

Researchers recommend future pandemic responses account for ethnicity, social factors

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A vaccination clinic at Iowa State University, May 2021. Credit: Christopher Gannon/Iowa State University

Findings from a disease model developed by a research team at Iowa State University may help public health officials evaluate and improve

strategies for the next pandemic.

Nearly two years ago, the U.S. Centers for Disease Control and Prevention released its recommendations for a phased COVID-19 [vaccine rollout](#). The agency prioritized groups based on occupation, age, living condition and high-risk medical conditions in an effort to protect the vulnerable and reduce deaths.

But Claus Kadelka, assistant professor of mathematics and lead author of a new paper in the *Journal of Theoretical Biology*, says future pandemic responses should also consider ethnicity and social contact patterns that affect disease dynamics.

"Many researchers in this field focus primarily on age. Who should get the vaccine first: [older people](#) who are the most vulnerable or [younger people](#) who have more contacts and can more easily spread the disease? Not considering other social dimensions when developing a [vaccination strategy](#) can lead to different or wrong predictions about the best way to prevent deaths," said Kadelka.

The researchers point to multiple studies showing that people of color have been disproportionately affected by COVID-19. The infection rate in predominately Black counties in the U.S. was three times higher than predominately white counties in 2020, and the Navajo Nation had more cases per capita than any state in the country.

One reason for the disparity, they explain, is that people of color are more likely to work in public-facing and high-contact jobs (e.g., [transportation services](#), [grocery stores](#), meat packing facilities), which do not easily allow for physical distancing and remote work. People of color are also more likely to live in higher-density or multi-generational housing where it's harder to quarantine and prevent the spread of the virus.

Using data from the CDC, U.S. Census Bureau and U.S. Bureau of Labor, the researchers applied a model they developed last year and incorporated different contact rates and occupational hazards by age and ethnicity. They then utilized the Iowa State supercomputer to analyze 2.9 million different vaccination strategies to identify those that achieved specific goals, such as minimizing infections or deaths from COVID-19.

Specific findings

"Our first big take-away from the study is that 'ethnic homophily,' the concept that people tend to interact more frequently with people from the same demographic group, matters," said Kadelka. "The best strategy that included ethnicity prevented more deaths than the best strategy without ethnicity."

Kadelka said the second big finding is less intuitive.

"When trying to minimize the number of deaths, it is best to get the vaccine to the oldest people of color first, because they are at immediate risk, followed by working-age non-Hispanic whites and non-Hispanic Asians with high-contact jobs, so they stop spreading the virus through the community."

As to whether the optimal vaccine strategy in the model would have had the same effect in the real world, Kadelka said it's hard to know because many social and disease characteristics, like detailed contact patterns and factors affecting susceptibility to infection, are still poorly understood. But he hopes the study will spur more research in the intersection of epidemiology and sociology.

The ISU researchers emphasized that prioritizing COVID-19 vaccine access based on ethnicity is not a theoretical concept. Two states, Montana and Vermont, opened [vaccine](#) eligibility to people of color

before the general public in the spring of 2021.

They also cited a study that found three dozen states set aside some of their allotted vaccines for certain residents and communities based on disadvantages in income, education and housing.

Disease models, like the one Kadelka's team developed and are continuing to work on, may help [public health officials](#) improve strategies when vaccines are in limited supply.

More information: Claus Kadelka et al, Ethnic homophily affects vaccine prioritization strategies, *Journal of Theoretical Biology* (2022). DOI: [10.1016/j.jtbi.2022.111295](https://doi.org/10.1016/j.jtbi.2022.111295)

Provided by Iowa State University

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