ASPE Predictions of Vaccine Hesitancy for COVID-19 Vaccines by Geographic and Sociodemographic Features

Methodological Description

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To support state and local communication and outreach efforts, ASPE developed state, county, and sub-state level predictions of hesitancy rates using the most recently available federal survey data.

We estimate hesitancy rates at the state level using the Census Bureau's Household Pulse Survey (HPS) data and utilize the estimated values to predict hesitancy rates in more granular areas using the Census Bureau's 2019 American Community Survey (ACS) 1-year Public Use Microdata Sample (PUMS). We present predicted hesitancy rates as follows:

1. State level – for all 50 states and Washington D.C.
2. Public Use Microdata Areas (PUMA) level – PUMAs are geographic areas within each state that contain no fewer than 100,000 people. PUMAs can consist of part of a single densely populated county or can combine parts or all of multiple counties that are less densely populated. Detailed maps of PUMAs for each state are available at: https://www.census.gov/geographies/reference-maps/2010/geo/2010-pumas.html
3. County level – to create county-level estimates, we used a PUMA-to-county crosswalk from the Missouri Census Data Center. PUMAs spanning multiple counties had their estimates apportioned across those counties based on overall 2010 Census populations.

The HPS is nationally representative and includes information on U.S. residents' intentions to receive the COVID-19 vaccine when available, as well as other sociodemographic and geographic (state, region and metropolitan statistical areas) information. The ACS is a nationally representative survey, and it provides key sociodemographic and geographic (state, region, PUMAs, county) information. We utilized data for the survey collection period March 3, 2021 – March 15, 2021, which the HPS refers to as Week 26.

We use the HPS survey question, *"Once a vaccine to prevent COVID-19 is available to you, would you…get a vaccine?",* which provides the following options: 1) "definitely get a vaccine"; 2) "probably get a vaccine"; 3) "probably not get a vaccine"; 4) "definitely not get a vaccine". We use two definitions to capture the strength of hesitancy to receive a vaccine.

- *hesitancy*: includes survey responses indicating that they would "probably not" or "definitely not" receive a COVID-19 vaccine when available.
- *strong hesitancy*: include only survey responses indicating that they would "definitely not" receive a COVID-19 vaccine when available.

Our sample includes individuals who responded (either "yes" or "no") to having received the COVID-19 vaccine and excludes respondents for whom there was no response. Those answering

"yes" to having already received the vaccine are therefore treated as "not hesitant," as are those who responded "definitely" or "probably" as to their intent to get a vaccine.

Our statistical analysis occurred in two steps. First, using the HPS, we used a logistic regression to analyze predictors of vaccine hesitancy using the following sociodemographic and geographic information: age, gender, race/ethnicity, education, marital status, health insurance status, household income, state of residence, and interaction terms between race/ethnicity and having a college degree.

Second, we applied the regression coefficients from the HPS analysis to the data from the ACS to predict hesitancy rates for each ACS respondent ages 18 and older. We then averaged the predicted values by the appropriate unit of geography, using the ACS survey weights, to develop area-specific estimates of hesitancy rates.

Vaccine hesitancy is complex and multifaceted. Many factors influence vaccine-decision making, including cultural norms, social and peer influences, political views, and other factors that are specific to an individual or group, as well as concerns regarding specific vaccines. Thus, our estimates should be used with caution when attempting to generalize beyond the factors examined herein. In addition, our estimates should be used in conjunction with other relevant information. Local contextual information, including trends and data related to vaccine access, community morbidity and mortality, social vulnerability, and vaccine administration can provide additional insights and applicability. Our estimates use individual level responses intended to capture sentiment within different geographic levels in the U.S. at the time of the survey; careful consideration is advised when examining questions outside of the time period or geographic level assessed in this analysis. Finally, our estimates at the PUMA or county level are subject to greater sampling error and uncertainty due to predictive modeling than those at the state level, and therefore are less precise; accordingly, they should be used with caution for purposes that require precise estimates.