RESEARCH LETTER

National Trends in the US Public's Likelihood of Getting a COVID-19 Vaccine—April 1 to December 8, 2020

The coronavirus disease 2019 (COVID-19) pandemic is causing enormous morbidity and mortality across the US and is disproportionately affecting racial/ethnic minority populations and elderly persons. High acceptance of COVID-19 vaccines will be instrumental to ending the pandemic.

Four cross-sectional internet surveys[1-4] (3 using convenience samples[1,3,4]) from April[2] and May[1,3,4] 2020 found that 58% to 69% of adults intended to get vaccinated against COVID-19, with higher percentages reported in April[2] than in May.[1,3,4] These studies did not track the same individuals over time, making it difficult to assess whether intent to get vaccinated has truly declined.

Multimedia

We analyzed biweekly survey data from a nationally representative longitudinal study to describe changes over time in the public's likelihood of getting a COVID-19 vaccine and across demographic subgroups.

Methods | The Understanding America Study (UAS) is a probability-based internet panel survey of approximately 9000 noninstitutionalized US adults.[5] Respondents are recruited using address-based sampling, allowing for valid statistical inferences and avoiding coverage problems from convenience web panels. Internet-enabled tablets are provided if needed.

Beginning March 10, 2020, the entire UAS panel has been invited to participate in biweekly tracking surveys about COVID-19; consenting respondents are invited on a rolling basis (590 invited daily) to participate in each wave and have 2 weeks to complete surveys.

Beginning April 1-14 and continuing through November 25–December 8, we asked: "How likely are you to get vaccinated for coronavirus once a vaccine is available to the public?" Response options (very unlikely, somewhat unlikely, somewhat likely, very likely, unsure) were dichotomized into "somewhat or very likely" vs all others. A multivariable Poisson regression model with robust standard errors was used to estimate adjusted risk ratios (aRRs) and 95% CIs of the likelihood of getting vaccinated. Changes in likelihood of getting a COVID-19 vaccine (overall and by demographic subgroups) were analyzed using linear regression models with cluster-robust standard errors at the respondent level. Analyses (SAS version 9.4) accounted for survey sampling weights. Statistical significance was defined as a 95% CI that did not cross 1. The UAS panel oversamples residents of Los Angeles County and, to a lesser extent, residents of the rest of California; survey sampling weights adjust for this.

Table. Percentage of Adults Who Stated in April 2020 and December 2020 That They Were Somewhat or Very Likely to Get Vaccinated for COVID-19, and Change Over Time

Demographic characteristic	April 2020 survey (April 1-14); likely to get a vaccine, % (95% CI)	December 2020 survey (November 25–December 8)			Change over time: April 2020 survey to December 2020 survey, % (95% CI)[b]
		Sample size	Likely to get a vaccine, % (95% CI)	Adjusted risk ratio (95% CI)[a]	
Overall	74.1 (72.4-75.8)	5660	56.2 (54.4-58.1)		−17.9 (−20.0 to −15.8)
Sex					
Men	79.1 (76.8-81.5)	2362	62.3 (59.6-65.0)	1 [Reference]	−16.9 (−20.0 to −13.8)
Women	69.5 (67.1-71.9)	3298	50.6 (48.1-53.1)	0.9 (0.8-0.9)	−18.9 (−21.8 to −16.0)
Age group, y					
18-49	69.1 (66.5-71.7)	2431	50.9 (48.2-53.7)	1 [Reference]	−18.2 (−21.4 to −15.0)
50-64	76.7 (73.8-79.6)	1755	57.0 (53.7-60.4)	1.2 (1.1-1.3)	−19.7 (−23.5 to −15.8)
≥65	83.8 (81.0-86.6)	1473	69.1 (65.7-72.5)	1.4 (1.3-1.5)	−14.7 (−18.6 to −10.8)
Race/ethnicity[c]					
White	77.8 (75.9-79.6)	3851	58.6 (56.5-60.8)	1 [Reference]	−19.1 (−21.5 to −16.8)
Black	50.7 (44.7-56.7)	413	37.6 (32.0-43.2)	0.7 (0.6-0.8)	−13.1 (−19.9 to −6.3)
Hispanic	73.1 (67.8-78.3)	810	52.7 (47.1-58.2)	1.0 (0.9-1.1)	−20.4 (−27.2 to −13.6)
Asian	90.9 (86.1-95.7)	290	80.6 (73.9-87.2)	1.3 (1.2-1.4)	−10.3 (−18.5 to −2.2)
Education					
High school completion or less	67.0 (63.7-70.2)	1146	47.6 (44.3-50.9)	1 [Reference]	−19.4 (−23.4 to −15.4)
Some college	70.5 (67.4-73.6)	2056	50.2 (46.9-53.5)	1.1 (1.0-1.2)	−20.3 (−24.3 to −16.4)
Bachelor's degree or higher	85.0 (82.8-87.1)	2457	70.3 (67.5-73.0)	1.5 (1.3-1.6)	−14.7 (−17.6 to −11.9)

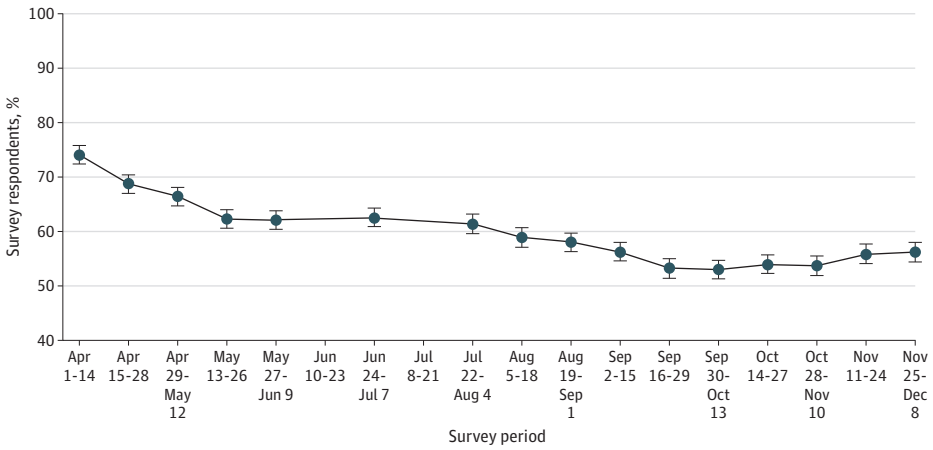
Abbreviation: COVID-19, coronavirus disease 2019.

[a] Mutually adjusted for all the demographic factors in the table.

[b] Ordinary least squares with cluster-robust standard errors was used to assess change over the time frame, which accounted for correlation of repeated measures and survey sampling weights.

[c] Online panel members self-reported race/ethnicity from a set of survey questions. Data are not presented for American Indian/Alaska Native, Native Hawaiian and Other Pacific Islander, and other non-Hispanic multiracial groups due to small sample sizes.

Figure. Percentage of US Adults Who Say They Are Likely to Get a COVID-19 Vaccine



Data were not collected for the periods of June 10-23 and July 8-21. Percentages and 95% CIs are plotted. COVID-19 indicates coronavirus disease 2019.

Participants provided written informed consent and the University of Southern California's institutional review board approved this study.

Results | To date, 8167 UAS panel respondents have consented to participate in the biweekly tracking surveys. The number of consenting respondents who completed the surveys varied across 2-week periods (range: 5259 to 6139; range of completion rate per 2-week period: 75%-97%).

During November 25-December 8 (**Table**), the self-reported likelihood of getting COVID-19 vaccination was lower among women than men (51% vs 62%; aRR, 0.9 [95% CI, 0.8-0.9]) and Black vs White individuals (38% vs 59%; aRR, 0.7 [95% CI, 0.6-0.8]), and higher among adults aged 65 years and older vs those 18-49 years (69% vs 51%; aRR, 1.4 [95% CI, 1.3-1.5]) and those with at least a bachelor's degree vs a high school education or less (70% vs 48%; aRR, 1.5 [95% CI, 1.3-1.6]).

Between April 1-14 and November 25-December 8, the percentage who stated they were somewhat or very likely to get vaccinated declined from 74% to 56% (difference: 18 percentage points [95% CI, 16-20]) (**Figure**). Significant declines over time in the likelihood of seeking vaccination were observed for both women and men and in all age, racial/ethnic, and educational subgroups.

Discussion | In this nationally representative survey, self-reported likelihood of getting a COVID-19 vaccine declined from 74% in early April to 56% in early December 2020, despite the early November press releases of high vaccine efficacy for 2 vaccines in phase 3 trials, although prior to Emergency Use Authorization. Low likelihood of getting a COVID-19 vaccine among Black individuals and those with lower educational backgrounds is especially concerning because of their disproportionately higher burden from COVID-19 disease.

Study strengths include analyses of change over time within the same group of individuals from a representative online survey panel. Limitations include use of only English- and Spanish-language surveys, self-reported metrics that may not correlate with future behavior, and small sample sizes for certain minority populations.

Educational campaigns to raise the public's willingness to consider COVID-19 vaccination are needed.

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Hospital Revenue Under Maryland's Total Cost of Care Model During the COVID-19 Pandemic, March-July 2020

The outbreak of coronavirus disease 2019 (COVID-19) resulted in large-scale, unprecedented deferment of nonurgent medical and surgical care beginning in mid-March 2020.[1] These volume reductions could threaten hospital solvency, particularly in rural areas and low-resource settings.[2]

Maryland has a distinctive health care payment model. A waiver from the Centers for Medicare & Medicaid Services allows a central body, the Health Services Cost Review Commission (HSCRC), to govern the rates for services and annual global budget for each hospital. Rates are set such that total revenues are anticipated to match each hospital's planned annual revenue.[3,4]

To offset revenue losses from deferment of nonurgent care, the HSCRC allowed Maryland hospitals to temporarily increase their inpatient and outpatient service prices by up to 10% to 15% in late March and allowed further increases in inpatient prices up to 20% in May through July 2020.

We aimed to investigate (1) the revenues of Maryland hospitals from March through July 2020 compared with historical trends and (2) whether the option to increase rates was associated with changes to hospital revenues in the state.

Methods | We used HSCRC hospital revenue and volume data from January 2018 through July 2020. We calculated total monthly hospital revenue and compared 2020 revenues with 2 counterfactuals: (1) revenues in 2018 and 2019 (dollar amounts adjusted for inflation) and (2) estimated revenues in 2020 under the assumption that prices were held at their February levels, rather than increased in response to COVID-19. To calculate estimated revenue, we applied February 2020 price levels to volumes observed in later months. Hospitals were excluded if monthly revenue was ever missing during follow-up (n = 16). Analysis was stratified by hospital characteristics: urban or rural county designation,[5] teaching status (yes or no), total hospital bed count, and percentage of Medicaid discharges (above or below median at baseline, defined using the 2018 American Hospital Survey).[6] Analysis was conducted using Stata MP, version 16.0 (StataCorp).

Results | From February to April 2020, total monthly inpatient revenue of Maryland hospitals decreased from $842 million to $698.6 million (a decline of $143.4 million [17.0%]) (**Figure**). During the same period, hospital outpatient revenues declined from $601.9 million to $328.0 million (a decline of $273.9 million [45.5%]). April 2020 inpatient revenues were 17.9% to 18.8% lower than in April 2018 and April 2019, while

Figure. Maryland Statewide Total Inpatient and Outpatient Hospital-Regulated Revenue