Predicting H1N1 Vaccination Status

Understanding factors related to vaccination patterns

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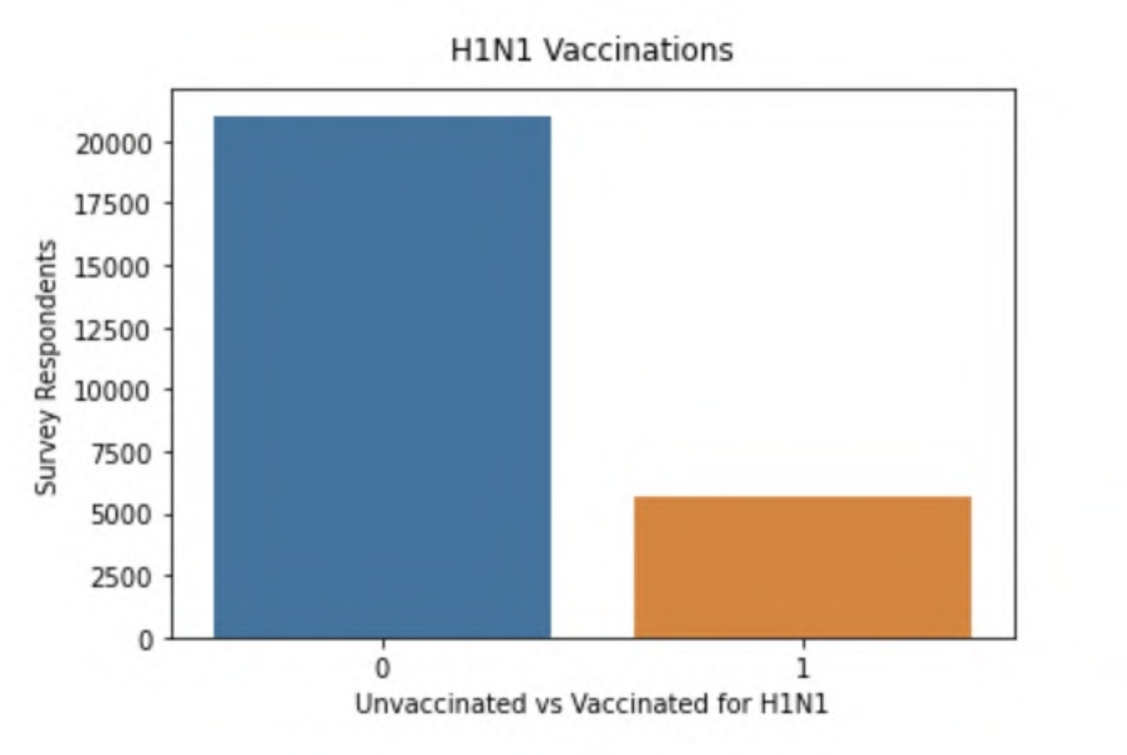
Background

According to Duke Global Health Institute, the probability of a pandemic with similar impact to COVID-19 is about 2% in any given year, and is predicted to grow three-fold in the next few decades.

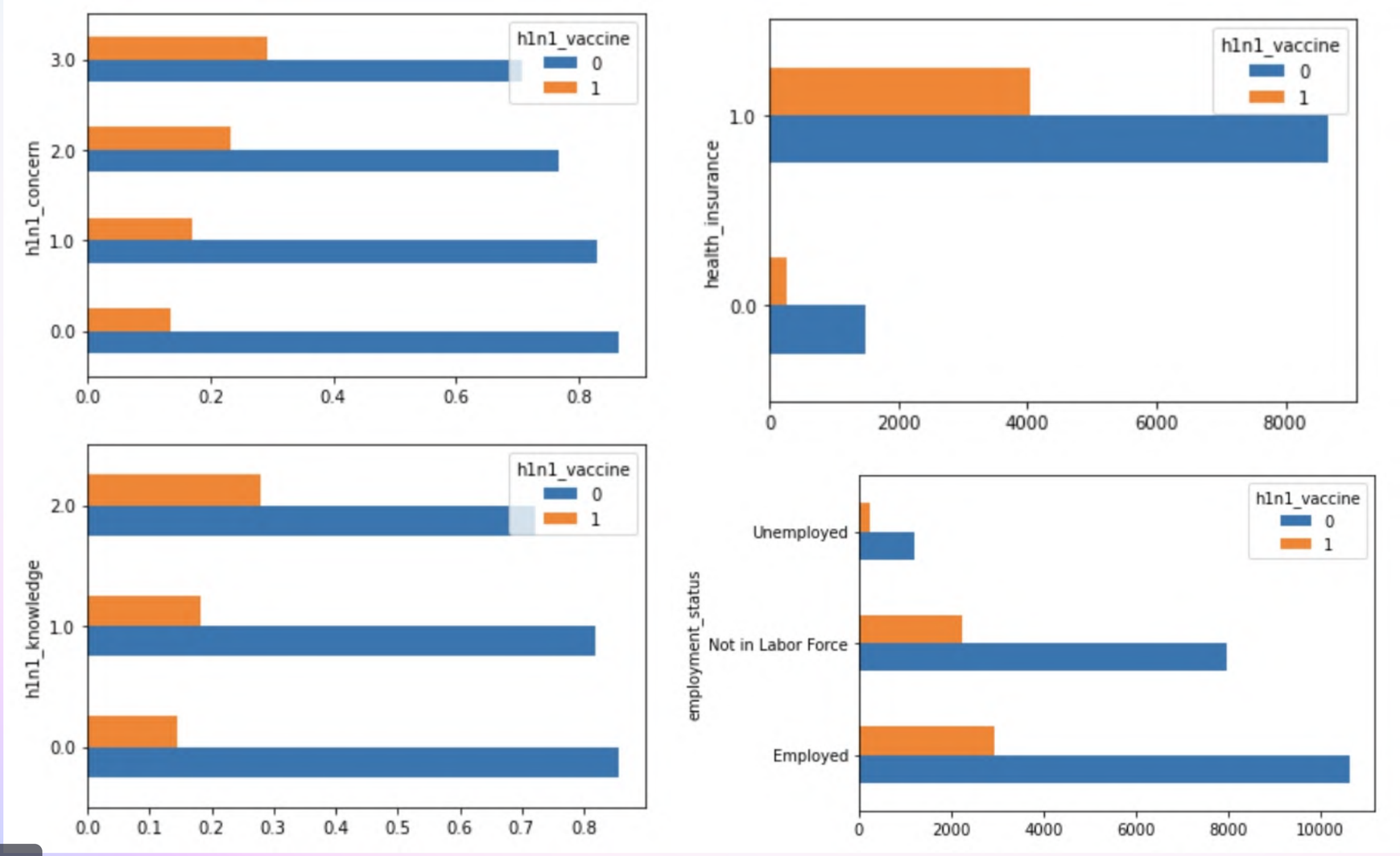
To help the New York State Department of Health best prepare future targeted vaccination campaigns, I used predictive modeling to explore what population factors have the strongest relationship with vaccination status.

Data Source



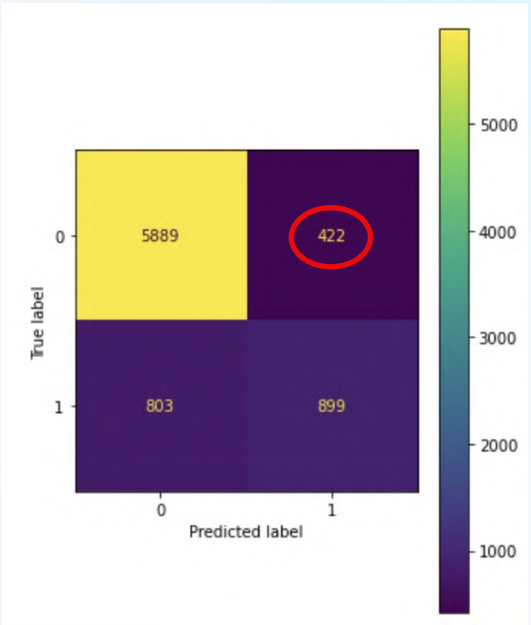
- The analysis relies on data from the H1N1 Flu Survey conducted by the National Center for Health Statistics (NCHS).
- The survey asked 26,700 respondents about their demographics, behaviors and opinions to monitor influenza immunization coverage for H1N1.
- Only around 20% of all respondents have received the H1N1 vaccine.

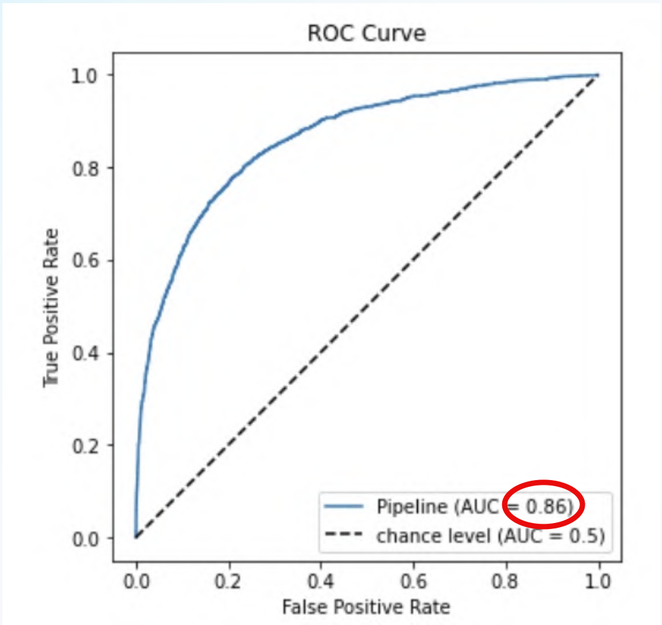
Exploratory Data Analysis



- EDA showed that individuals that had more knowledge regarding H1N1 and those with more concern towards it were far more likely to receive the vaccine.
- Those with health insurance were also significantly more likely to have received the H1N1 vaccine.
- Furthermore, employed individuals were more likely to be vaccinated compared to unemployed individuals and those not in the labor force.

Final Model

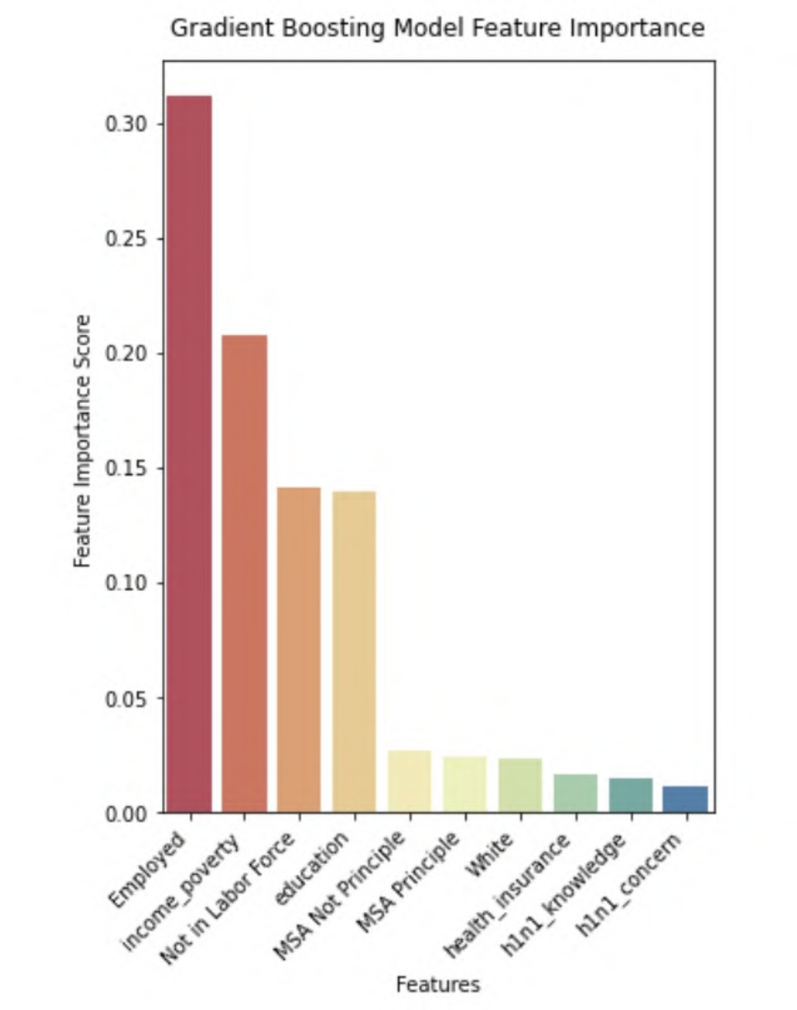




- The model with the best ROC-AUC curve was a Gradient Boosting Model with tuned hyperparameters and oversampling of the minority class using SMOTE.
- With each iteration the models aimed to maximize the ROC-AUC curve and Precision scores.
- Final Model AUC 86% / Precision Score 88%-68%

	precision	recall	f1-score	support
0	0.88	0.93	0.91	6311
1	0.68	0.53	0.59	1702
accuracy			0.85	8013
macro avg	0.78	0.73	0.75	8013
weighted avg	0.84	0.85	0.84	8013

Top Predictive Factors



- Employment Status
- Income Level
- Education Level
- MSA
- Health Insurance
- H1N1 Knowledge
- H1N1 Concern

Recommendations

 # 1 Gear future information campaigns and provide affordable access to vaccines for individuals from the following demographic groups:

- Unemployed Individuals
- Income below $75,000
- No college degree
- Non-MSA Resident
- No Health Insurance

#2 Increase awareness about the risks of future virus's and effectiveness of vaccines to increase knowledge of the virus and level of concern surrounding the virus.

Questions?

PRESENTER

Bianna Gas

GITHUB

https://github.com/biannagas/Phase-3-Project