Insight into how often COVID-19 spreads through households

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A new study published in the *Clinical Infectious Diseases* journal demonstrates how quickly COVID-19 can spread through a household, and provides insight into how and why communities of color have

suffered disproportionately from the pandemic.

The observational study, conducted between April and October of 2020, followed 100 COVID-positive patients around the Raleigh, NC area and included a total of 208 additional household members. A household member was defined as someone who was staying in the same living space as the person who tested positive. Researchers tested other household members with PCR nasal swabs weekly for three weeks following the initial COVID case, or by a seroconversion antibody test at the fourth week. Excluding 73 household members who already tested positive for COVID when researchers got to their home, the secondary attack rate among household contacts was 32 percent.

"We think this number is actually much higher," said Jessica Lin, MD, the study's senior author and assistant professor in the UNC Department of Medicine, Division of Infectious Diseases at the UNC School of Medicine. "Sometimes we were getting to households to test people four or five days after the initial COVID-positive person showed symptoms. By that time a lot of household members were already infected. But because that infection happened before we got there, we couldn't include it in our data."

This study also took place before the more infectious Delta variant was widely circulating in the U.S., leading Lin to believe the current secondary attack rate in households is significantly higher.

The majority of secondary cases occurred within the first week of the initial positive COVID test. Researchers found that these secondary cases shared a similar nasopharyngeal viral load, or the amount of virus a person had in their nose and throat.

"This means the viral load of the index case matters," Lin said. "A higher viral load means it's more likely that there will be secondary transmission

in a household, and viral load is also an indication of how sick a person could get from the virus."

The study also looked at living density—the concentration of people living within a household—as a factor that determined whether COVID spread to other household members. Of the participants enrolled in the study, 44 percent identified as Hispanic or non-white. Researchers found that minority households were more likely to experience a higher living density, and had a higher risk of secondary infection that white households.

"It's very difficult to follow public health guidelines in some living situations," Lin said. "If you have multiple people and generations sharing common areas or bedrooms, or say you are a single parent, it becomes nearly impossible to isolate or even physical distance."

Lin says these findings all come back to one key message—vaccinations. The more people in a household that are vaccinated, the less likely the chance that secondary COVID infections occur. Even if one person is vaccinated, it helps, especially if the vaccinated person happens to be the first infection in a household. A person who has been vaccinated will most likely have a lower viral load, which will make it harder for the virus to infect other household members.

"Household transmission really is the main place where most people are getting COVID," Lin said. "It's spreading from their family and friends, people that are in their bubble and they feel safe with. When you get vaccinated, you aren't just protecting yourself, you're protecting those important people around you."

More information: Carla Cerami et al, Household transmission of SARS-CoV-2 in the United States: living density, viral load, and disproportionate impact on communities of color, *Clinical Infectious*

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