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Phase II results of Co-Immunity Project show higher-than-expected rates of exposure to novel coronavirus in Jefferson County

Study finds 4-6 times higher rates of exposure to the virus than previously detected

LOUISVILLE, Ky. – Results from the second phase of the University of Louisville’s groundbreaking project to track COVID-19 in Jefferson County show that 4 to 6 times more people than previously reported may have been exposed to the virus since the beginning of the pandemic.

From June 10-19, researchers conducting Phase II of the [Co-Immunity Project](#) tested members of the Louisville community for both the presence of the novel coronavirus in the participant’s nasal passages and for antibodies against the virus in their blood. Samples were collected at five community drive-up locations across Louisville by UofL Health and researchers from the [University of Louisville’s Christina Lee Brown Envirome Institute](#). Samples were analyzed by UofL’s Center for Predictive Medicine for Biodefense and Emerging Infectious Disease (CPM) in its Regional Biocontainment Laboratory (RBL).

To obtain a representative sample for the study, households in Jefferson County were organized into geographic regions based on U.S. Census Bureau tract boundaries. Households within each region were sent invitations to participate in proportion to the population of that region. Within the regions, areas that had higher concentrations of non-White residents were sampled at a higher rate to increase their representation.

Invitations were mailed to a total of 18,232 addresses. Based on the ages and sexes of all adults in the household as provided by those responding to the invitation, one adult from each household was asked to provide a sample.

The researchers tested 509 people who responded to the mailed invitations. An additional 1,728 community members booked appointments on their own and were tested after hearing about the study in the news or on social media. Many individuals who were invited to participate did not book an appointment. The researchers believe this may have been due to widespread protests occurring at that time in the city.

Of the 2,237 individuals who were tested, 10 percent were non-White. The ages of tested individuals was as follows:

- 21 percent between 18-34
- 40 percent between 35-59
- 40 percent age 60 or older

Residential locations of the 2,237 participants are shown in Map 1 (see below). Overall, nearly 0.4 percent of the population of Jefferson County was sampled.

Analysis of the study data found that at least 0.05 percent of the participants had an active infection during the time of the study and approximately 4 percent (5.1 to 3.2 percent) of people had detectable levels of antibodies in their blood, indicating they had been exposed to the virus earlier in the year.

“These results allow us, for the first time, to more accurately estimate the spread of coronavirus within our community. If we extrapolate the results from this study to the general population, it would suggest that as many as 20,000 people may have been exposed to the virus – many more than the 3,813 cases reported in the city by the end of June,” said Aruni Bhatnagar, Ph.D., director of the Brown Envirome Institute.

This difference may be due to the fact that people did not have symptoms and were not aware they were infected.

“We were told by several participants that they believed they had COVID-19 before testing was widely available. Nonetheless, our preliminary data suggest that the estimated number of people who have had COVID-19 may be 4-6 times higher than those who have tested positive to-date,” said Rachel Keith, Ph.D., assistant professor of environmental medicine at UofL who conducted the study. “This suggests that the virus is much more widespread in our community than previously estimated. I believe this indicates a need for continued and widespread testing, including antibody testing, which plays an important role in understanding the spread of disease.”

“The random sampling of the population also allows us to calculate the true mortality associated with COVID-19,” Bhatnagar said. “Previous estimates of COVID-19-related mortality have varied from 0.5 to 15 percent. However, given that the city had reported 209 deaths by the end of June, our results suggest that the rate of mortality associated with the virus, at least in Kentucky, may be 1.3 percent. This is significantly higher than the 0.65 percent rate suggested by the CDC. Our research suggests that many who are infected with the virus nationwide have not been tested and that there is urgent need to continue random testing so that we can calculate the most accurate mortality rate,” Bhatnagar said.

The study data also provide an estimate of the spread of the infection in Louisville.

“Because participants were drawn from all parts of the city, we could estimate which areas have had the highest rates of infection,” Keith said. “Although we are still analyzing all our data, our early results show that the highest cluster of individuals exposed to the virus is in Western Louisville. (See Map 2, below). We found that the prevalence of exposure was twice as high in non-White participants as in White participants. Most (54 percent) of those who tested positive for the antibody were between the ages of 35-59 years old,” she said.

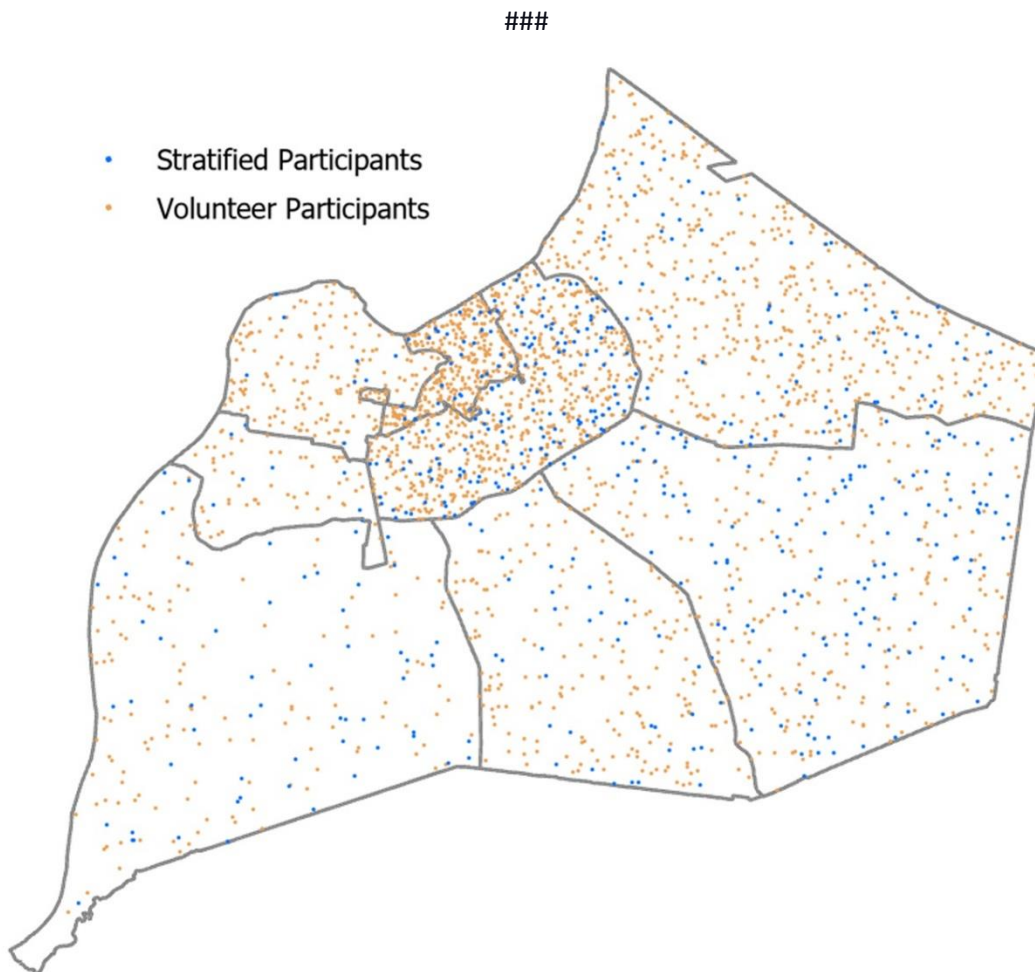
The researchers cautioned that because so little is known about SARS-CoV-2 and because the rates of community infection and exposure are changing rapidly, the results of this survey are applicable only to the period of June 10-19.

“Although many individuals had detectable levels, the amount of antibodies in blood varied greatly among the participants,” said Kenneth Palmer, Ph.D., director of the CPM. “As a result, we are not sure to what extent they are protected from re-infection. Indeed, some of our early results show that the

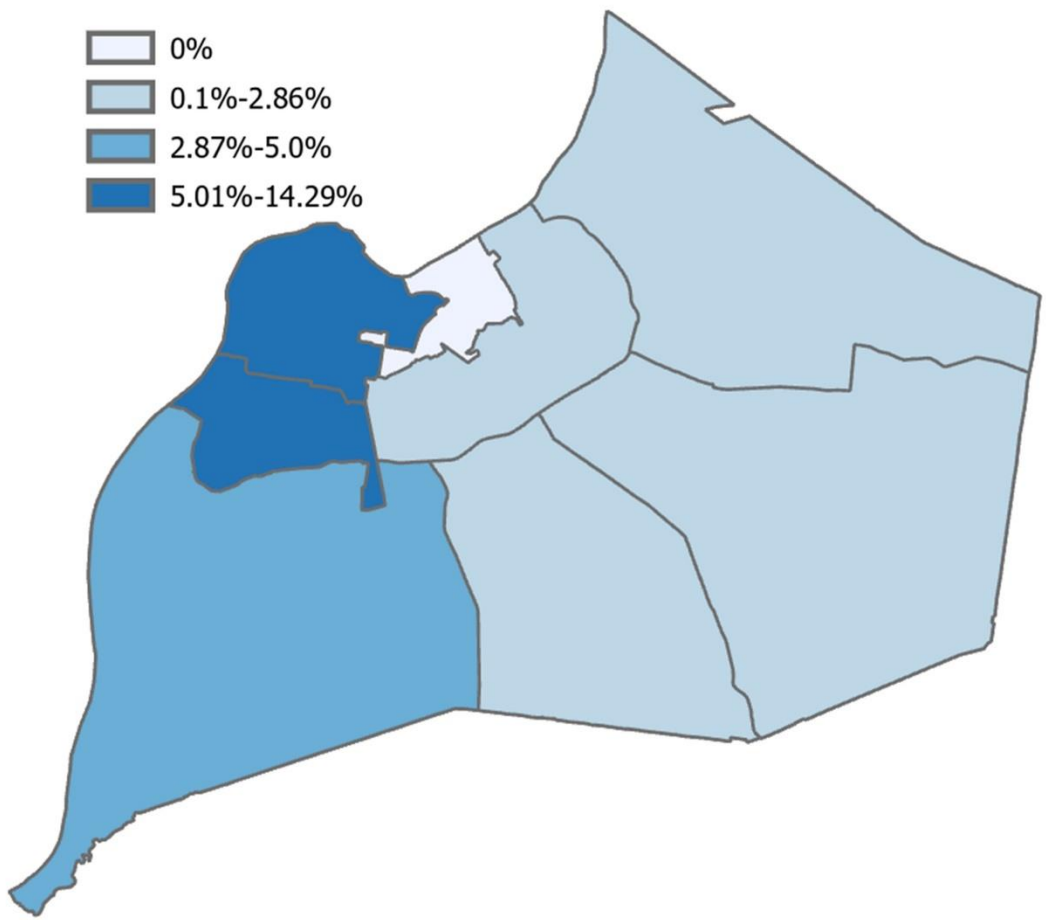
levels of antibodies decline rapidly within a month. Therefore, we are planning to re-measure individuals who had antibodies in their blood to see if those levels are maintained over time and if so, for how long.”

Currently, the researchers are repeating the antibody test in those health care workers who were found to have anti-SARS-CoV-2 antibodies during [Phase I of the Co-Immunity Project](#). They also plan to repeat community-wide testing in Jefferson County in September.

This study was supported in part by the James Graham Brown Foundation. The Co-Immunity Project is a collaboration of the UofL Christina Lee Brown Envirome Institute, the Louisville Healthcare CEO Council and three health systems in Louisville – Baptist Health, Norton Healthcare and UofL Health.



Map 1: Residential location of individuals tested for SAR-CoV-2 infection. Blue dots are participants who responded to mailed invitations (stratified), orange dots are individuals who self-volunteered for testing.



Map 2: Prevalence of COVID-19 in Jefferson County in June 2020.