Strategies for reducing racial/ethnic disparities in the COVID-19 vaccination campaign

Marissa Reitsma
PhD Student in Health Policy
Center for Health Policy, Stanford University

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Results are preliminary
Study Team

Anneke Claypool
PhD student (2021), Management Science & Engineering

Jeremy Goldhaber-Fiebert
Associate Professor of Medicine, Stanford School of Medicine

Joshua Salomon
Professor of Medicine, Stanford School of Medicine

Results are preliminary
Prevention Policy Modeling Lab

Health Policy
Stanford

SC-COSMO Modeling Consortium (http://sc-cosmo.org)

Results are preliminary
Background

• COVID-19 has disproportionately impacted Black, Indigenous, and Hispanic people

Risk for COVID-19 Infection, Hospitalization, and Death By Race/Ethnicity

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Background

• COVID-19 has disproportionately impacted Black, Indigenous, and Hispanic people

• Vaccination rates to date have been unequal across race/ethnicity groups

Results are preliminary

How do elements of COVID-19 vaccination strategies, including eligibility criteria, distribution rules, accessibility, and confidence affect uptake, by race/ethnicity?

How can states improve the efficiency and equity of the vaccine rollout?
1. Addressing allocation, access, and acceptance to reduce racial/ethnic disparities in age-based vaccination strategies in California and the United States
Age-based prioritization ≠ Risk-based prioritization

Equal vaccination rates: smaller proportion of deaths averted among Black and Hispanic populations

Unequal vaccination rates: even greater disparities in outcomes

Age-based vaccination strategies confer disproportionate benefits to White populations

Results are preliminary
Approach

- Assume age-based eligibility (65+)
- Modeled daily vaccine uptake over 8-week period, at census tract level, by race/ethnicity
  - Modeled mortality differentials over age, race/ethnicity and geography...
    - To translate cumulative vaccination coverage into estimated mortality reductions
- Compare scenarios varying:
  - Allocation rules to census tracts within states
  - Accessibility by race/ethnicity and region
  - Acceptance by age, race/ethnicity and region

Results are preliminary
# Data Sources

<table>
<thead>
<tr>
<th>Data</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population by age, race/ethnicity, census tract</td>
<td>2015-2019 American Community Survey</td>
</tr>
<tr>
<td>Social vulnerability index by census tract</td>
<td>CDC</td>
</tr>
<tr>
<td>COVID-19 mortality by age and race/ethnicity at state level</td>
<td>National Center for Health Statistics</td>
</tr>
<tr>
<td>COVID-19 mortality, all ages, all races, by county</td>
<td>Johns Hopkins University, Center for Systems Sciences and Engineering</td>
</tr>
<tr>
<td>Vaccine acceptance by age, race/ethnicity and state</td>
<td>Delphi Group at CMU</td>
</tr>
<tr>
<td>Vaccination access by race/ethnicity and state, all ages</td>
<td>Kaiser Family Foundation</td>
</tr>
</tbody>
</table>

Results are preliminary
Allocation and Uptake Model

National vaccine supply
- 2 million doses per day

State-level allocation
- Proportional to eligible population size

Tract-level allocation
- Proportional to eligible population size vs. 2:1 for disadvantaged quartile

Daily vaccinations within tracts
- Reflects eligible population size, acceptance and access

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Proportional allocation

Additional allocation to disadvantaged census tracts

Results are preliminary
Estimated Acceptance by Age, Race, and Region

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Estimated Acceptance by Age, Race, and Region

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Percent Vaccinated or Accepting</th>
</tr>
</thead>
<tbody>
<tr>
<td>18−24</td>
<td>40%</td>
</tr>
<tr>
<td>25−34</td>
<td>60%</td>
</tr>
<tr>
<td>35−44</td>
<td>80%</td>
</tr>
<tr>
<td>45−54</td>
<td>100%</td>
</tr>
<tr>
<td>55−64</td>
<td>100%</td>
</tr>
<tr>
<td>65+</td>
<td>100%</td>
</tr>
</tbody>
</table>

Results are preliminary
Estimated Acceptance by Age, Race, and Region

Results are preliminary
Estimated Access by Race and Region

Results are preliminary
Results: coverage (65+) by race/ethnicity across scenarios

Results are preliminary
Results: deaths averted by race/ethnicity, vaccinating 65+

- All intervention scenarios are more efficient and more equitable than the status quo
- Allocation: big boost for Black and Hispanic populations
- Access: more important than acceptance for 65+ population

Results are preliminary
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*Values Shown for Populations Exceeding 200,000

*All non-white race/ethnic groups have population < 200,000, so difference not computed.
Policy Impact: California’s Allocation Strategy

- Collaboration with CDPH partners to model the impact of increasing allocation to most disadvantaged quartiles of zip codes
- Adapted modeling framework to run custom scenarios for California
  - Direct data feed for key inputs
  - Direct line to decision-makers
- Policy change announced March 3

Results are preliminary
Key findings for age-based eligibility

- Age-based eligibility confers greater benefits for White populations, which are further compounded by access barriers for older Black and Hispanic adults.

- Prioritizing additional supply for disadvantaged areas (census tracts, zip codes) is both more equitable and more efficient than proportionate distribution.

- Even in the best-case scenario, equity gaps are difficult to close under age-based eligibility schemes.

Results are preliminary.
1. Addressing allocation, access, and acceptance to reduce racial/ethnic disparities in age-based vaccination strategies in California and the United States

2. Tracking and reducing vaccination disparities in the context of all-adult eligibility

Results are preliminary
"Due to the phased approach of vaccine distribution, demographics presented here are not yet expected to align with general population demographics."

-Arizona Vaccination Dashboard
Approach

- Expand age-based eligibility analysis framework to eligibility for all adults
- Collapse access and acceptance into ‘relative rates of uptake’
  - Based on a snapshot of state vaccination data (by race and age) extracted on March 31
  - Controls for the interaction of historical age-based eligibility criteria and age-race population structures
- Model scale-up of coverage by race/ethnicity over April-July, assuming a steady state-specific vaccination rate
- Compare scenarios based on time to reach 75% population coverage among adults

Results are preliminary
Differential Uptake Rates on March 31

Relative Rate of Uptake: Observed share of vaccinations, divided by the expected share of vaccinations under proportionate uptake.

After controlling for the impact of age-based eligibility criteria on the expected distribution of vaccinations by race, we observe persistently lower relative uptake rates among Black and Hispanic populations across states.

Legend

Race/Ethnicity
- Asian
- Black
- Hispanic
- White

Population (Millions)
- 0.2–0.4
- 0.5–0.9
- 1.0–1.9
- 2.0+

Results are preliminary.
Results: Scale-Up Scenarios, National

Results are preliminary.
Time difference in reaching 75% coverage, people of color vs. White

Results are preliminary
Time difference in reaching 75% coverage compared to national average

Results are preliminary
Future work: tracking of disparities in vaccination coverage

- Prospective data extraction
- Benchmarking progress in eliminating disparities in uptake
- Updating projections

Results are preliminary
Key findings for universal adult eligibility

- Relative uptake rates among White adults have been substantially higher than among Black and Hispanic adults.
- Limitations in available data present challenges in monitoring disparities.
- If current disparities in uptake persist, Hispanic and Black adults would reach the 75% coverage threshold a month later than White adults.
- Eliminating access barriers and increasing vaccine confidence among marginalized populations can narrow, but not eliminate, gaps in coverage.
- Place-based allocation strategies can further accelerate vaccination in disadvantaged communities, and may be needed to close coverage gaps by July.

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Thank you!