



What we have or haven't learned from COVID-19 - Connecting COVID-19 with monkeypox

coordination and partnering between scientific researchers, policymakers, and the general public

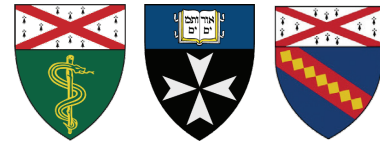
Saad B. Omer, MBBS MPH PhD FIDSA

Director, Yale Institute for Global Health

Harvey & Kate Cushing Professor of Medicine (Infectious Diseases) | Yale School of Medicine

Professor of Epidemiology of Microbial Diseases | Yale School of Public Health

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The New York Times

Opinion

Is America Ready for Another Outbreak?

No. But there are clear steps the government needs to take.

By Saad B. Omer

Dr. Omer is the director of the Yale Institute for Global Health.

Jan. 23, 2020



Let scientists lead



Scientific & Public
Misinformation



No false assurance

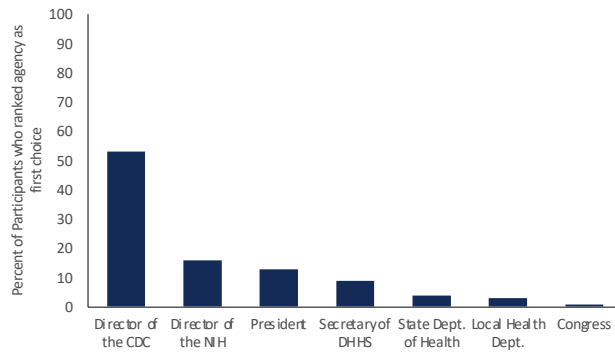
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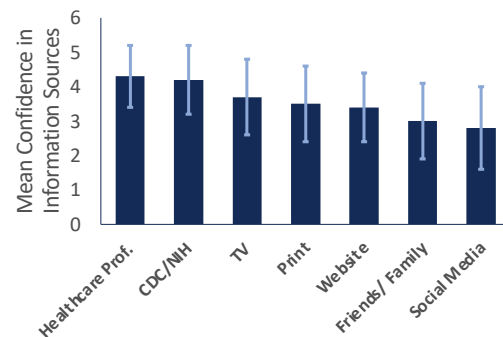
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Confidence in leadership and sources of information

COVID-19



Who Should be in Charge of America's COVID-19 Outbreak Response?



Participants' Confidence in Various Information Sources

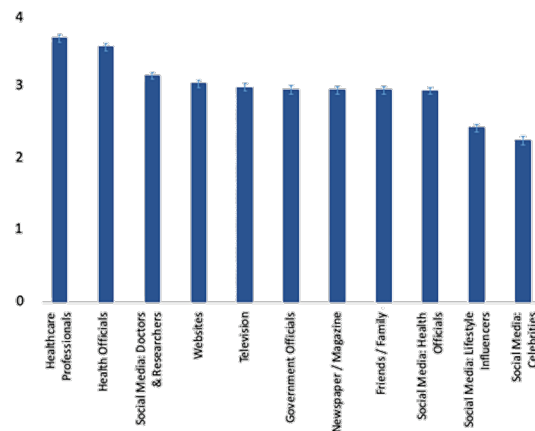
McFadden et al. PLoS One, 2020



3

Confidence in leadership and sources of information

Mpox



Winters et al. PLoS One, 2022



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**“A vaccine that remains in a vial is 100% safe
& 0% effective”**

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Vaccine acceptance for COVID-19 in the US



67%
May 2020
(Expected)

68.8%
December 2022
(Actual)

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Vaccine acceptance for COVID-19 in the US

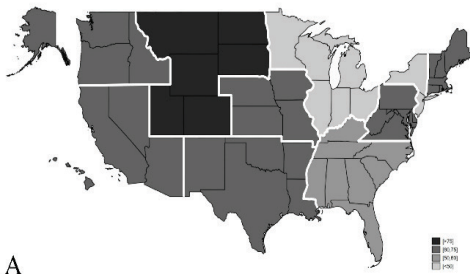


Fig 1. Map showing the 10 HHS regions with percent acceptance of COVID-19 vaccine

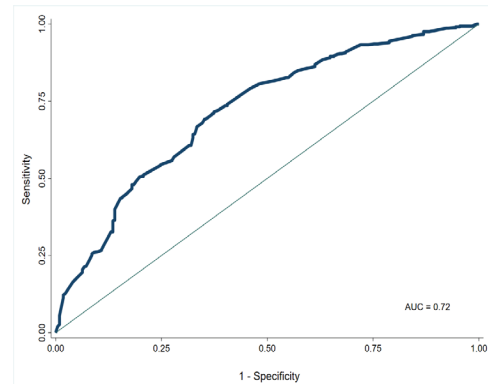


Fig 2. ROC curve for the model logit (COVID-19 vaccine acceptance) = $\beta_0 + \beta_1 \text{ age (26-35)} + \beta_2 \text{ age (36-45)} + \beta_3 \text{ age (46-55)} + \beta_4 \text{ age (55+)} + \beta_5 \text{ gender} + \beta_6 \text{ race (AI)} + \beta_7 \text{ race (Asian)} + \beta_8 \text{ race (PI)} + \beta_9 \text{ race (white)} + \beta_{10} \text{ education (HS)} + \beta_{11} \text{ education (SC)} + \beta_{12} \text{ education (Col)} + \beta_{13} \text{ education (GS)}$

Malik et al. EClinicalMedicine, 2020



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Saad B. Omer ✓
@SaadOmer3

The U.S. has never vaccinated its adult population in the numbers needed. Therefore, there's a national vaccine plan -Now.

12:21 AM · Jun 4, 2020

Saad B. Omer ✓ @SaadOmer3 · Jun 22, 2020
#COVID19 control in the U.S. relies on public behavior (e.g. social distancing, hand-washing, masks).

Why is there no **national** communication campaign? a **national** behavior change strategy?

Previous examples:

- 🇺🇸 truth campaign
- CDC's "Get Yourself Tested" campaign for HIV, STIs

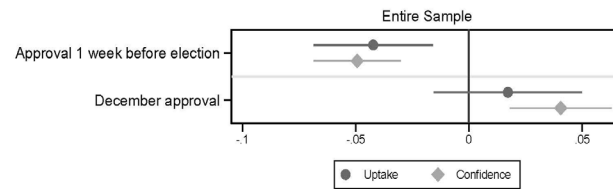
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Approval Timing and Vaccine Acceptance



Compared to 1 week after the election

With Scott Bokemper, Greg Huber, Alan Gerber, and Erin James

Vaccine, 2020.



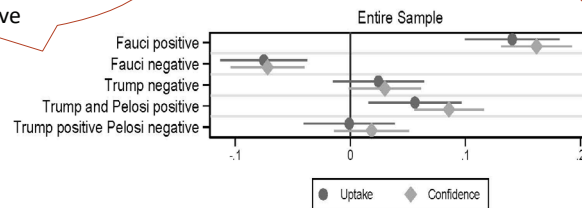
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Vaccine Endorsement and Vaccine Acceptance

Positive statement:
Says he/she believes
the vaccine is safe
and effective

Negative statement:
Says he/she does not
believe the vaccine is
safe and effective



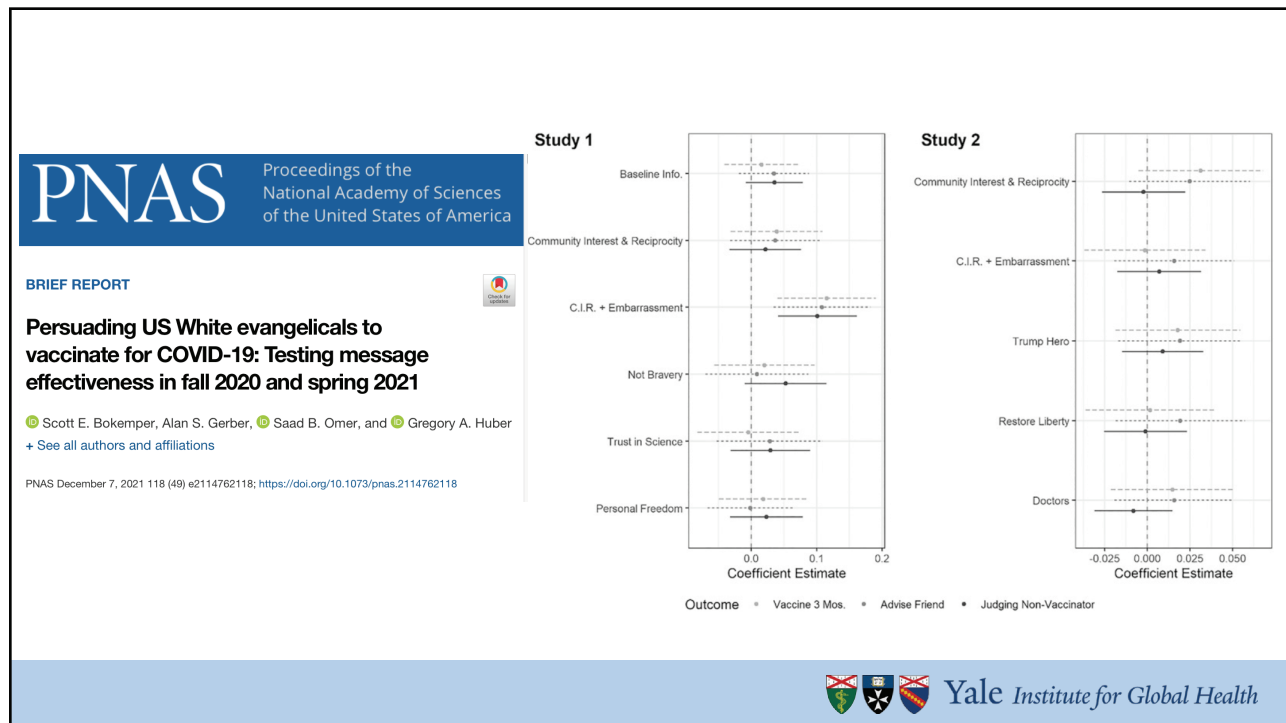
Compared to a Trump positive statement

Vaccine, 2020.

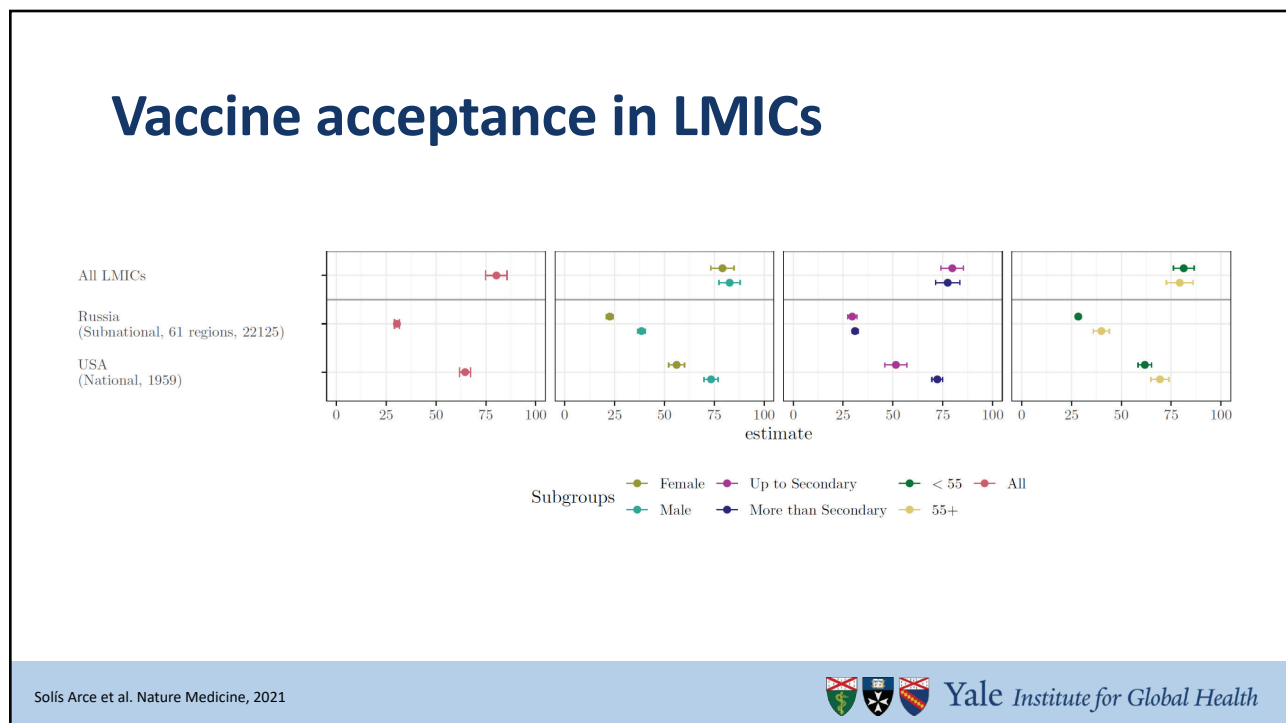


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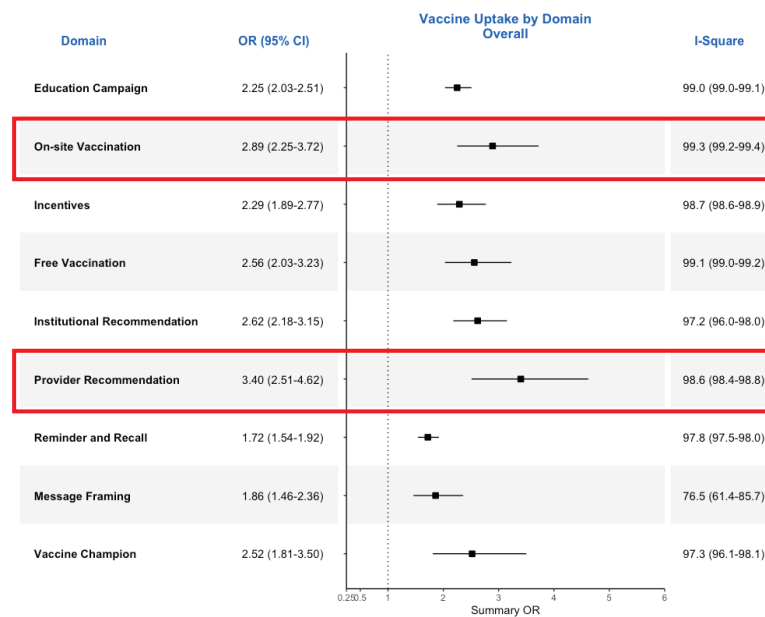


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Results – Overall



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Interventions to Increase Vaccine Coverage



Education Campaign
Providing education on vaccination, disease, and how vaccines work



On-Site Vaccination
Providing vaccines at workplace or places of worship



Incentives
Offering financial incentives for vaccination



Free Vaccination
Providing vaccination free of cost



Institutional Recommendation
Recommendation made by the institution that a person works at



Provider Recommendation
Recommendation by doctor/nurse



Reminder & Recall
Reminders for vaccination



Message Framing
Gain vs. loss framing of the vaccine



Vaccine Champions
Appointed champion that encouraged vaccination



Other
Alternative interventions aside from those listed



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Interventions with limited effect



LIMITED EFFECT INTERVENTIONS

These are the interventions our team has identified as having limited effect across multiple studies.



Message framing has minimal difference between gain vs loss frame.



If incentives are not valued by the recipients, they are less effective in improving vaccine uptake.



Incentives are less effective with healthcare workers.

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Decisional aids and self-assessment are less effective.



Solely pushing out educational messages is less effective. Educational messages should be paired with self-efficacy and response efficacy messages.



Quality improvement studies did not assess vaccine uptake often but show to be less effective in increasing vaccine uptake.

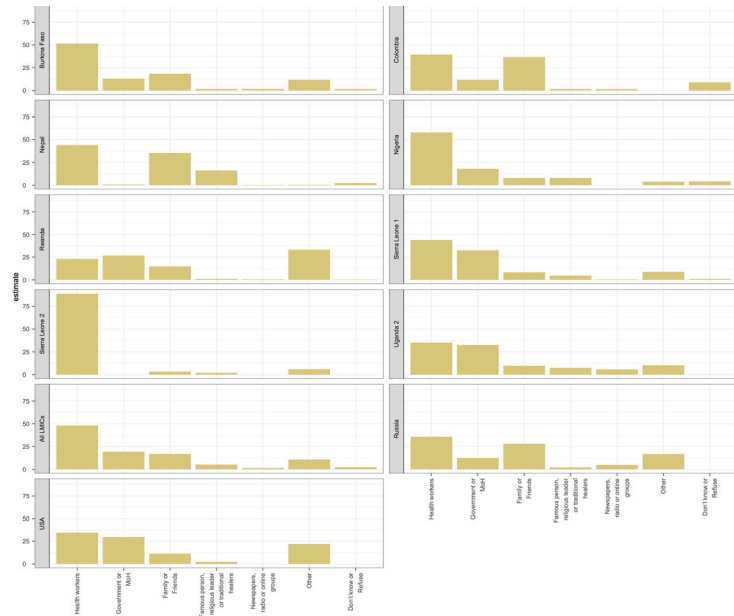
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Which of the following people would you trust MOST to help you decide whether you would get the COVID-19 vaccine?



Solis Arce et al. Nat Med, 2021



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The New York Times
OPINION
GUEST ESSAY

Doctors and Nurses Are the Key to the Final Vaccine Push

June 24, 2021

Scott Heine/Getty Images

By Saad B. Omer
 Dr. Omer is the director of the Yale Institute for Global Health.

Yale School of Medicine

COVID-19 Vaccination: A Communication Guide for Providers

- Overview
- Faculty
- Content & Tests
- Support

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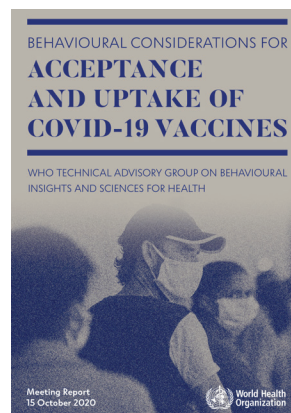
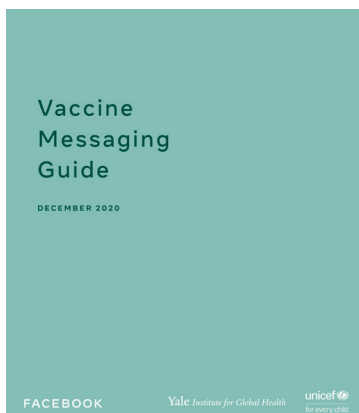
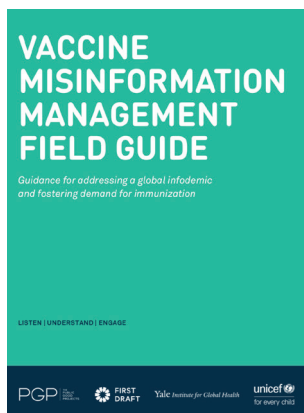
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Guides and Messaging

Vaccine Acceptance



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THE LANCET



Promoting COVID-19 vaccine acceptance: recommendations from the *Lancet* Commission on Vaccine Refusal, Acceptance, and Demand in the USA

Saad B Omer, Regina M Benjamin, Noel T Brewer, Alison M Buttenheim, Timothy Callaghan, Arthur Caplan, Richard M Carpiano, Chelsea Clinton, Renee DiResta, Jad A Elharake, Lisa C Flowers, Alison P Galvani, Rekha Lakshmanan, Yvonne A Maldonado, SarahAnn M McFadden, Michelle M Mello, Douglas J Opel, Dorit R Reiss, Daniel A Salmon, Jason L Schwartz, Joshua M Sharfstein, Peter J Hotez

20 Omer et al. Lancet, 2021

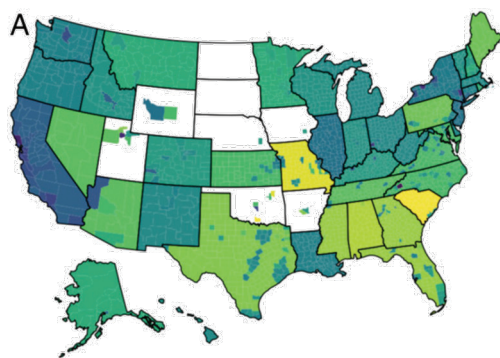
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Non-pharmaceutical Interventions are Behavioral Interventions

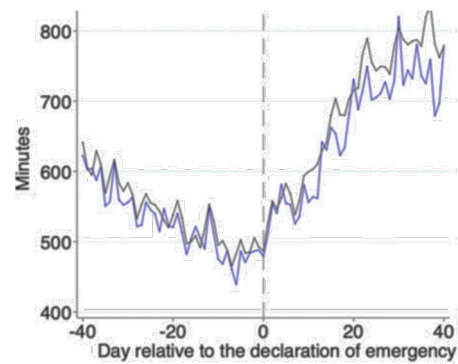
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What is the effect on mobility of social distancing guidelines?



Date that counties enacted stay-at-home order



Trends for the mean time at home in minutes for counties

22

What is the effect on mobility of social distancing guidelines?

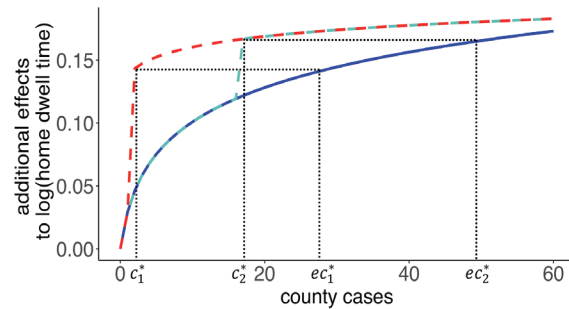


Fig. 5. Illustration of the case equivalent response to the stay-at-home order concept. The symbol c^* is the level of cases when the stay-at-home order went into effect, and $ec^* - c^*$ is the cases needed to induce the equivalent additional time at home. The horizontal difference is the case equivalent response to the stay-at-home order. The blue curve is the voluntary response for the no stay-at-home order counterfactual. The red (cyan) curve is the response with the stay-at-home order when the mandate is imposed on the median (mean excluding New York City's 9,065 cases) number case when a stay-at-home order went into effect. We note that the median county reflects the experience of most Americans better than the mean county.

23 Yan et al. Proc Natl Acad Sci, 2021



23

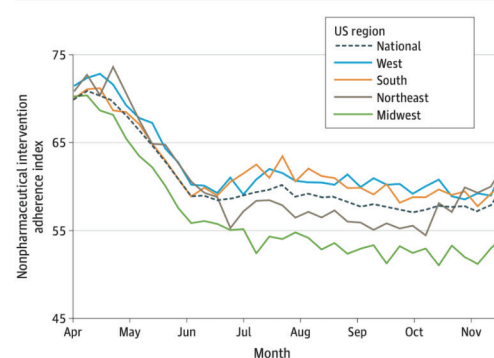
JAMA The Journal of the American Medical Association

Change in Reported Adherence to Nonpharmaceutical Interventions During the COVID-19 Pandemic, April–November 2020

Matthew A. Crane, BS
Kenneth M. Shermock, PharmD, PhD
Saad B. Omer, MBBS, MPH, PhD
John A. Romley, PhD

Author Affiliations: Johns Hopkins University School of Medicine, Baltimore, Maryland (Crane); Department of Pharmacy, Johns Hopkins Health System, Baltimore, Maryland (Shermock); Yale Institute for Global Health, New Haven,

Figure 2. Adherence to Protective Nonpharmaceutical Interventions (NPIs) in the US During the Coronavirus Disease 2019 (COVID-19) Pandemic, April–November 2020



The NPI adherence index ranges from 0 to 100. This index is the sum of reported adherence to 16 protective behaviors in the 7 days prior to survey completion. A higher score indicates better adherence. Mean values weighted for representativeness and adjusted by linear regression for sociodemographic and new COVID-19 cases are shown.

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Virtual Media, Real Consequences

25



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Randomized Trials of Social Media Messaging

5 countries: Kenya  India  Pakistan  Philippines  Ukraine 

27 campaigns designed and launched

\$500K+ Ad credits given to run tests from UNICEF COs

Tens of millions of Facebook users reached with strategic messaging content



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Outputs from test campaigns

Strategic digital communications launched via UNICEF in four countries



1.4B Impressions

Average reach
7.5M – 34.6M users per
campaign launched in-country



Significant Lift

and positive shifts in attitudes
towards vaccines



3.75M clicks

for additional vaccination
resources



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What we learned



Partnership
works



Language matters



Values-based
messaging shifts
attitudes



Context is key for
moving the needle



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Digital Media for Health Outcomes

A course for ministries of health



African
Union



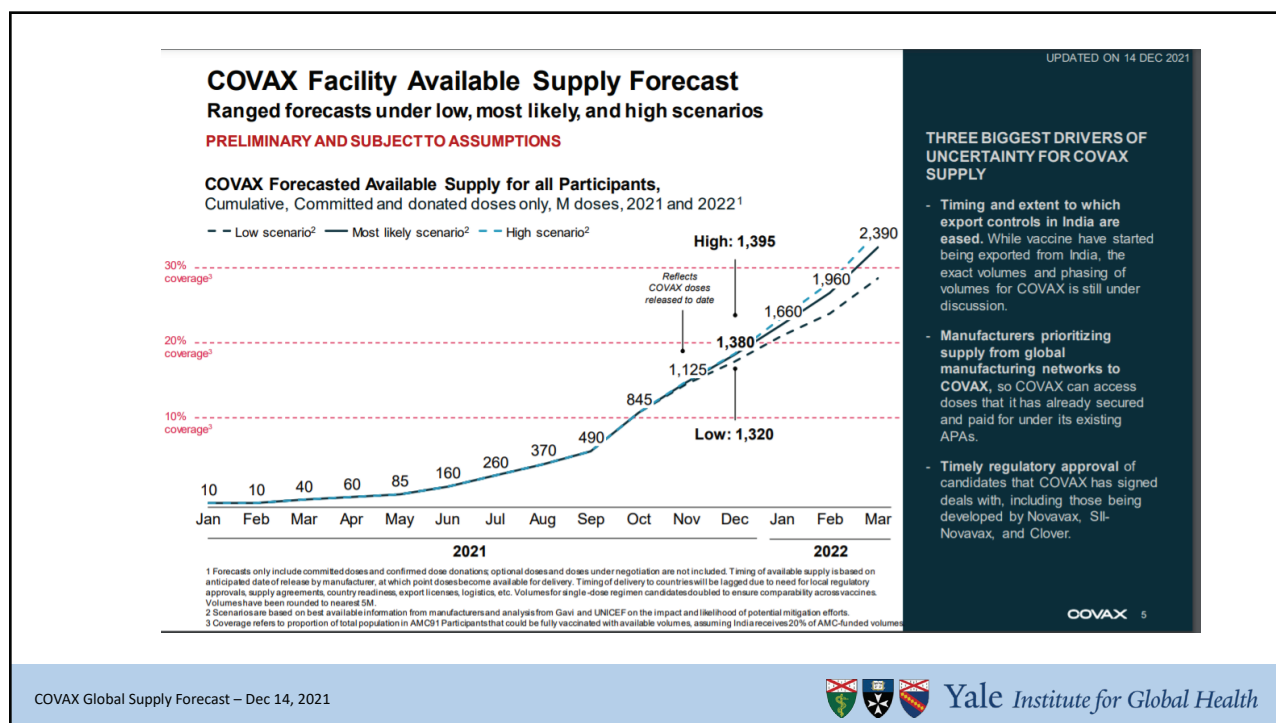
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National Responses Are Inadequate for Global Pandemics

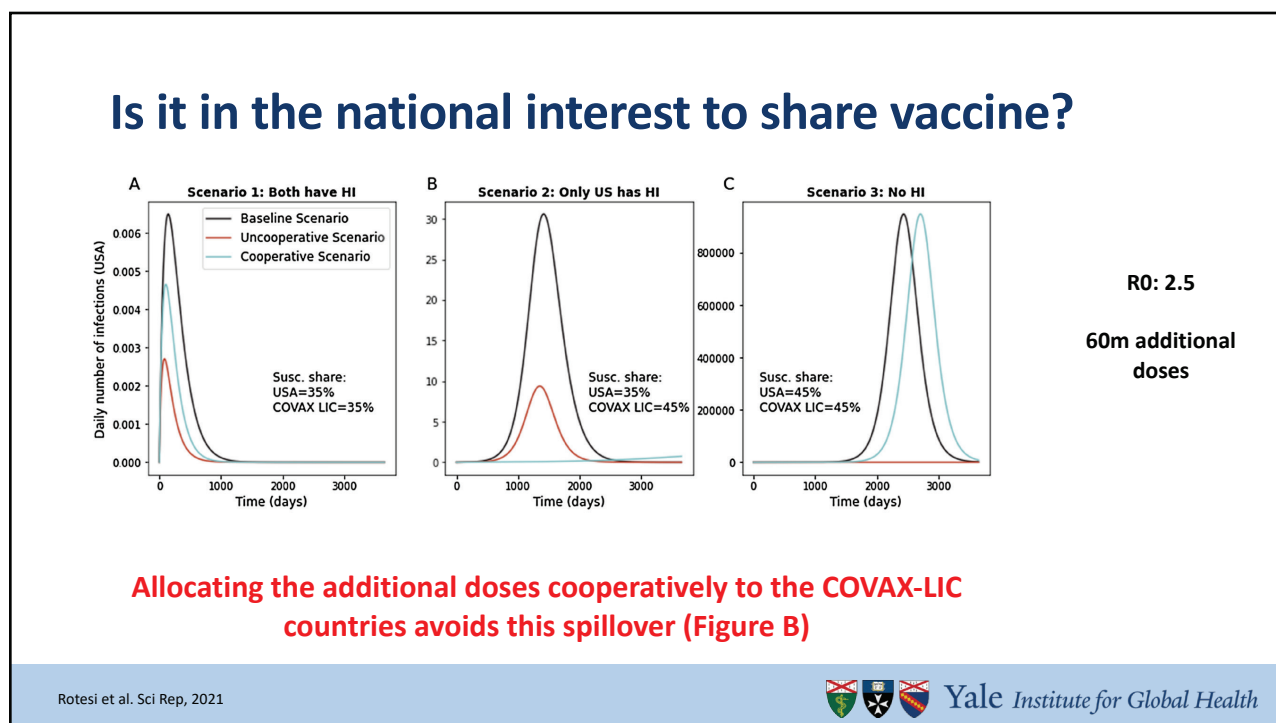
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FOREIGN AFFAIRS

The World Isn't Ready for the Next Outbreak

The Case for a Pandemic Trust Fund

By **Andrew C. Heinrich and Saad B. Omer** September 6, 2021



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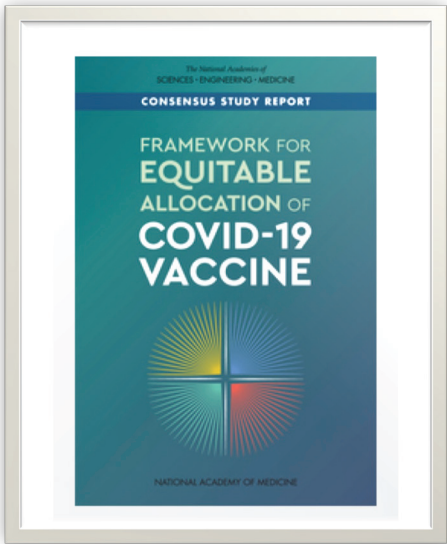
Science, Ethics, and Policy

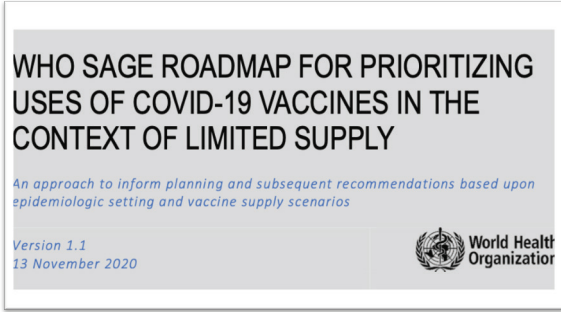
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Who to vaccinate first? A peek at decision-making in a pandemic

Ruth Faden, Alejandro Cravioto, Joachim Hombach, David C. Kaslow, Sonali Kochar, Hanna Nohynek, Annelies Wilder-Smith, Mathew A. Crane & Saad B. Omer



Faced with the challenge of advising the World Health Organization on who should be the first to receive COVID-19 vaccines, an advisory group used an approach it hadn't tried before.

36 Faden et al. Nature, 2022


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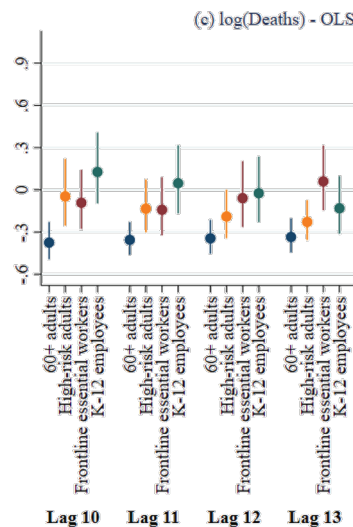
Rationale for a Morality First Strategy



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Risk-based vs. Age-based Covid Vaccine Prioritization



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Novel Surveillance

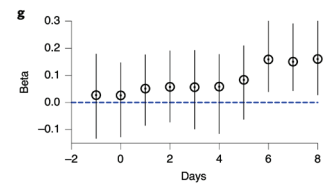
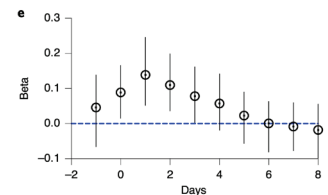
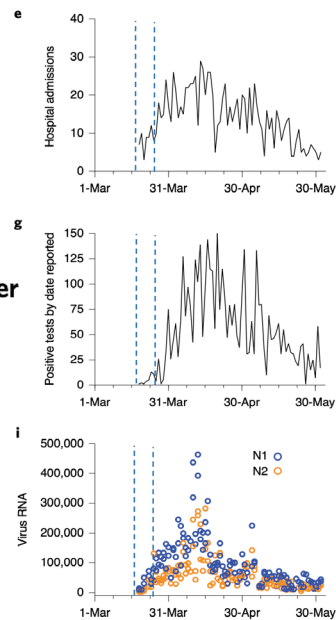
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nature
biotechnology

Measurement of SARS-CoV-2 RNA in wastewater tracks community infection dynamics

Jordan Peccia^{1,10,12}, Alessandro Zulli^{1,10}, Doug E. Brackney^{2,10}, Nathan D. Grubaugh¹, Edward H. Kaplan^{1,4,5}, Arnau Casanovas-Massana³, Albert I. Ko¹, Aryn A. Malik^{4,7}, Dennis Wang⁴, Mike Wang⁴, Joshua L. Warren⁸, Daniel M. Weinberger³, Wyatt Arnold¹ and Saad B. Omer^{3,4,12} 



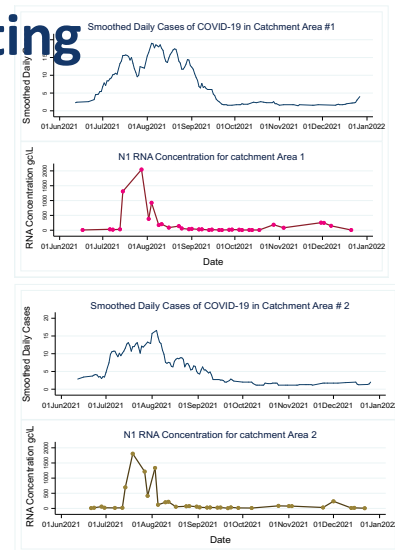
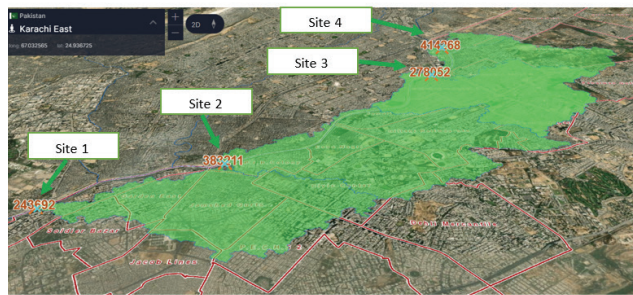
e, Daily lags of 1–4 d are associated with hospitalization. **g,** Daily lags of sludge virus RNA data at longer time lags (6–8 d in the past) best correlate with the time series of publicly reported positive tests.

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Untreated Wastewater Testing

In Karachi



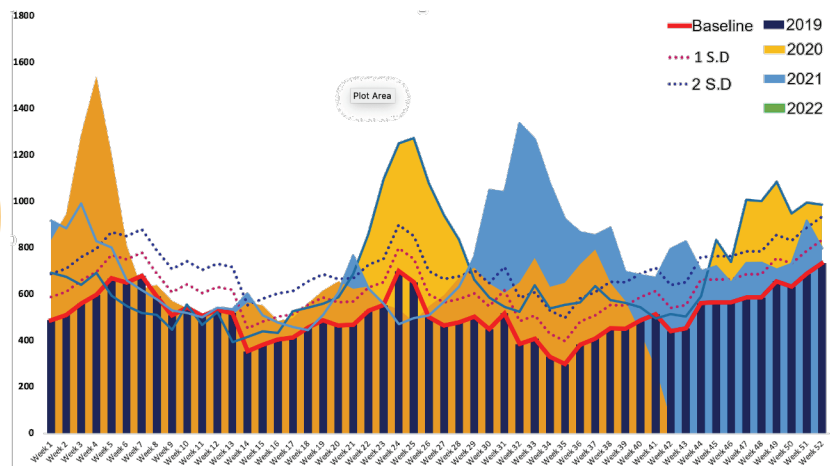
41 AKU

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Graveyard Surveillance for Estimating Excess Mortality

Karachi, January 2019 – October 2022



42 AKU

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People Value their Values

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Chandrashekar et al. Nature, 2006

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Moral Foundations Theory



Care / Harm



Fairness / Cheating



Loyalty / Betrayal



Authority / Subversion



Purity / Degradation



Liberty / Oppression

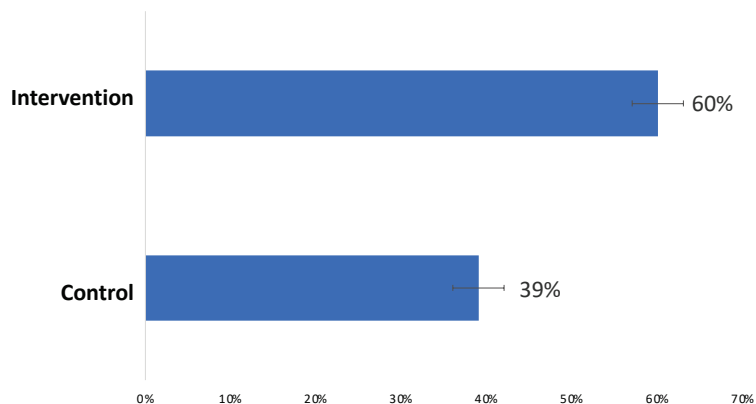
45 Haidt 2012



45

Purity violation & Vaccination intentions

Results from a randomized controlled trial



Those in the intervention group were **2.6 times more likely** to get the HPV vaccine in the next 6 months compared to the control group

Adjusted Odds Ratio: 2.6
95% Confidence Interval: 1.6-4.1

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Intervention

UNICEF post shown to intervention group

"It is important to vaccinate your children following the schedule to keep them **free from disgusting diseases like measles.**"



Es importante vacunar a tus hijos/as según el calendario, para mantenerlos libres de enfermedades desagradables como la polio y el sarampión.

unicef
for every child

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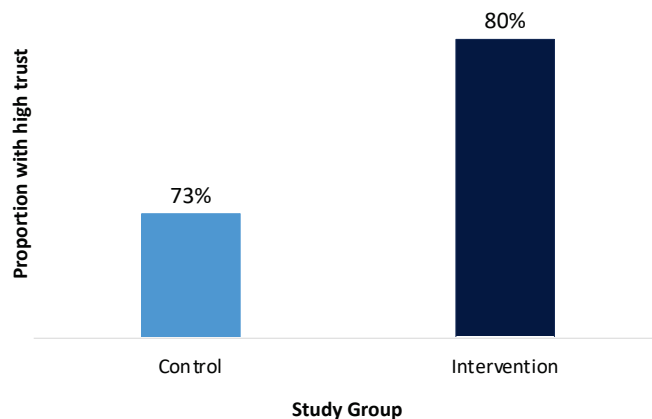


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Overall Effect of Intervention

Compared between control and intervention groups



Significantly more people in the intervention group scored high on the Vaccine Trust Indicator compared to the control group

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Outbreak Science Should be Consequentialist

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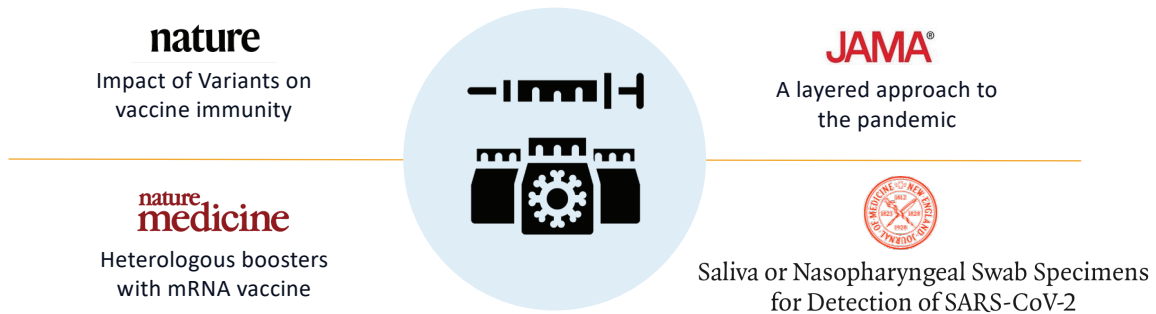
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Examples of Interdisciplinary Research



51 Lucas et al. 2021; Peña-Hernández. 2021; Lucas et al. 2022; Omer et al. 2022; Wyllie et al. NEJM, 2020



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An (Incomplete) List of Lessons

- 1 Don't take compliance for granted
- 2 Invest early in behavioral research
- 3 Virtual media, real consequences
- 4 Global engagement: enlightened self interest
- 5 Connect to people's values
- 6 Investments in novel surveillance
- 7 Facilitate collaborative research
- 8 Ethical considerations should be baked into decision-making
- 9 Vaccine acceptance interventions based on rigorous evidence
- 10 Policy innovations in the inter-outbreak period

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Thank You!