Addressing racial/ethnic disparities in the COVID-19 vaccination campaign

Marissa B. Reitsma[1], Jeremy D. Goldhaber-Fiebert[1], Joshua A. Salomon[1]

[1] Stanford Health Policy, Centers for Health Policy and Primary Care and Outcomes Research, Department of Medicine, Stanford University, 117 Encina Commons, Stanford, CA, 94305, USA

Background
As the COVID-19 vaccination campaign advances in the United States, unequal vaccination rates across racial/ethnic groups have compounded existing disparities in cases, hospitalizations, and deaths among Black, Indigenous, and Hispanic populations (1–3). With states opening eligibility to all adults, equitable vaccine scale-up requires action to address the causes of differential coverage.

Objective
To quantify differential vaccine uptake rates by race/ethnicity within each US state in order to project racial/ethnic disparities in vaccine coverage through July 1, 2021, under a '*status quo*' scenario of continued differential uptake, and alternative scenarios reflecting implementation of strategies to reduce disparities by addressing allocation, access, and acceptance.

Methods
We analyzed demographic data (population distribution by age, race/ethnicity, and census tract) from the American Community Survey. From state websites, we extracted the shares of people receiving at least one vaccine dose, stratified by age and separately by race/ethnicity, through March 31, 2021. Combining these data, we estimated relative uptake rates by race/ethnicity within each state as the observed share of vaccinations for a racial/ethnic group, divided by the expected share under proportionate uptake. The expected share was first computed within specific age groups assuming that vaccinations within an age group were received by persons in different racial/ethnic groups in proportion to population size in that age group. The all-age expected share for each racial/ethnic group was a weighted average of age-specific shares, weighted by the fraction of all vaccinations delivered to that age group. This approach allowed us to control for the interaction of historical age-based eligibility criteria and age-race population structures, thereby isolating the impacts of accessibility of vaccinations (e.g., language, internet access, appointment systems, transportation, time off work) and differences in vaccine confidence by race/ethnicity.

We modeled scale-up of vaccinations within each census tract in a state under three different scenarios. In all scenarios, we assumed a steady national supply of vaccinations at current levels of 1.68 million doses per day going to previously unvaccinated individuals, based on the seven-day average reported by the CDC. We assumed that vaccine doses would be allocated to states in proportion to adult population size; we assumed that vaccination doses would be distributed to census tracts within each state based on population size (either in equal proportions or prioritized based on the CDC Social Vulnerability Index, depending on the scenario). We assumed that within a census tract, vaccination doses would be allocated across racial ethnic groups in proportion to population size, weighted by the estimated relative uptake rate.

Findings
In most states, relative uptake rates among eligible White populations have been substantially higher than among Black and Hispanic populations, by a median factor of 1.3 times for White compared to Black adults (IQR, 1.2-1.4) and median 1.4 times for White compared to Hispanic adults (IQR, 1.2-1.9) (Figure 1). The joint effects of disproportionate uptake and age-based

eligibility focused on older adults has resulted in estimated national coverage among Black and Hispanic adults (27%) being 39% lower than among White adults (44%) as of March 31, 2021.

If current disparities in uptake rates persist among the eligible adult population ('*Status quo*' scenario), Hispanic adults and Black adults would reach 75% coverage of ≥1 vaccine dose nationally 26 days and 28 days later, respectively, than White adults (Figure 2, state-specific results in Supplement). When White adults reach 75% coverage nationally, coverage among Hispanic and Black adults would be 58%.

If relative uptake rates across racial/ethnic groups trended steadily from starting values (Figure 1) toward 1.0 over six weeks ('*Equalized uptake*' scenario), delays in reaching 75% thresholds would shrink to 18 and 20 days for Hispanic and Black adults, respectively (Figure 2 & Supplement). Geographic targeting of vaccination doses to disadvantaged communities could further reduce disparities. For example, doubling per-capita dose allocations for the most disadvantaged quartiles of census tracts in each state, as measured by the Social Vulnerability Index, further reduces delays to reach 75% thresholds to 9 days for Hispanic adults and 11 days for Black adults, and could narrow national coverage disparities on July 1, 2021 by more than two-thirds ('*Equalized uptake and geographic targeting*' scenario in Figure 2 & Supplement).

Discussion

States should work to achieve equitable vaccination coverage through interventions that act on both vaccine supply and demand. Multiple states have implemented place-based allocation schemes (4). Actions are also needed to eliminate transportation and language barriers, minimize unfair competition for appointments (e.g. by adopting pre-registration systems), increase vaccine confidence among marginalized populations, and accommodate work schedules and time off for vaccination. As the country races toward coverage goals required to control the epidemic, pro-equity policies are critical to ensuring that marginalized populations are not left behind (5).

References

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Figure 1. Relative rates of COVID-19 vaccination uptake, by race/ethnicity and state. Estimates shown for populations that exceed 200,000 and have data available on state reporting dashboards.

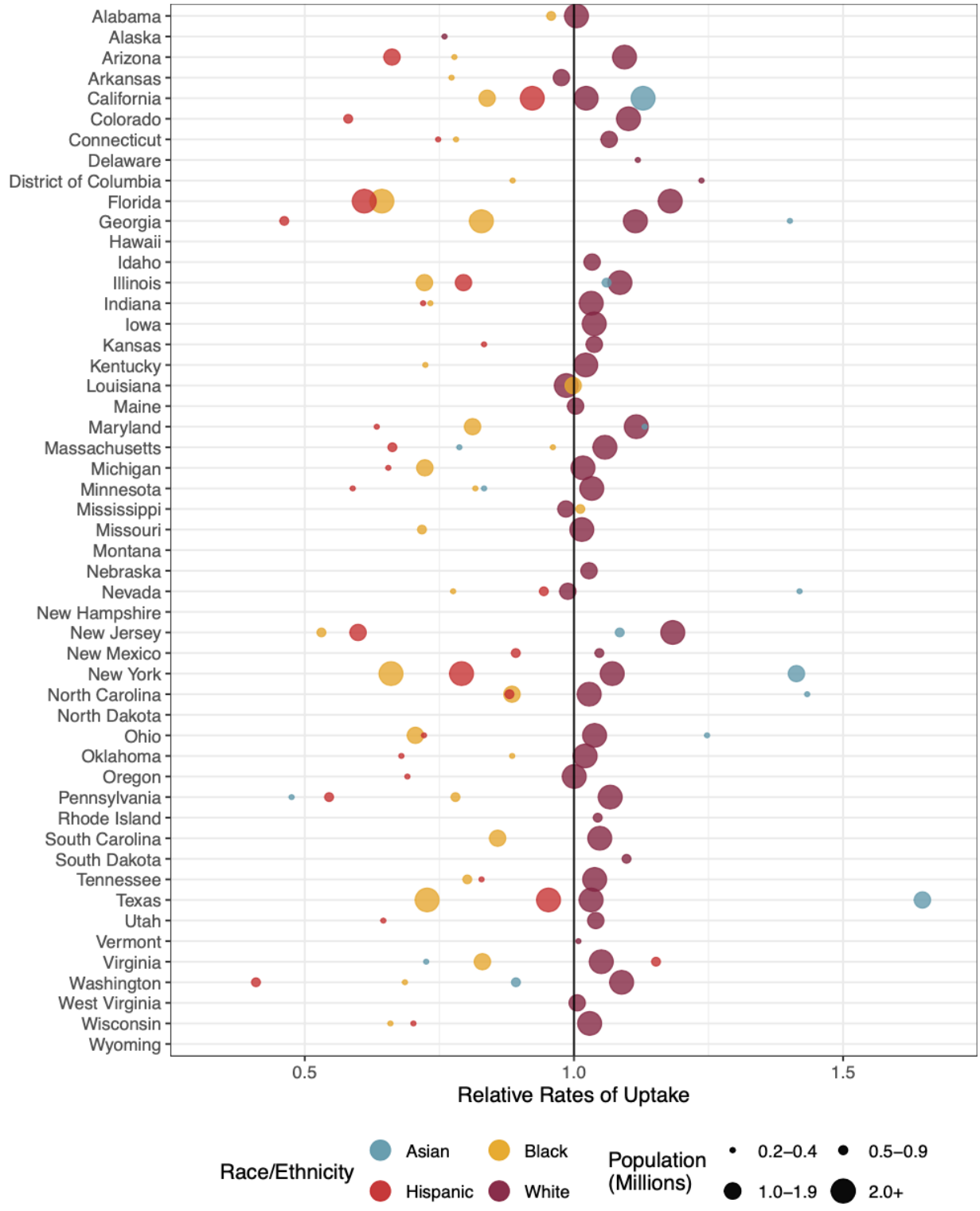

Figure 2. Coverage of one or more COVID-19 vaccination doses among population 16 years and older, by racial/ethnic group, aggregated to national level. Panels show scenarios: A) status quo, B) equalized uptake, and C) equalized uptake and geographic targeting. Dashed line shows overall coverage among the US population aged 16 years and older.