

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

**Kevin Spring**

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# Presentation Outline

- Business Problem
- Data
- Model Results
- Prediction Tool
- Recommendations
- Next Steps



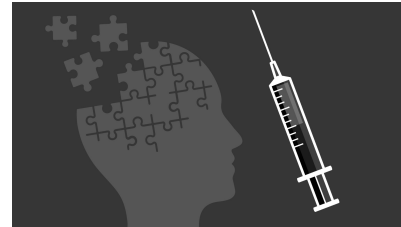
## Business Problem

*What factors lead to a person being vaccinated or unvaccinated?*

*Can we predict if someone will be vaccinated or not?*



Combined Seasonal  
Flu & Covid vaccine



Only useful if people  
are vaccinated

# Business Solution

ML model to predict who will be **VACCINATED** or **UNVACCINATED**



## VACCINATED

- Offer to get 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

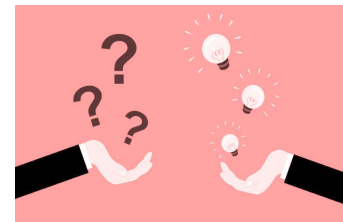
- Seasonal Flu and H1N1 virus circulating
- Similar to current Flu / COVID environment



26,707 adult  
respondents



- Vaccination status
- Opinions of risk and effectiveness
- Demographics



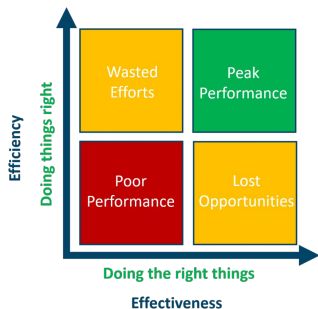
- Yes / No
- Scale (1-5)
- Refuse or No Response

# Results

## Important variables for prediction



Access to  
healthcare



Opinion on  
vaccine  
effectiveness



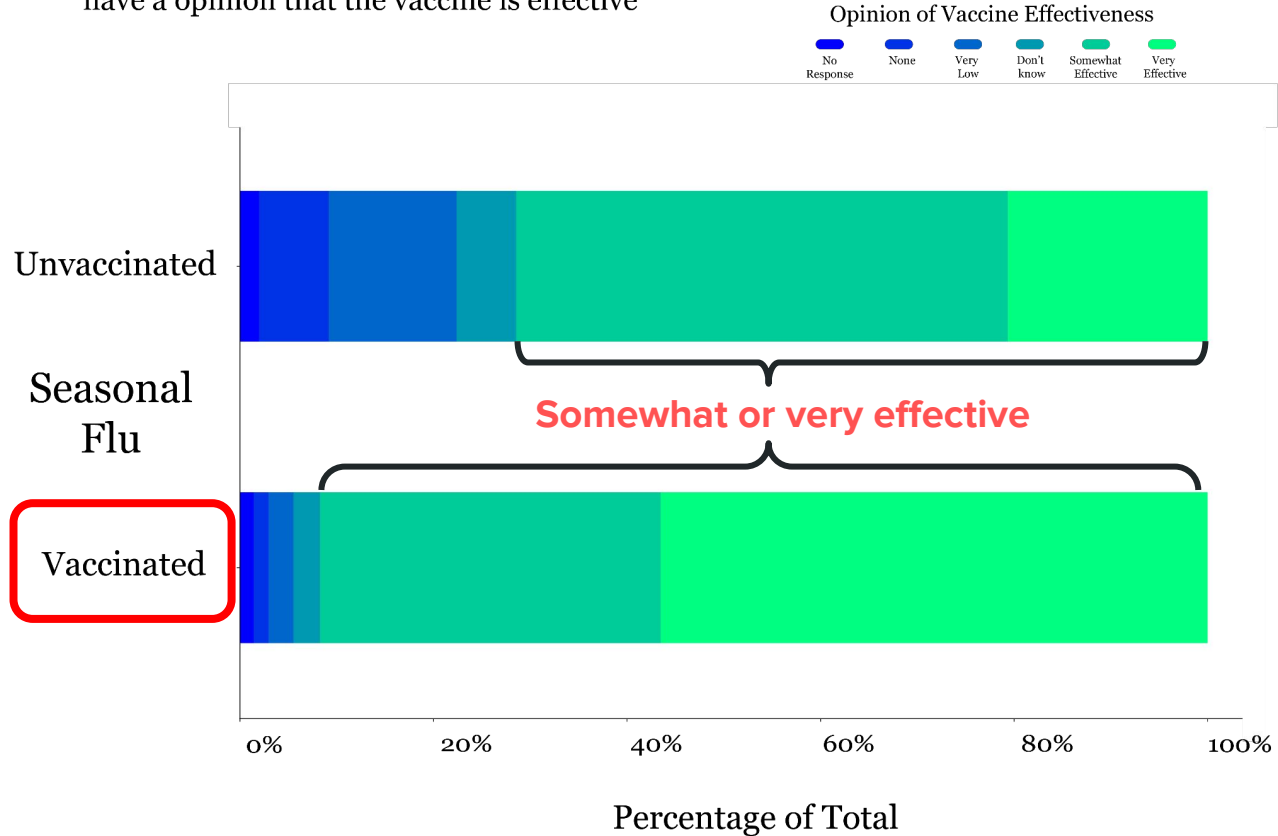
Opinion on  
risk of  
infection



Age group

# Vaccination Status and Opinion of Vaccine Effectiveness

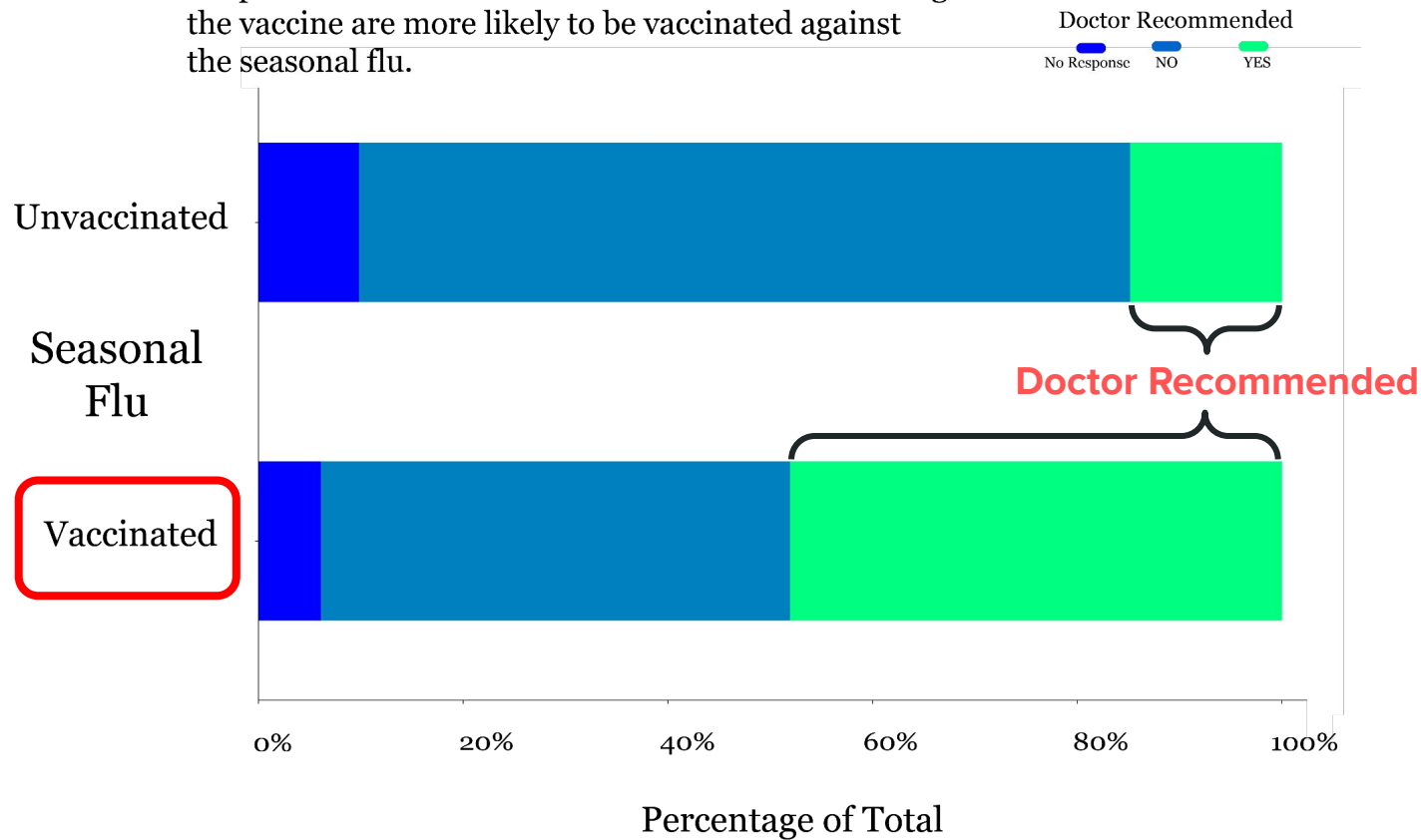
People that are vaccinated are more likely to have a opinion that the vaccine is effective



Source: CDC | Kevin Spring

# Vaccination Status and Doctor Recommendation

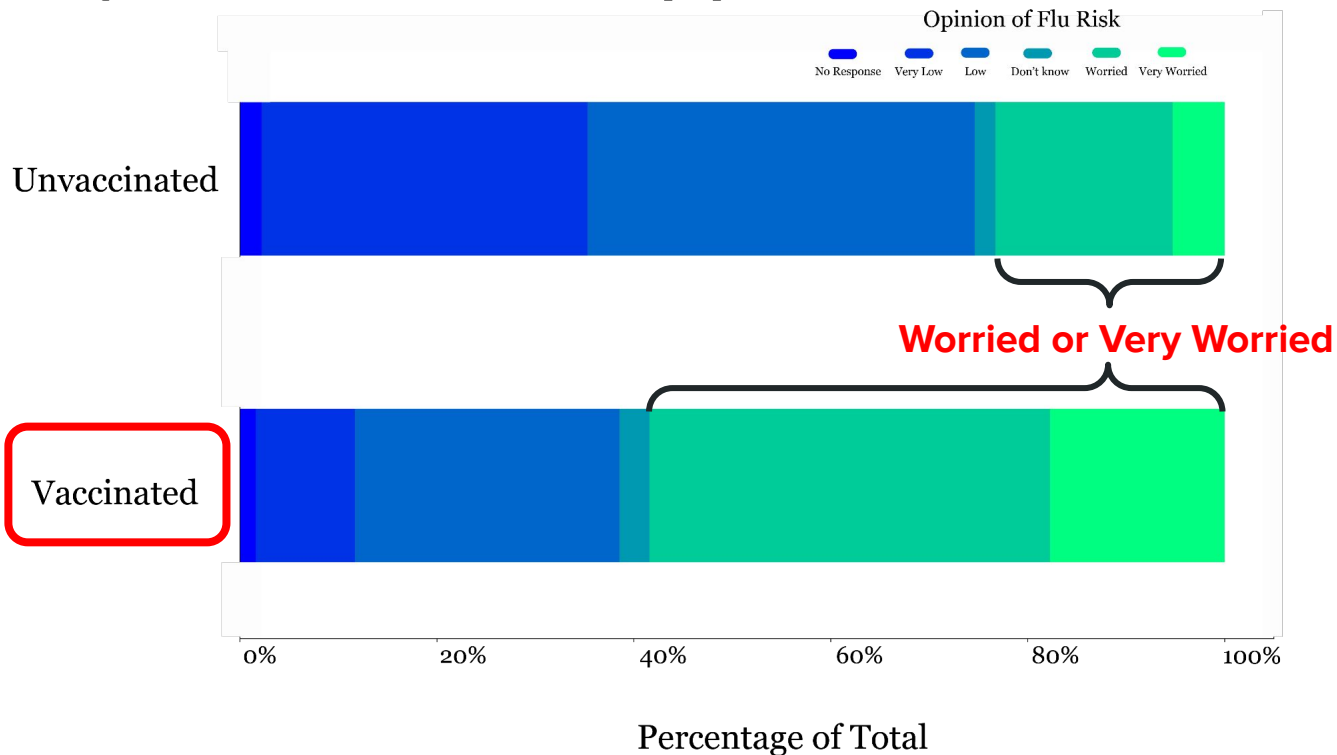
People that have a recommendation from a doctor to get the vaccine are more likely to be vaccinated against the seasonal flu.





# Opinion of Flu Risk and Vaccination Status

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

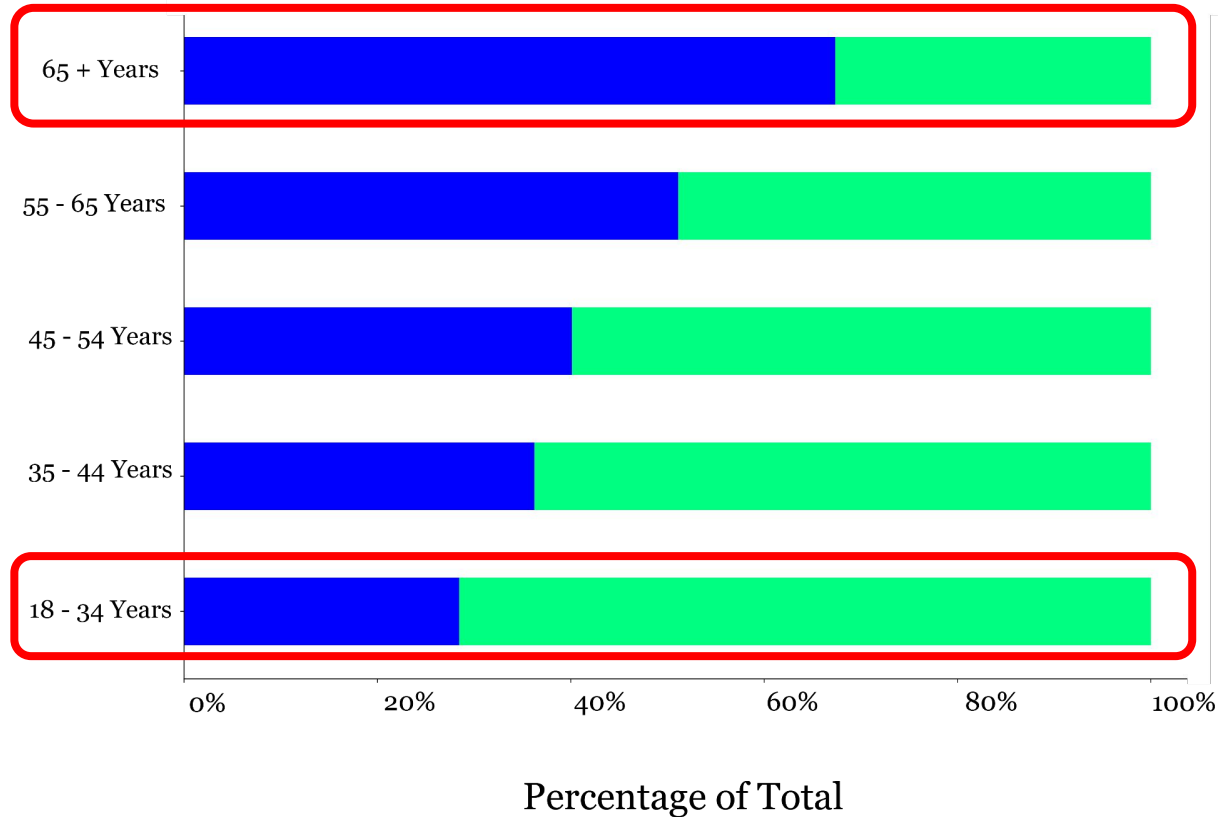


# Vaccination Status by Age

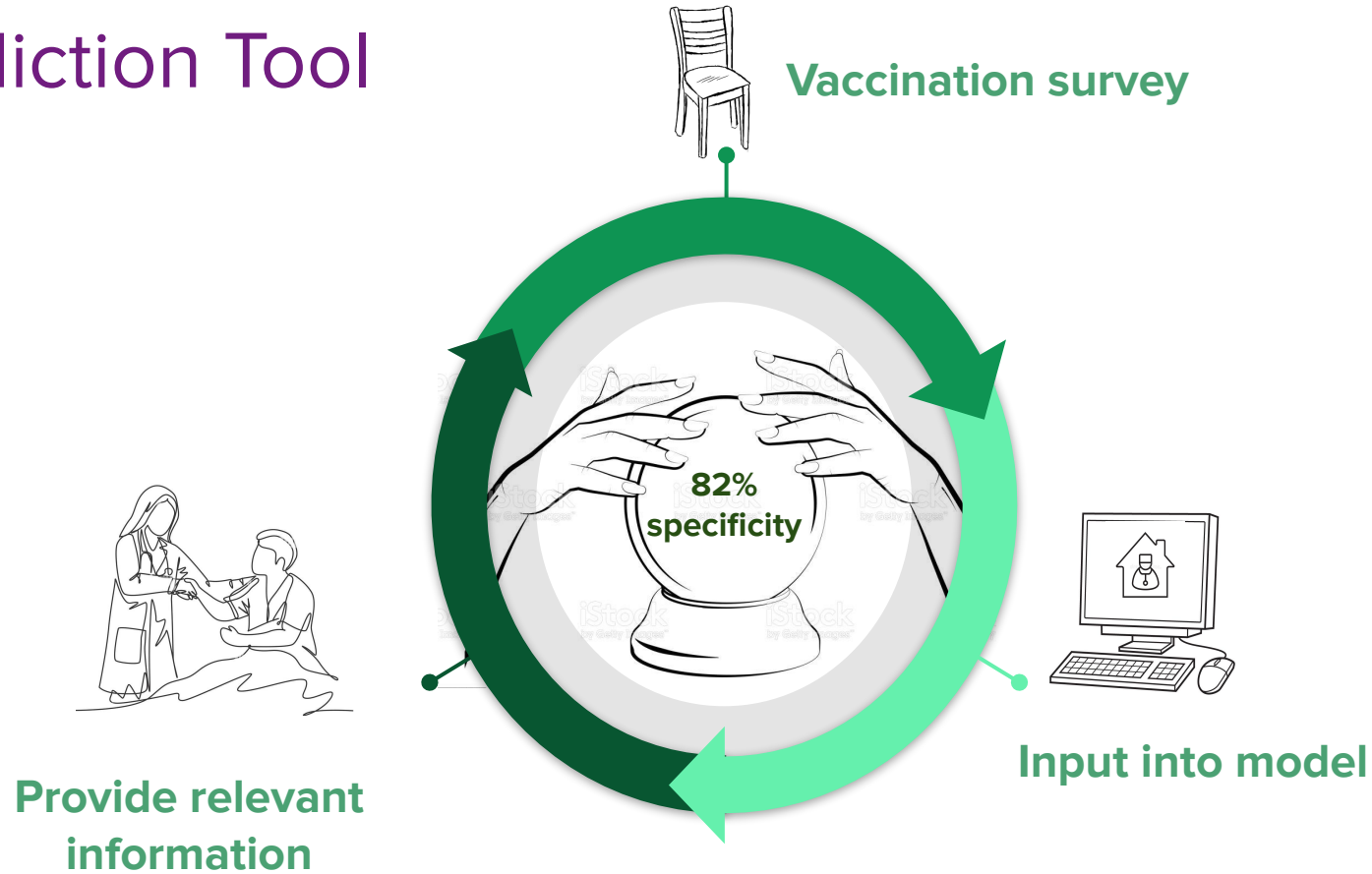
As people age they are more likely to be vaccinated against the seasonal flu.

Vaccination Status

Yes No



# Prediction Tool



# Recommendations



Vaccinated



Option to get the vaccine now

Model Prediction

Unvaccinated



< 55 years old

$\geq 55$  years old

Give information on effectiveness of vaccination

Give information based on risk of infection

Follow up on vaccination status

## Next Steps

- Create persuasive information for healthcare workers to give their patients on the risk of the seasonal flu and COVID-19, and the effectiveness of Moderna's new Flu-COVID vaccination.
- Create a dashboard for healthcare workers to predict if a patient will get vaccinated or not along with the model's recommendations.

# Thank You!

**Email:** [kevinjspring@gmail.com](mailto:kevinjspring@gmail.com)

**GitHub:** [@kjspring](https://github.com/kjspring)

**LinkedIn:** [linkedin.com/in/kevin-spring-9947b0167/](https://www.linkedin.com/in/kevin-spring-9947b0167/)

**Website:** [kjspring.github.io](https://kjspring.github.io)

# Appendix

# Important variables for prediction

Feature	Value	Importance
Opinion: Effectiveness of Seasonal Flu Vaccine	Very Effective (5)	24%
Opinion: Risk of Seasonal Flu Infection	Very Low (1)	14%
Age Group	65+ Years	9%
Doctor Recommend Seasonal Vaccine	Yes (1)	7%
Opinion: Effectiveness of Seasonal Flu Vaccine	Low (2)	4%



# 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	82%	75%	25%	18%