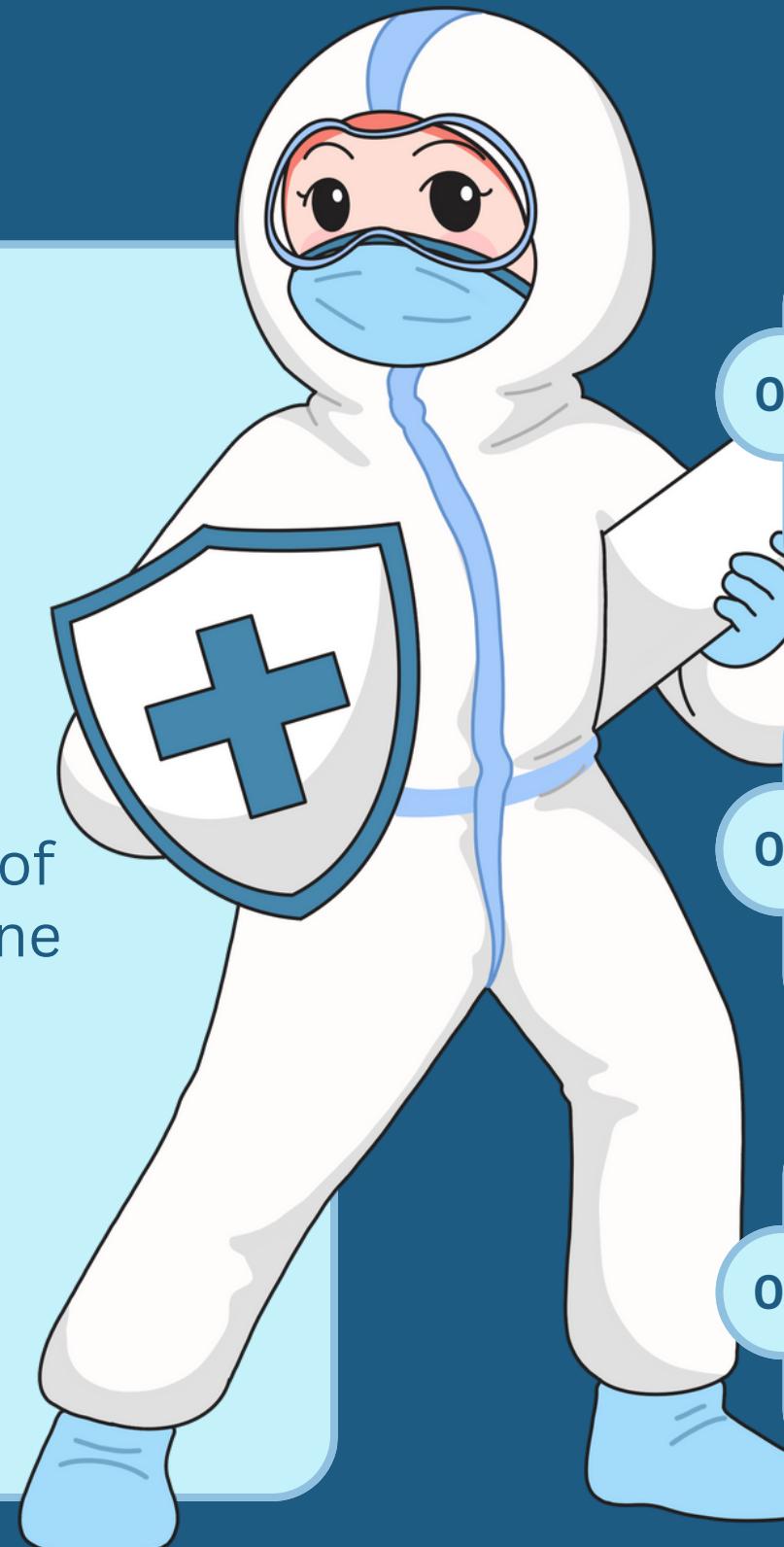
# Project objectives

Main objective:

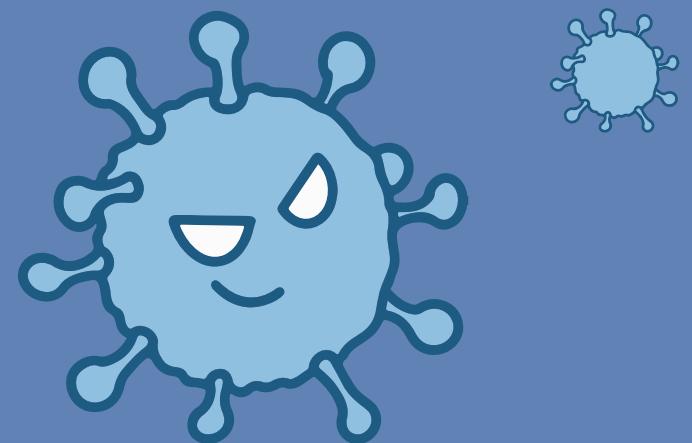
To develop a model capable of predicting seasonal flu vaccine uptake by analyzing an individual's information and behavioral patterns.

## Specific objectives:

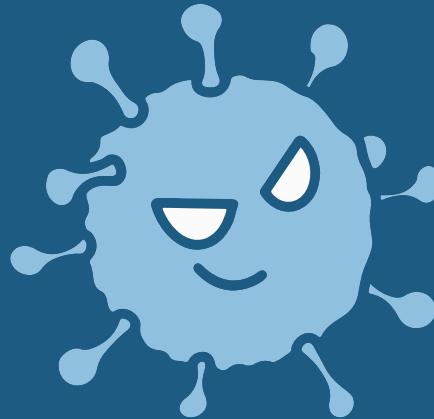
- 01 Identify key factors that influence individuals' decisions regarding vaccine uptake.
- 02 Develop a model capable of forecasting whether or not an individual will take the vaccine based on collected data.
- 03 Evaluate the performance of the predictive model and validate its accuracy.



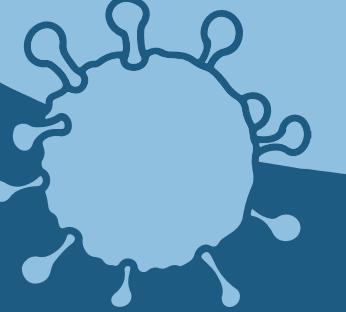
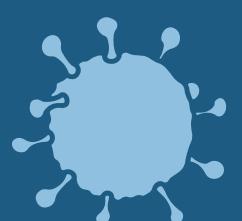
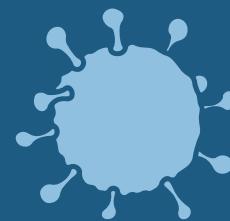
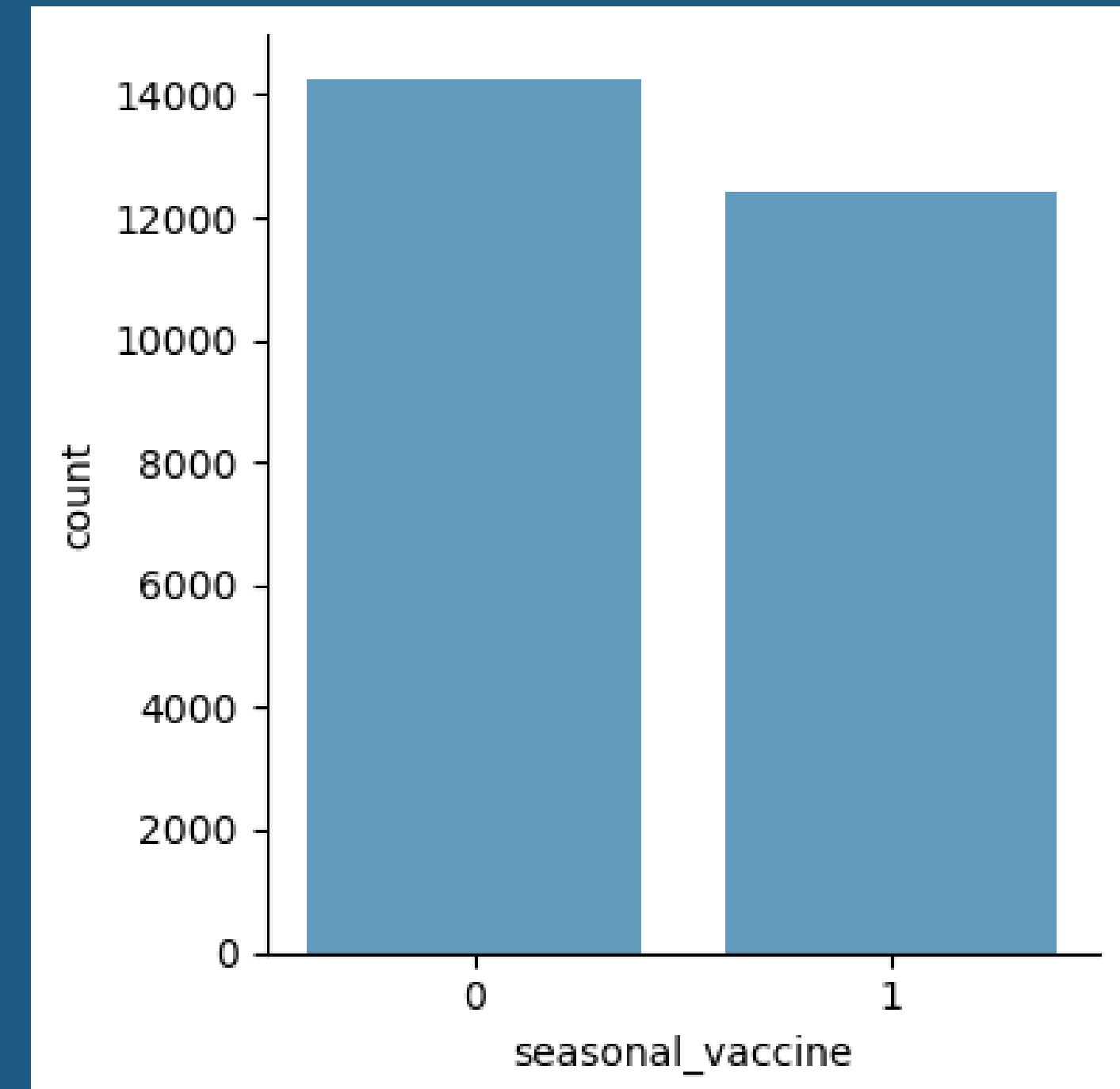
# EXPLORATORY DATA ANALYSIS



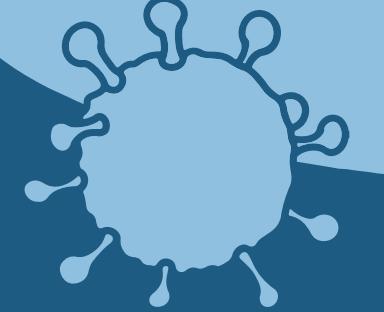
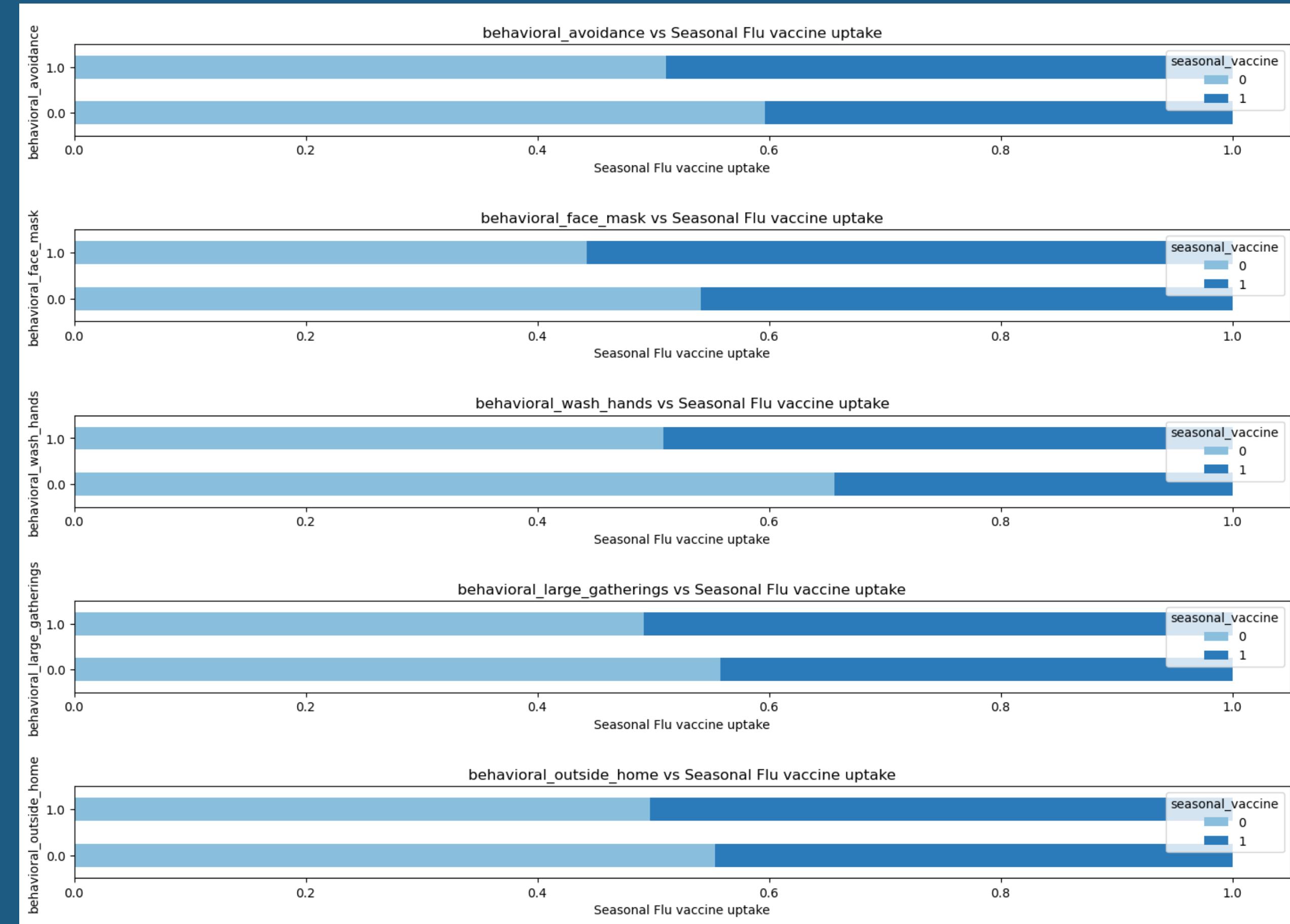
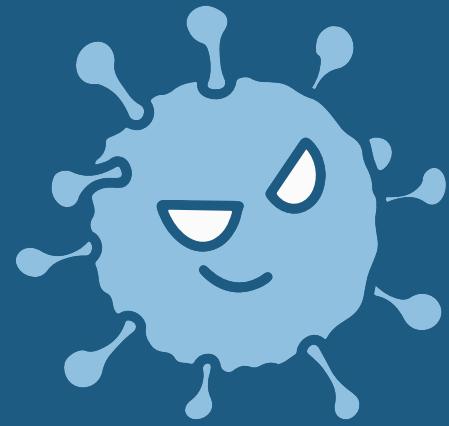
# Vaccination status of the respondents



Individuals who got vaccinated were slightly less than those who did not get vaccinated.

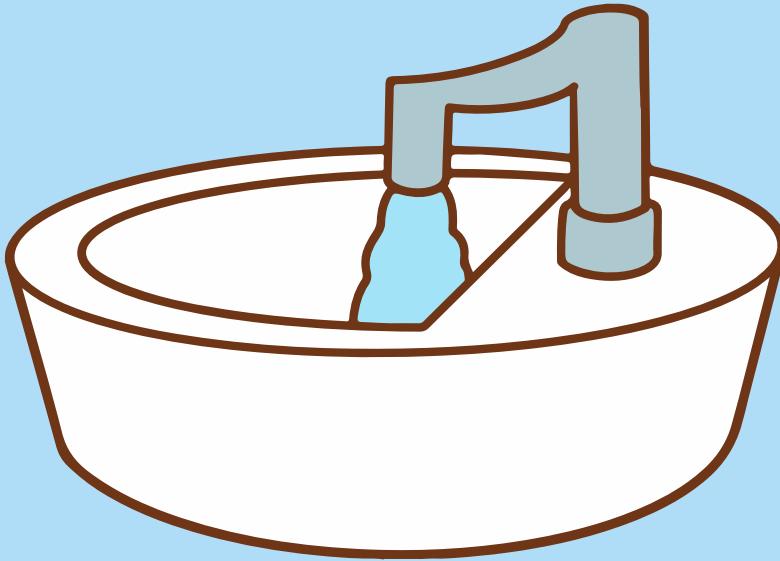


# Do behavioral factors affect vaccine uptake?

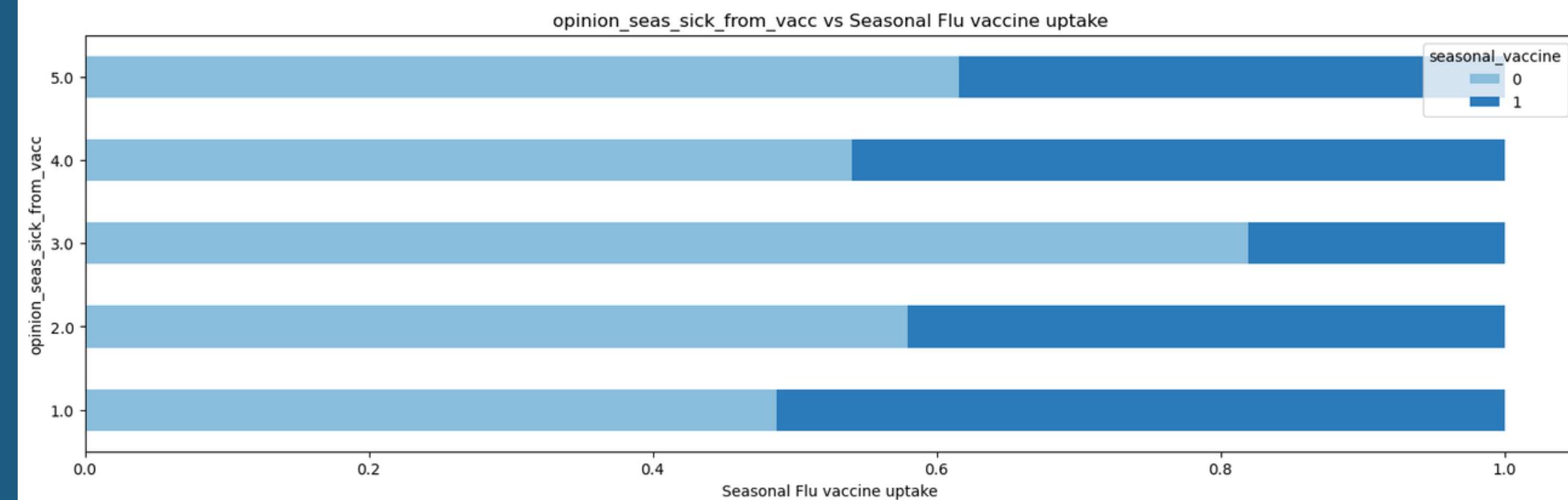
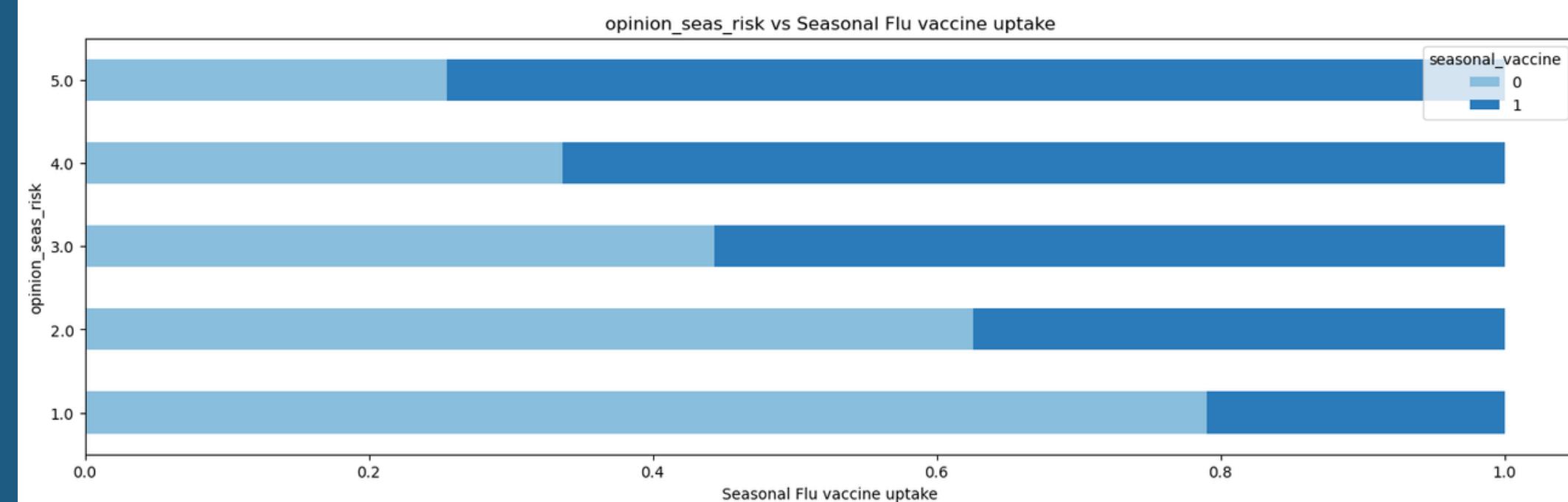
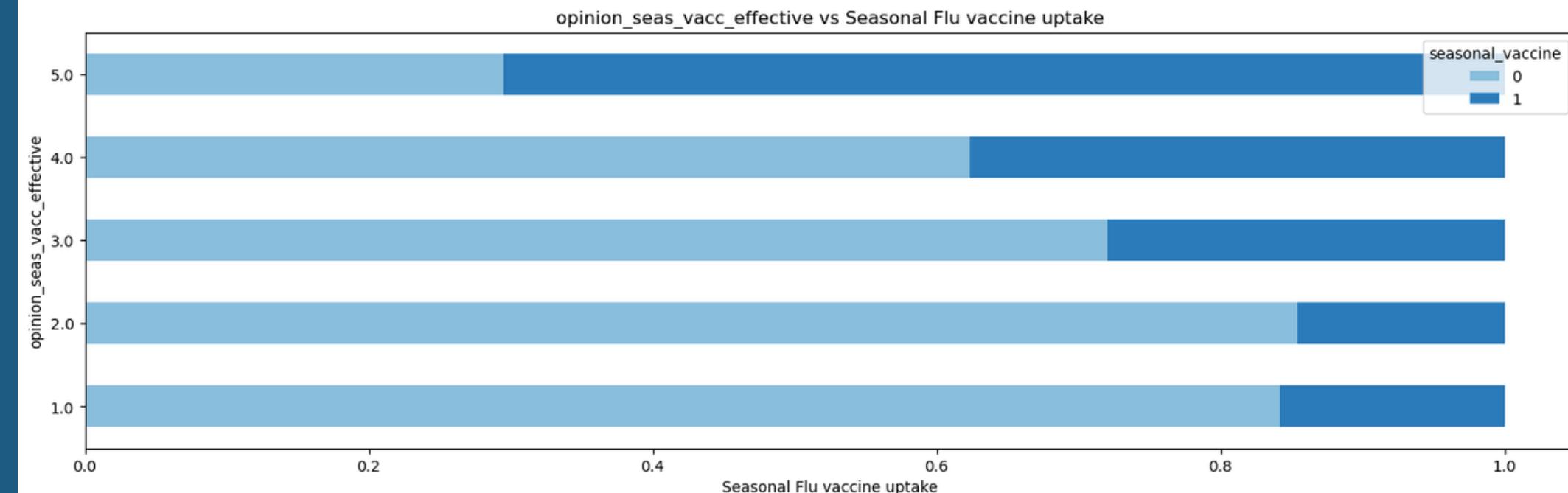
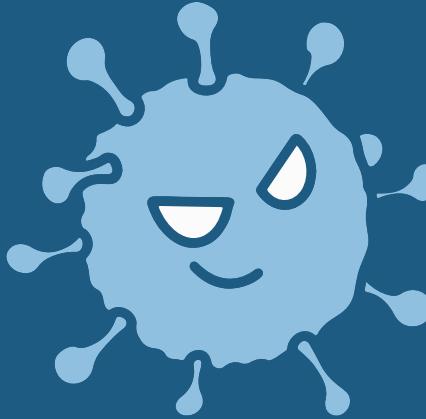


## FINDINGS:

- Majority of individuals that were not vaccinated also reported not following the preventative guidelines buying face masks.
- Around half of the vaccinated individuals were following the preventative measures.

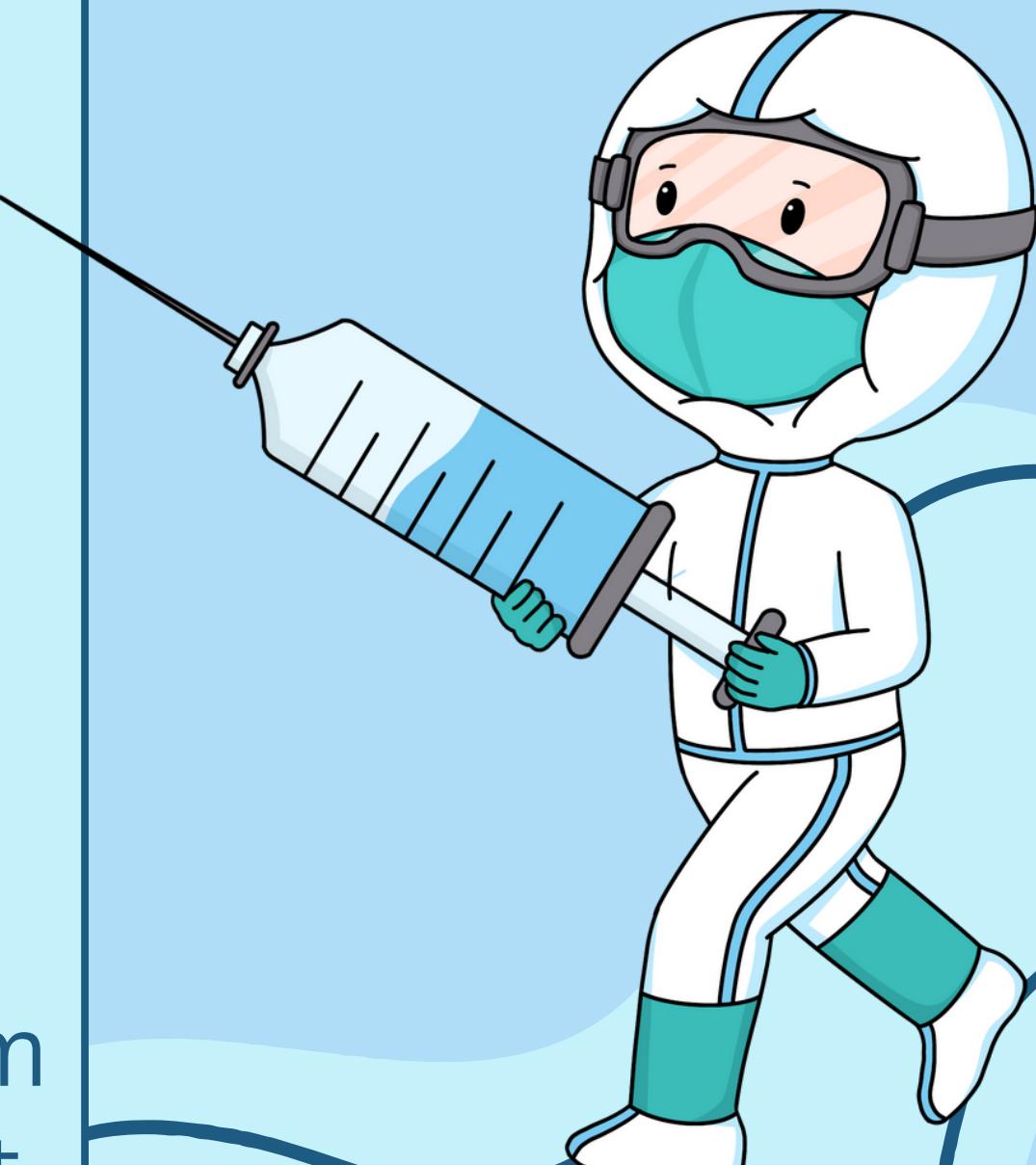


# Did Individual's opinions about the vaccine affect vaccine uptake?

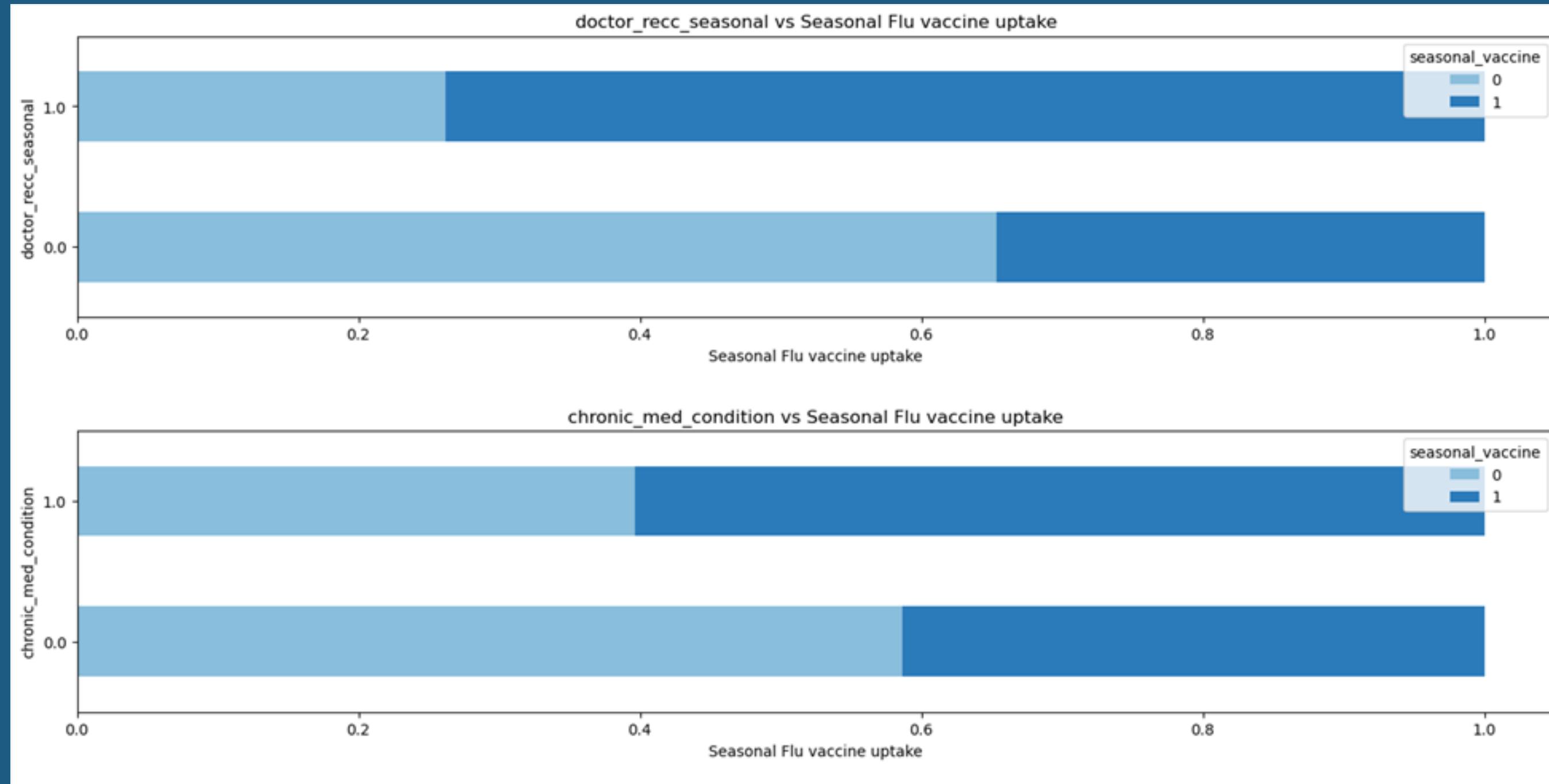


# FINDINGS:

- Most respondents who believe the vaccine to be very effective were vaccinated.
- Most respondents who thought that the risk of getting sick with seasonal flu without vaccine was very high were vaccinated.
- Most respondents who's worry of getting sick from taking seasonal flu vaccine was very high were not vaccinated.



# Did health factors affect vaccine uptake?

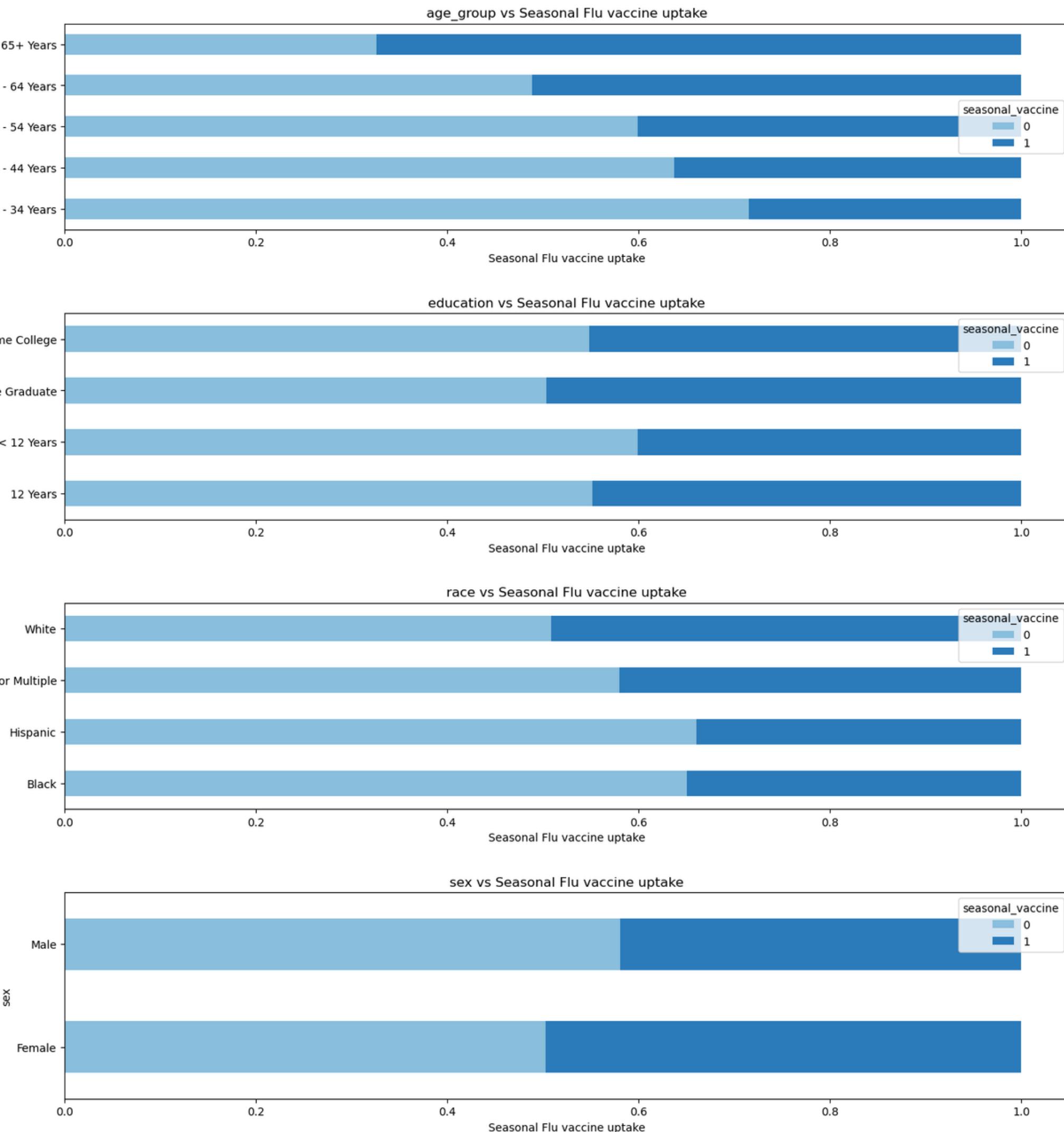


# FINDINGS:

- More individuals to whom the seasonal flu vaccine was recommended by a doctor were vaccinated.
- More individuals with chronic medical conditions were vaccinated.



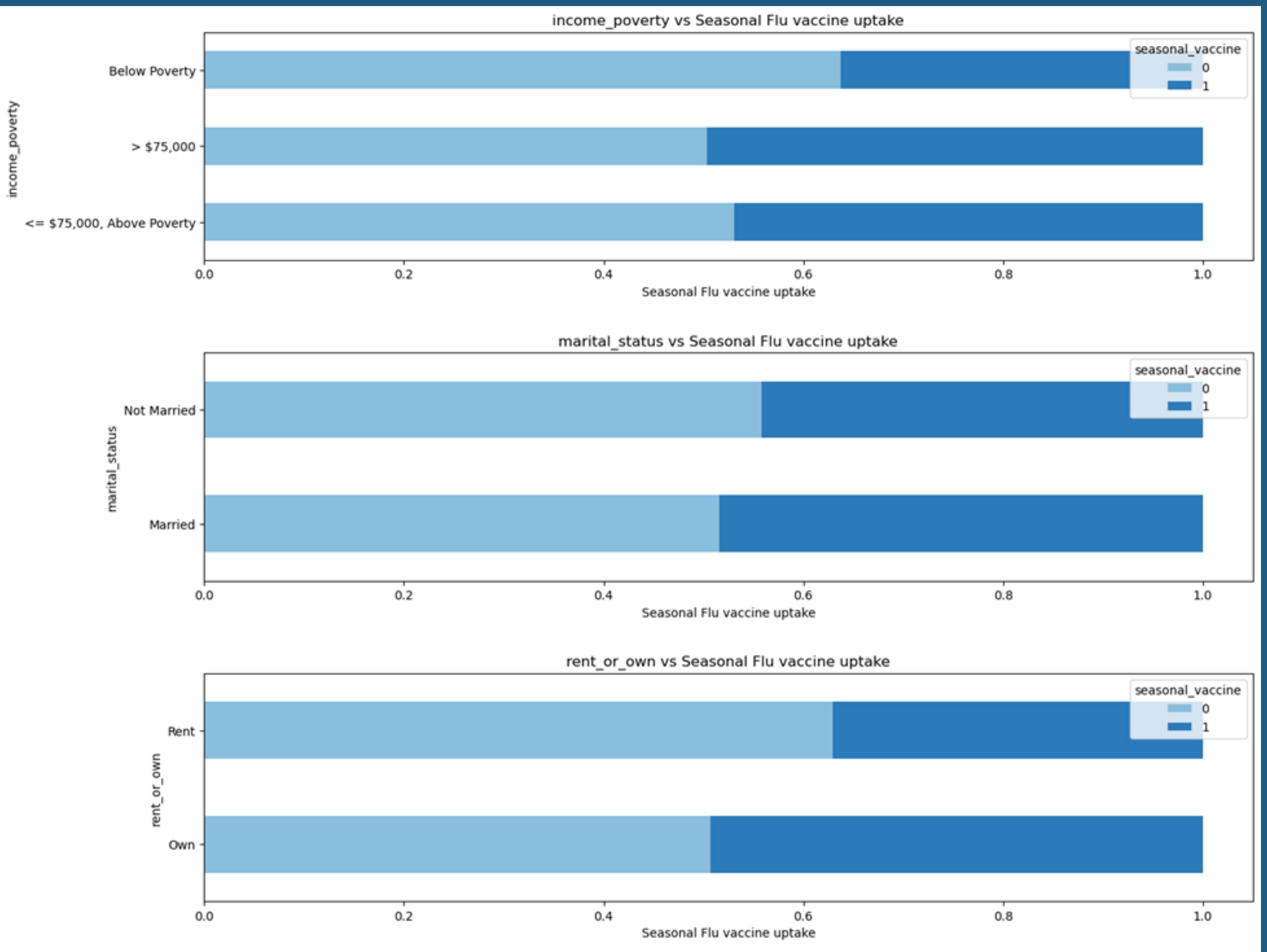
# Did demographical factors affect vaccine uptake?



## FINDINGS:

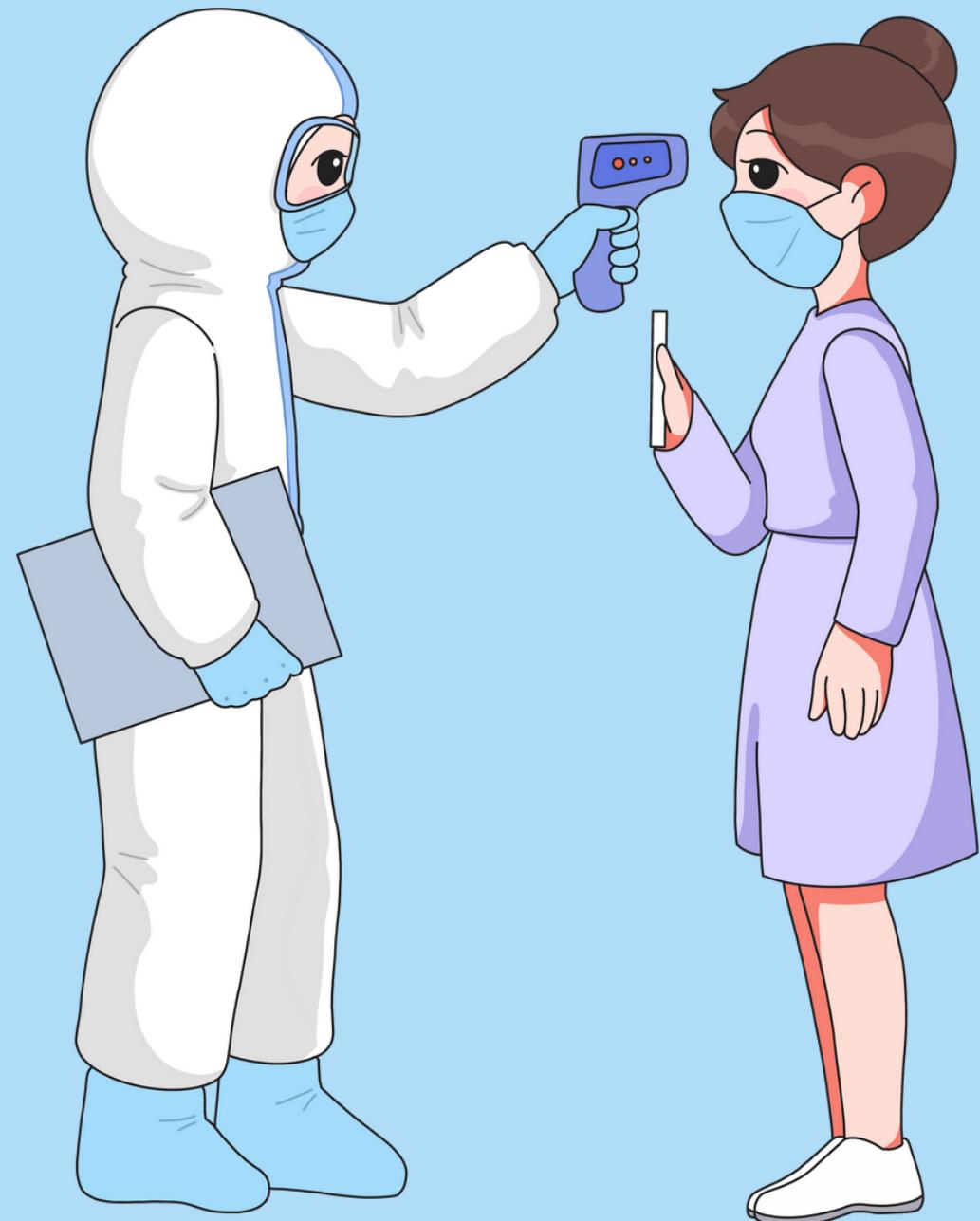
- More individuals of 65 years and above were vaccinated. As the age decreased, the number of vaccinated individuals also decreased.
- As the level of education decreased, the number of vaccinated individuals also decreased.
- More respondents of the female gender were vaccinated as compared to the male gender.



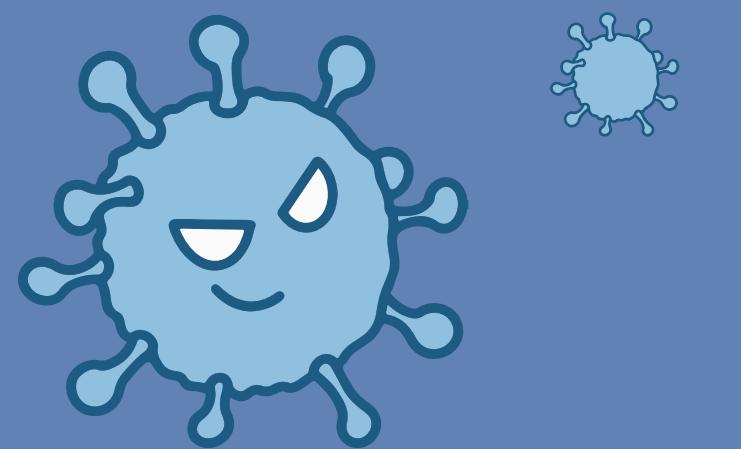


## FINDINGS:

- More individuals with a higher annual income were vaccinated.
- More married respondents were vaccinated as compared to the not married.
- More respondents who own their home were vaccinated as compared to those who rent.



# MODELLING



# MODELS USED:

- Logistic Regression
- Decision Tree Classifier
- Random Forest Classifier
- Naive Bayes Model
- Gradient Boosting Model

# LOGISTIC REGRESSION

- This was the baseline model.
- It had an accuracy of 74.36%.
- After Feature Selection, the accuracy improved to 77.25%

# DECISION TREE CLASSIFIER

- This model had an accuracy of 72.15%.
- The model was performing better on training data than on testing data so a Random Forest was built next to improve the performance.

# RANDOM FOREST CLASSIFIER

- This model had an accuracy of 74.45%.
- After tuning, the accuracy changed to 77.17% .
- Tuning balanced out the performance of the model in training and testing data.

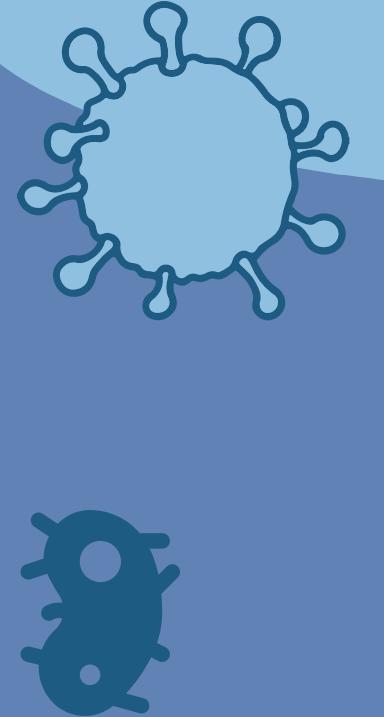
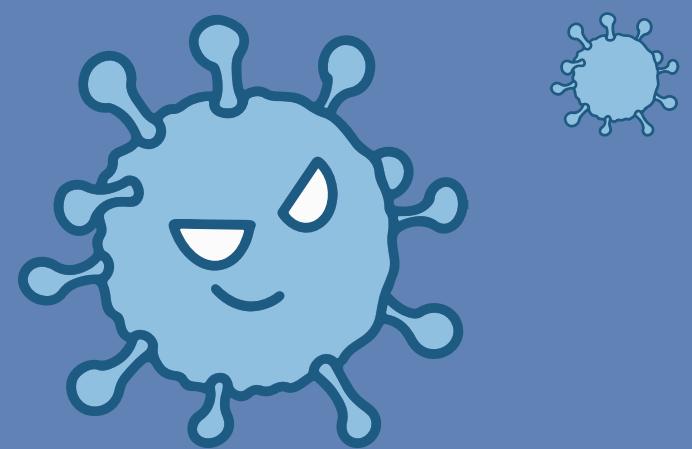
# NAIVE BAYES MODEL

- This model had an accuracy of 75.26%.
- It is a simple model with decent performance but might not capture complex relationships well.

# GRADIENT BOOSTING CLASSIFIER

- This model had an accuracy of 77.67%.
- After tuning, the accuracy changed to 77.13% .

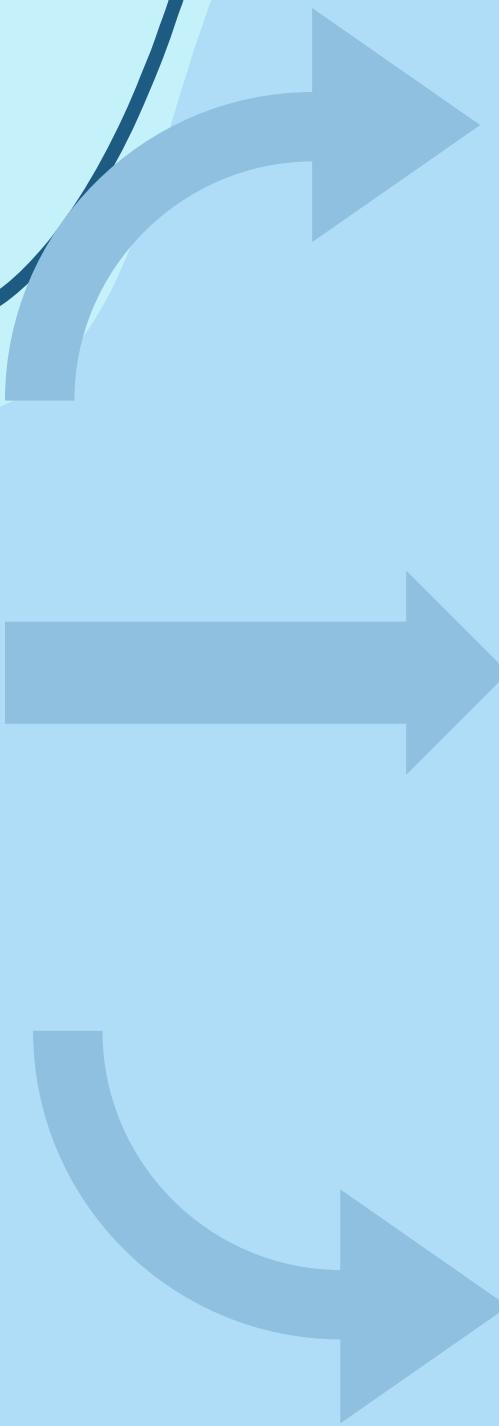
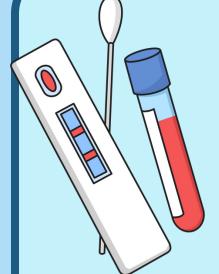
# EVALUATION



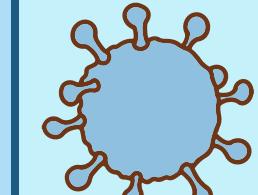
- The Random Forest after Hyperparameter Tuning Model was chosen as the final model as it performed best on both the training and testing data .
- The accuracy of the Baseline Model was improved from 74.36% to 77.17% .
- The final model can accurately predict whether an individual got the flu vaccine 77% of the time.

# RECOMMENDATION



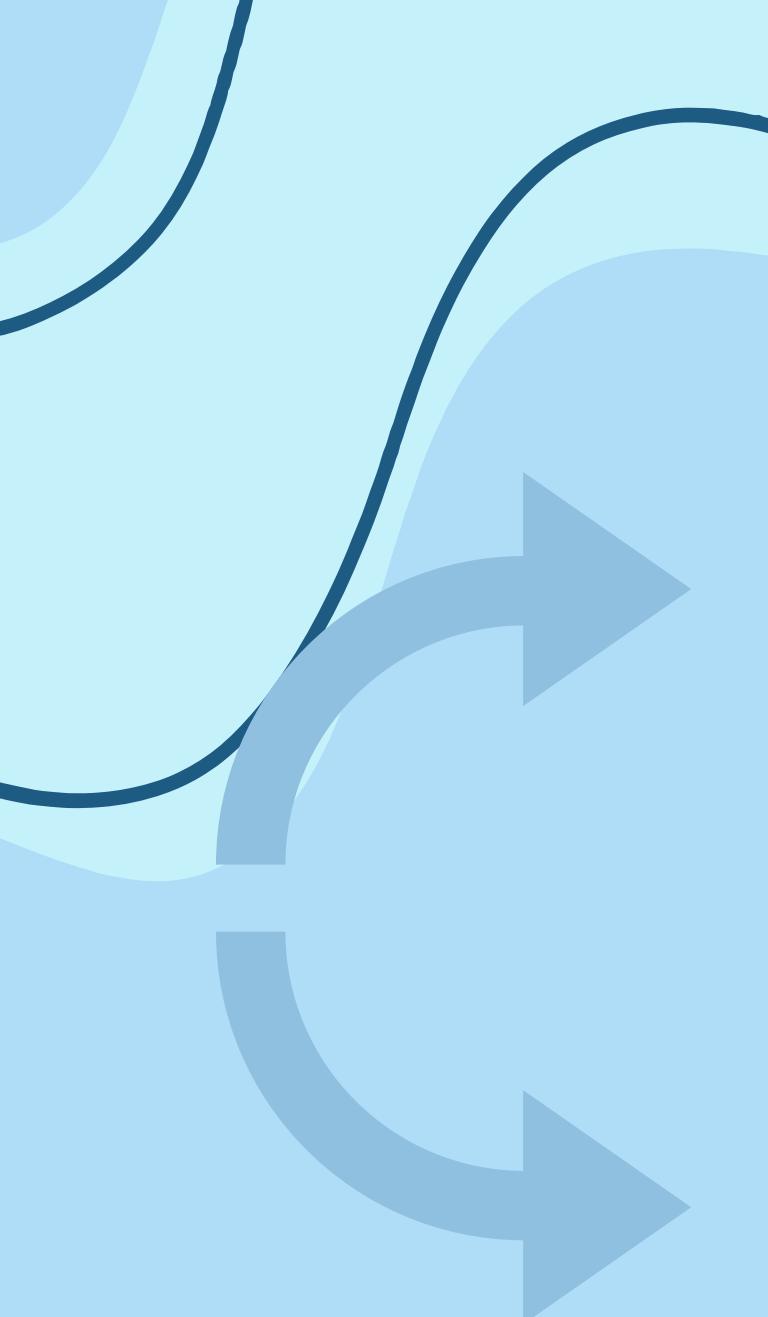
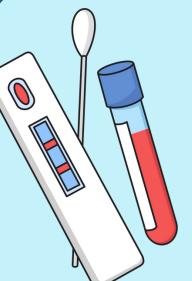
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Focus on educating the public about the importance of following preventative guidelines like wearing face masks, especially for those who are hesitant about getting vaccinated.
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Encourage healthcare providers to recommend the flu vaccine to their patients, as individuals are more likely to get vaccinated when it is recommended by a doctor.
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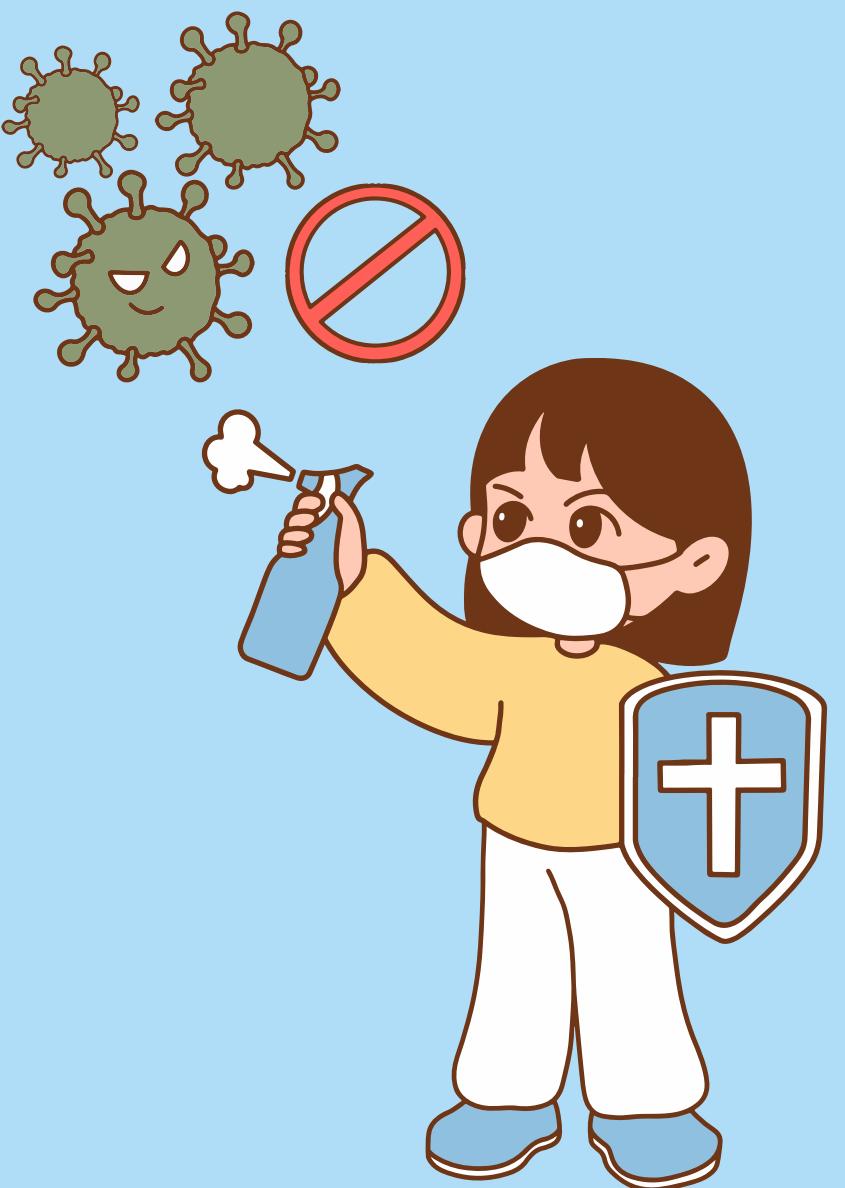
Tailor outreach efforts to demographic groups that are less likely to be vaccinated, such as younger individuals and those with lower levels of education.

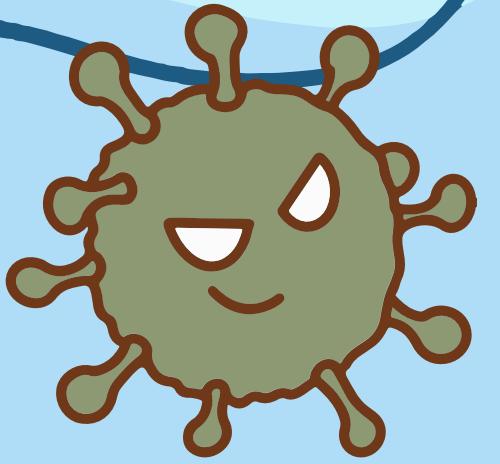


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Ensure that cost is not a barrier to vaccination by offering free or low-cost vaccination clinics, particularly for individuals with lower incomes.
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Highlight the Safety and effectiveness of the flu vaccine in preventing illness and emphasize the risks associated with not getting vaccinated.





**THANK YOU**