

# Encouraging COVID-19 Vaccination in the US

Which demographics are most hesitant?

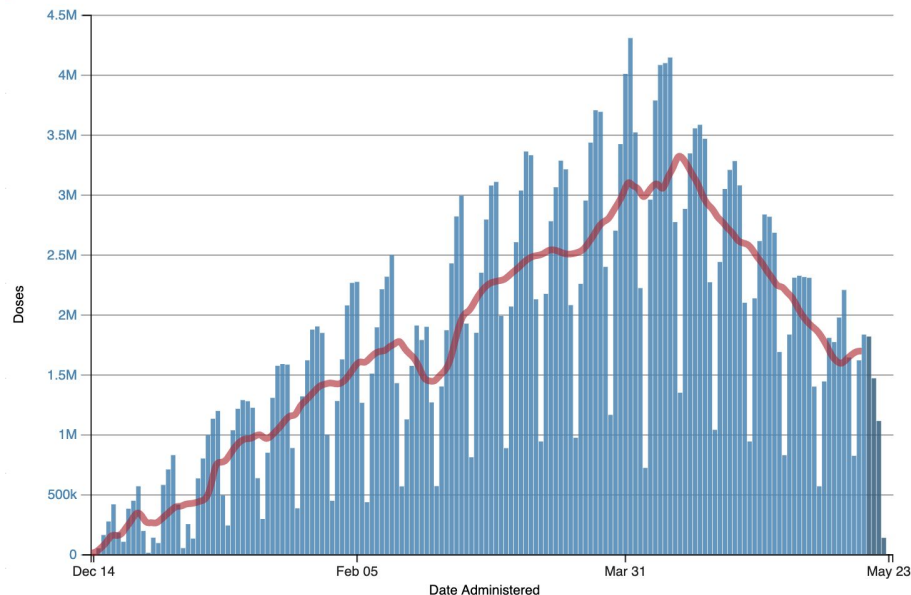
# Agenda

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- Challenge statement: What and why
- My approach
- Caveats
- Results
- Recommendations for further analysis

# The challenge: Declining COVID-19 vaccination rate

- State and local governing bodies around the country are asking: **how can we encourage more people to get vaccinated sooner?**
- Key metric for lifting restrictions and getting back to business as usual
- Vaccine doses administered per day initially increased, but **has been declining since mid-April.**
- **Only 61% of adults have received at least one dose** as of May 22.



# My Approach

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- Trained machine learning models to predict vaccine hesitancy or optimism
  - Logistic regression and random forest
- Determined the top predictors from these models to understand which population characteristics and circumstances are more likely to be hesitant versus optimistic

# Data Summary

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- Census Bureau's Household Pulse Survey
  - Randomly sampled from all 50 states and top 15 metro areas
  - Adults 18 years or older
  - Survey conducted from March 3 to March 15, 2021
  - Public Microdata Sample of ~78,000 responses
- Potential predictors included:
  - How life had changed for the household during the pandemic
  - Information such as family size, housing situation, state or metro area, employment status, income, age, race and ethnicity

# Defining vaccine optimism versus hesitancy

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A respondent was considered **Optimistic** if:

- OR**
- They had received at least one dose
  - Said they **Definitely Do or Probably Do intend** to get vaccinated in the future

A respondent was considered **Hesitant** if:

- AND**
- They had not received any doses yet\*\*
  - Said they **Probably Do Not or Definitely Do Not intend** to get vaccinated in the future

\*\* Eligibility was not yet expanded to all adults at the time they were surveyed

# Caveats

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- Respondents were surveyed in early March. More recent surveys may reveal different trends and importance in predictors
- Some groups are over- or under-represented based on who actually responded to the survey
  - In this survey, based on comparing population percentages to 2020 census statistics:
    - White respondents are over-represented
    - Asian respondents are slightly under-represented
    - Black and Hispanic/Latinx respondents are far under-represented

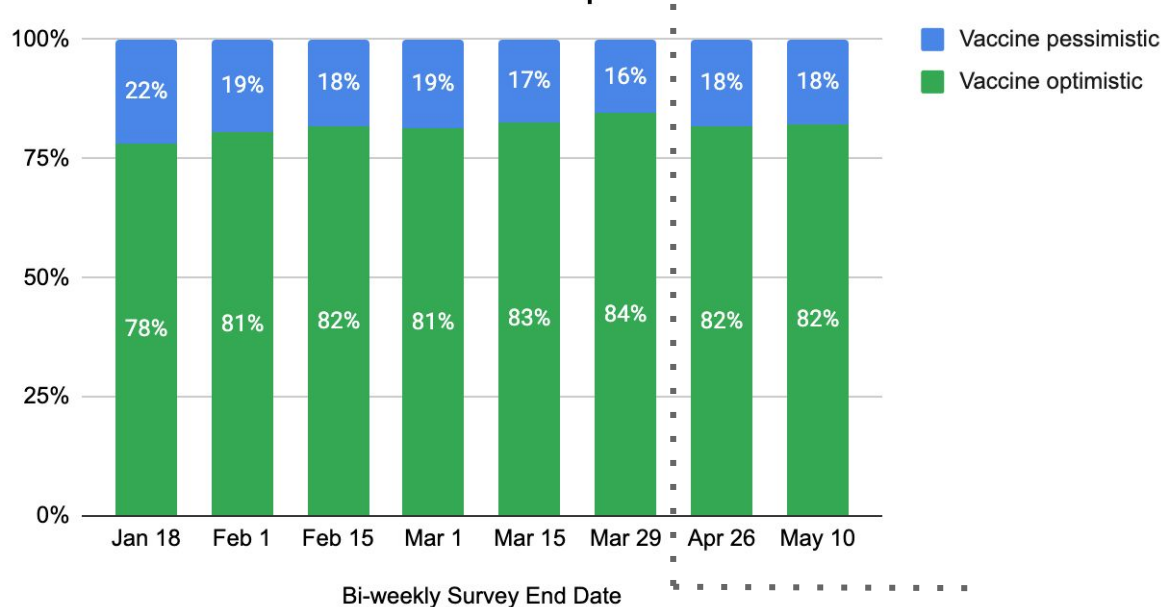
# Data Overview



# Vaccine sentiment remains fairly steady

- People are getting vaccinated, but sentiment does not appear to be changing over time

Vaccine Sentiment across All Respondents



Census Bureau added new survey response of 'Unsure' -- here considered pessimistic

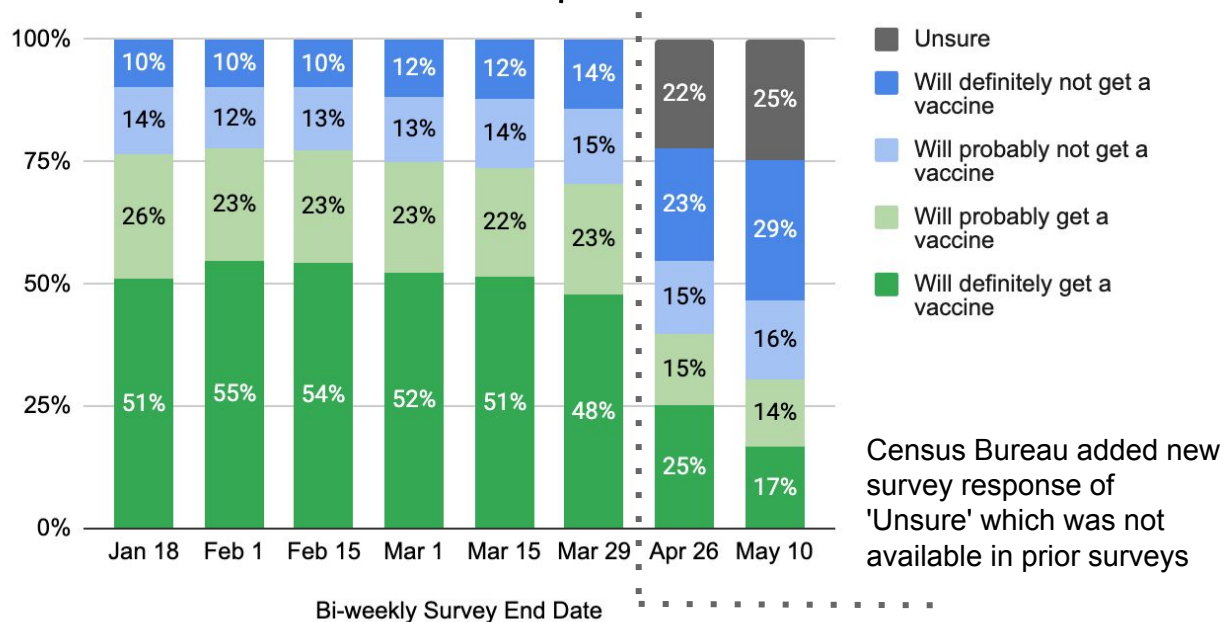
Source Data: <https://www.census.gov/programs-surveys/household-pulse-survey/data.html>

Population is all survey responses; not limited to publicly available microdata samples

# People who want the vaccine are getting it

- All adults became eligible for appointments as of April 19th
- As time goes on, a higher proportion of unvaccinated people are hesitant (or unsure)

Intentions of Unvaccinated Respondents

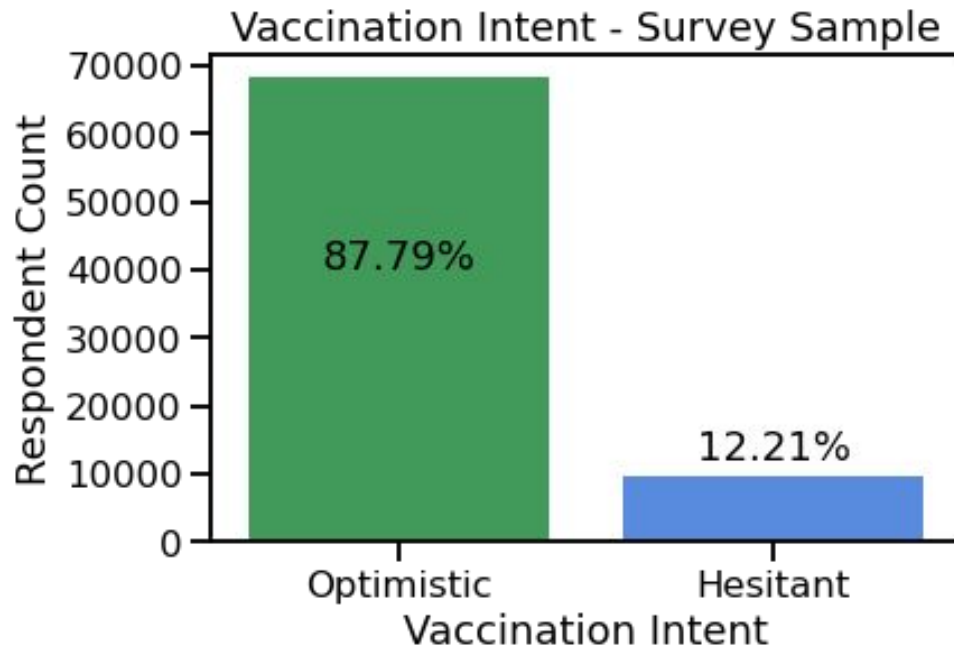


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# Vaccine Intent across our survey sample

- Slightly more optimistic than entire response population
  - 12% pessimistic
  - 88% optimistic



# Machine Learning Results

# Top Predictors of Vaccine **Hesitancy**

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- Having children under 18 in the household
- Living in a mobile home
- Difficulty meeting household expenses
- Does not use public transportation such as bus, rail, or ride-share

# Top Predictors of Vaccine **Optimism**

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- Older in age
- Higher level of education
- Identifying as Asian race/ethnicity
- Avoided eating at restaurants due to pandemic
- Higher pre-tax income level
- Took fewer trips to stores due to the pandemic

# Recommendations

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