Disparities, high proportion of past COVID-19 infections among adults and children in Santa Ana

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In a large-scale, population-based surveillance conducted in partnership with the City of Santa Ana, researchers at the University of California,

Irvine's Program in Public Health found 27% positivity of SARS-CoV-2 antibodies among participating Santa Ana residents. This unique study was one of the first to examine household transmission of COVID-19 and to include a pediatric population (ages 5+).

The results of this study, conducted during the 2020-2021 winter surge as part of the city's Santa Ana CARES COVID-19 response efforts, were more than twice the prevalence of SARS-CoV-2 antibodies as that of a county-wide study, dubbed "actOC," conducted by UCI Public Health researchers in summer 2020 (12%). Both studies highlight the disparities in infection across racial/ethnic groups in one of the largest counties in the U.S.

In addition to finding a greater prevalence of COVID-19 antibodies among adults (28%) and children (26%) than previously expected, the Santa Ana study found disparities in previous infection across racial/ethnic groups including Hispanics (29%), Asians (15%), Whites (12%), and other non-Hispanics (6%). The county-wide actOC study had previously found that Hispanic participants were nearly 50% more likely to test positive for SARS-CoV-2 antibodies.

These findings may help researchers make predictions and public health administrators and city officials to make policy preparations as the virus continues to mutate into increasingly transmissible variants, vaccine uptake slows in Orange County, and schools manage the return of students to in-person instruction.

"We know that COVID-19 is a disease of disparities, and this research illustrates the disproportionate impact of this devastating disease in areas of high density and those with larger concentrations of essential workers," said Bernadette Boden-Albala, MPH, DrPH, principal investigator of the study, director of UCI's Program in Public Health, and founding dean of the campus' future School of Population and

Public Health. "With these findings, public health and city officials will be better able to address the ongoing impacts of COVID-19 as well as future risks to the community's health and well-being."

In communities such as Santa Ana, which is one of the most diverse and densely populated cities in Orange County, it is critical that investigations into the spread of COVID-19 aim to understand patterns of race-ethnic disparities, which raise the question of what social, biological, and environmental factors—also known as the social determinants of health—influence the spread of disease.

"After the pandemic began, it quickly became clear that our residents were being disproportionately affected because of where they work, the size of their households and other factors," Santa Ana Mayor Vicente Sarmiento said. "This study has helped shine a light on just how great that disparity is and how urgent it is that we vaccinate our community against COVID-19."

Informing public health strategies

The study was made possible through funds from the federal CARES Act received by the City of Santa Ana and approved by the Santa Ana City Council. Results will enable leaders across the county to identify key demographics at higher risk of contracting COVID-19 and could help develop more effective public health strategies, such as:

- Equitable vaccine distribution policies that prioritize those who have the highest likelihood of transmission and infection,
- Consideration of essential workers and other individuals who can't work from home and the impacts of disease transmission within their own households,
- Community-based interventions that address ongoing vaccine

hesitancy, including within communities with higher prevalence of infection, and
- Partnerships with local organizations and community health workers who are the appropriate individuals to present culturally organized information on the importance of infection mitigation efforts, vaccine campaigns and other health-related topics.

An equity-driven process

To recruit a truly representative sample of Santa Ana residents, the study enrolled around 3,200 people randomly selected from 54 census blocks and contacted via U.S. mail, door-to-door outreach, social media marketing and the deployment of bilingual community health workers. These efforts were conducted in partnership with community organization Latino Health Access.

Three schools—Santa Ana High School, Valley High School and Saddleback High School—and Centennial Park served as drive-through testing sites staffed by community health workers hired by UCI Public Health. Surveys were conducted in English, Spanish and Vietnamese. Blood samples were collected via finger pinprick and analyzed using technology developed by the Vaccine Research and Development Center on campus. Individual results were mailed within 2-3 weeks of the test site visit.

In addition to racial/ethnic disparities, findings also showed disparities across zip codes with 92701, 92703, and 92704 containing the highest prevalence of previous infection. Among adults with COVID-19 antibodies, nearly one-third worked outside the home and one-third did not work—a finding that highlights the increased occupational risk for essential workers who can't work from home and the likelihood that their household members are also at higher risk for infection.

Potential impact

Few studies have examined the impacts of COVID-19 and social determinants of health, specifically in a Hispanic population. Orange County, with its racial/ethnic diversity and large income gap, serves as a prime example of why it's so important to look at the spread of disease at the community level to better allocate resources and implement effective policies. Santa Ana, the county's second largest city with a 77% Hispanic population, disproportionately bore the burden of COVID-19.

"Some of our work early in the local epidemic suggested that Hispanic or Latino folks were more likely to be exposed to the virus, and that cases were clustering in zip codes in Santa Ana," said Daniel Parker, Ph.D., assistant professor of public health and researcher on the study. "This project allowed us to really zoom our focus in on communities in Santa Ana to try to tease out what was going on with transmission in these settings. Were these patterns a result of geographic clustering of essential workers in Santa Ana? Or was there also a lot of within-household transmission going on in this setting?"

This study is the first of its size to examine transmission of COVID-19 in children ages 5 and older in a majority Hispanic community in which many residents worked in sectors deemed "essential" during stay-at-home orders.

While there is still much to learn about COVID-19, including how long antibodies last, findings from this study play an important role in informing community-driven programs and policies. Community-based efforts are needed to boost vaccine rates and reduce hesitancy, especially those operating through the lens of health equity.

Results were published in *Scientific Reports*.

More information: Tim A. Bruckner et al, Estimated seroprevalence of SARS-CoV-2 antibodies among adults in Orange County, California, *Scientific Reports* (2021). DOI: 10.1038/s41598-021-82662-x