

Prediction Tool and Target Information for Moderna's Dual Purpose COVID-Flu Vaccine

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Presentation Outline

- Business Problem
- Data
- Models
- Predictions
- Recommendations
- Next Steps

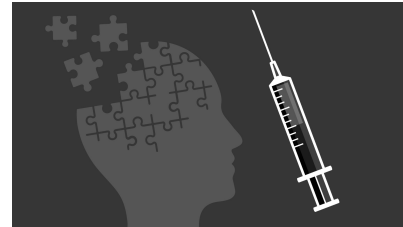


Business Problem

What factors lead to a person being vaccinated or unvaccinated



Combined Seasonal
Flu & Covid vaccine



Only useful if people
are vaccinated

Business Solution

Predict who will be: **VACCINATED** and **UNVACCINATED**



VACCINATED

- Follow-up reminder



UNVACCINATED

- Persuade based on the most important variables indicated by Machine Learning model



**U.S. Department of
Health and Human Services**
Centers for Disease
Control and Prevention

2009 CDC National Immunization Survey

- Year when new respiratory virus (H1N1) with seasonal flu
- Similar to current flu / covid environment



- 26,707 adult respondents



- Vaccination status
- Opinions
- economic status
- demographics

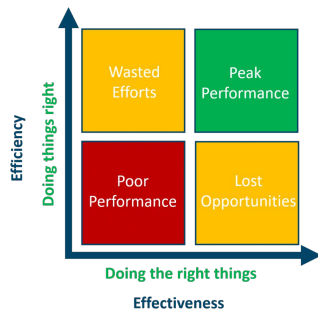


- Yes / No
- Scale (1-5)
- Refuse or No Response

Important variables for prediction



Access to
healthcare



Opinion on
vaccine
effectiveness



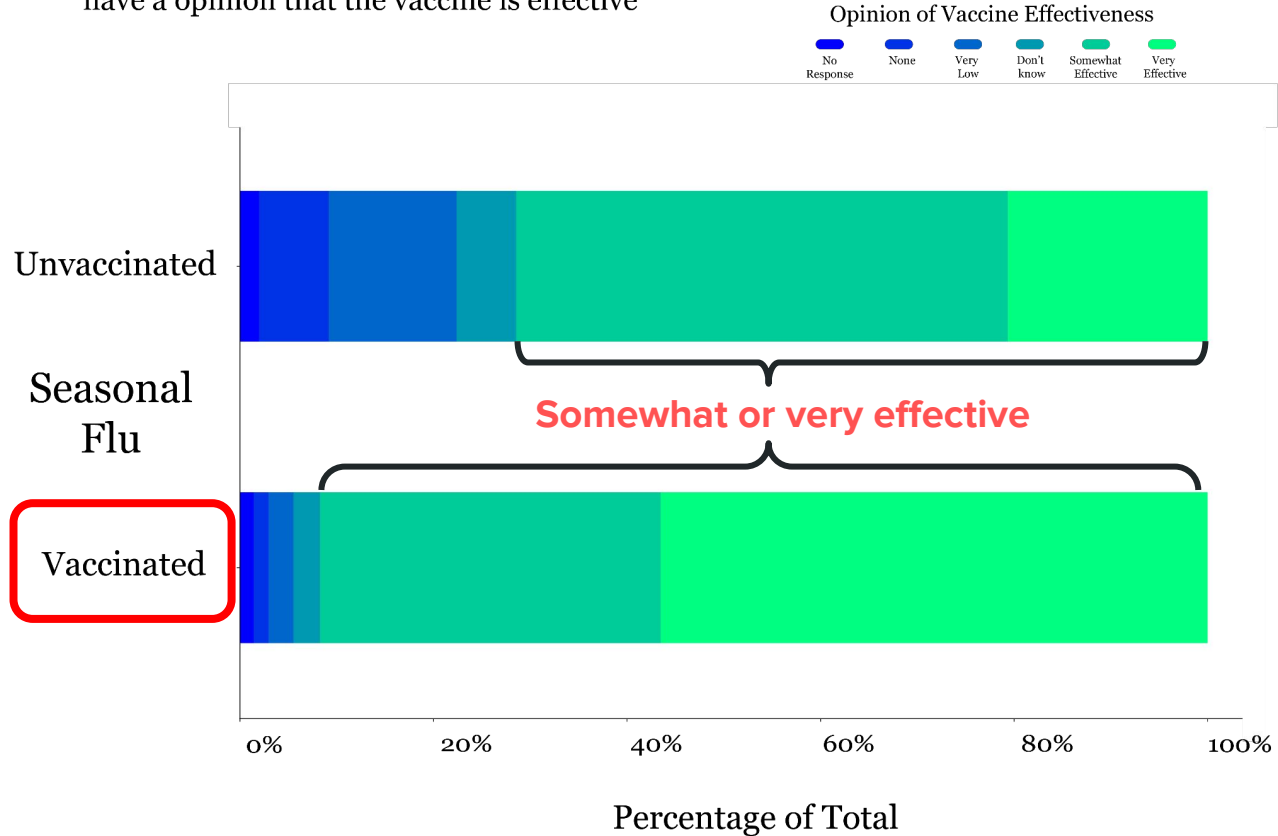
Opinion on
risk of
infection



Age group

Vaccination Status and Opinion of Vaccine Effectiveness

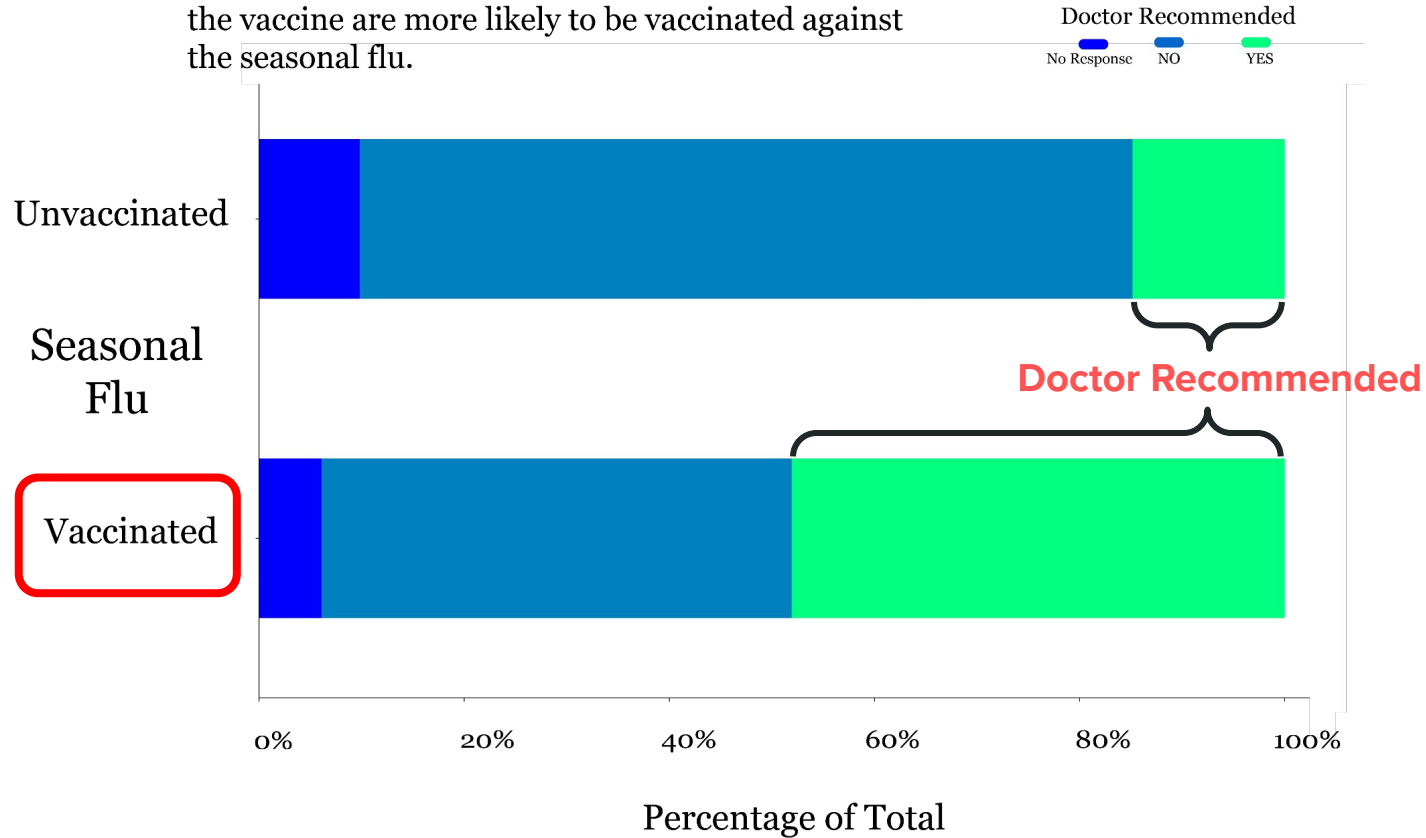
People that are vaccinated are more likely to have a opinion that the vaccine is effective



Source: CDC | Kevin Spring

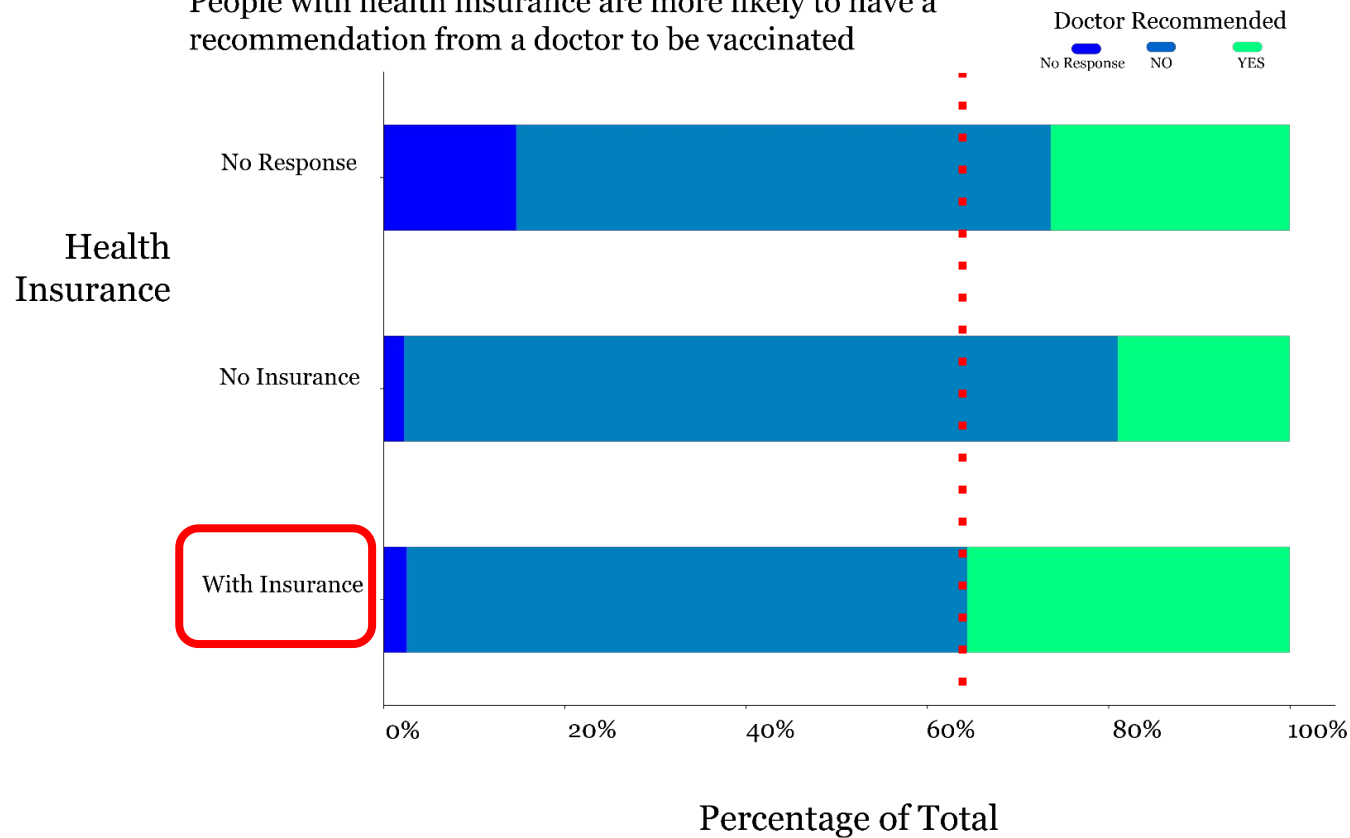
Vaccination Status and Doctor Recommendation

People that have a recommendation from a doctor to get the vaccine are more likely to be vaccinated against the seasonal flu.



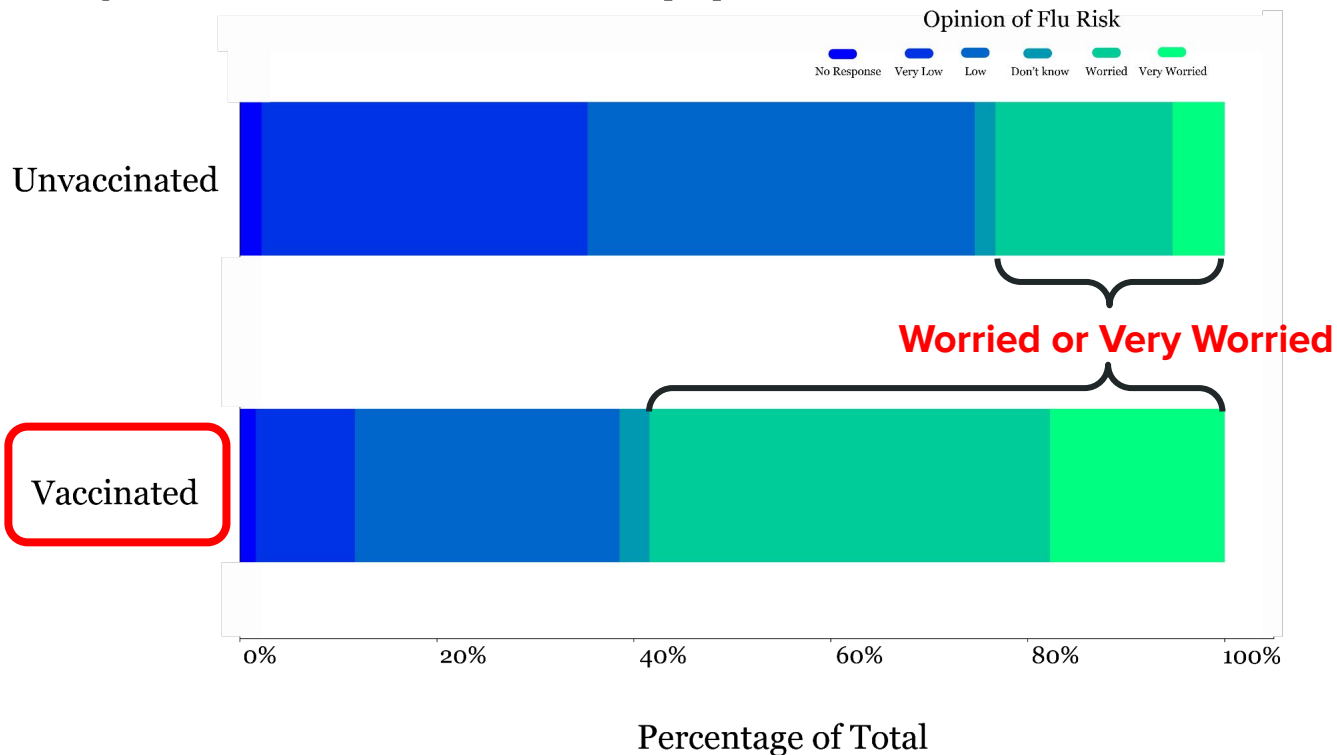
Vaccination Status and Access to Health Insurance

People with health insurance are more likely to have a recommendation from a doctor to be vaccinated



Opinion of Flu Risk and Vaccination Status

People that are vaccinated are more worried about the negative effects of the flu than unvaccinated people

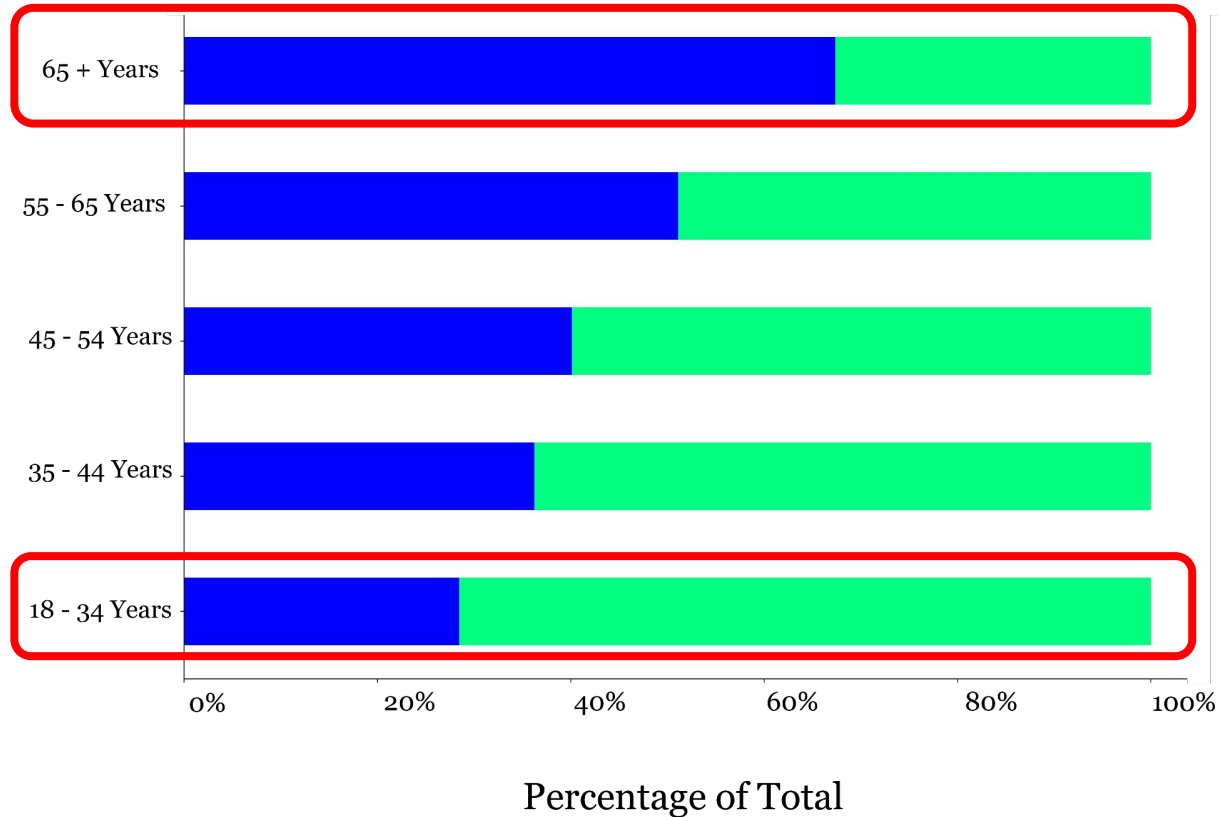


Vaccination Status by Age

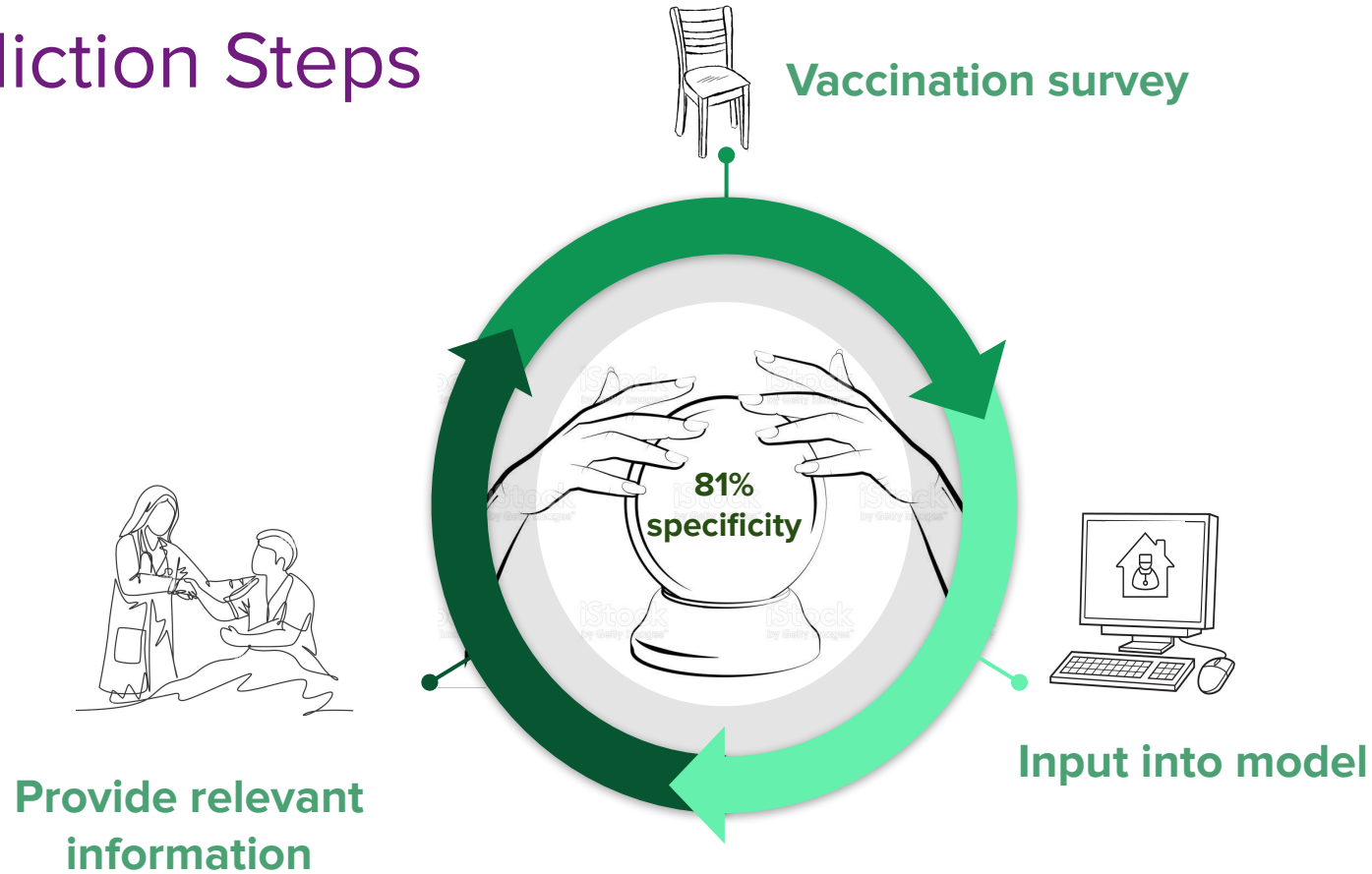
As people age they are more likely to be vaccinated against the seasonal flu.

Vaccination Status

Yes No



Prediction Steps



Recommendations



Vaccinated



Option to get the vaccine now

Model Prediction

Unvaccinated



< 55 years old

≥ 55 years old

Give information on effectiveness of vaccination

Give information based on risk of infection

Follow up on vaccination status

Thank You!

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Appendix

Important variables for prediction

Feature	Value	Importance
Opinion: Effectiveness of Seasonal Flu Vaccine	Very Effective (5)	21%
Doctor Recommend Seasonal Vaccine	Yes (1)	11%
Opinion: Risk of Seasonal Flu Infection	High (4)	7%
Opinion: Risk of Seasonal Flu Infection	Very Low (1)	7%
Age Group	18 - 34 Years	6%
Age Group	65+ Years	5%
Opinion: Effectiveness of Seasonal Flu Vaccine	Low (2)	2%
Healthcare worker	Yes (1)	2%
Opinion: Risk of Seasonal Flu Infection	Very High (5)	2%
Health Insurance	Yes (1)	2%

Examples of prediction outcomes

ID	9320 (TN)	15308 (TP)	9463 (FN)	12417 (FP)
Age	35-44 Years	65+ Years	55-64 Years	65+ Years
Gender	Female	Male	Male	Male
Children	2	0	0	0
Employed	No Response	Not Employed	Employed	Not Employed
Income	No Response	<= \$75,000	> \$75,000	<= \$75,000
Flu Risk	Low (2)	Low (2)	High (2)	Low (2)
Effectiveness	Somewhat (4)	Very Effective (5)	Low (2)	Very Effective (5)
Dr. Recommendation	Not Received (0)	Received (1)	Not Received (0)	Not Received (0)
Predicted	Not Vaccinated (0)	Vaccinated (1)	Not Vaccinated (0)	Vaccinated (1)
Actual	Not Vaccinated (0)	Vaccinated (1)	Vaccinated (1)	Not Vaccinated (0)
Rate	81%	74%	26%	18%