

# Letters

## RESEARCH LETTER

### Seroprevalence of SARS-CoV-2-Specific Antibodies Among Adults in Los Angeles County, California, on April 10-11, 2020

Inadequate knowledge about the extent of the coronavirus disease 2019 (COVID-19) epidemic challenges public health response and planning. Most reports of confirmed cases rely on polymerase chain reaction-based testing of symptomatic patients.<sup>1</sup> These estimates of confirmed cases miss individuals who have recovered from infection, with mild or no symptoms, and individuals with symptoms who have not been tested due to limited availability of tests.

We conducted serologic tests in a community sample to estimate cumulative incidence of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection, as serologic tests identify both active and past infections.

**Methods** | This study was approved by the Los Angeles County Department of Public Health Institutional Review Board, and written informed consent was obtained.

We tested for SARS-CoV-2-specific antibodies using a lateral flow immunoassay test (Premier Biotech). Residents of Los Angeles County, California, within a 15-mile (24 km) radius of the testing site were eligible for participation. Participants were offered testing at 6 study sites on April 10 and April 11, 2020; those unable to come to the testing sites were offered in-home testing on April 13 and April 14, 2020.

We used a proprietary database representative of the county maintained by LRW Group, a market research firm, to select participants. A random sample of these residents was invited, with quotas for enrollment for subgroups based on age, sex, race, and ethnicity distribution of Los Angeles County residents. Participation was restricted to 1 adult per household. Each test was read by at least 2 study staff members.

We used these data to estimate the population prevalence of SARS-CoV-2 antibodies. The unweighted and weighted proportions of positive tests (either IgM or IgG) in the analysis sample were calculated. Because the sample differed on demographics and income distribution from Los Angeles County, weights were calculated to match the 2018 census on sex, race/ethnicity, and income. We then adjusted the weighted and unweighted proportion of positive results for accuracy of the test. Estimates of the sensitivity (82.7%; 95% CI, 76.0%-88.4%) and

Table. Unweighted Characteristics of Study Participants and Proportion With IgM or IgG for SARS-CoV-2

Characteristics	Sample size	Proportion of sample, % (95% CI) <sup>a</sup>	No. positive	Unweighted proportion positive for IgM or IgG, % (95% CI) <sup>a</sup>
Entire sample	863	100	35	4.06 (2.84-5.60)
Sex				
Male	347	40.21 (36.92-43.57)	18	5.18 (3.10-8.07)
Female	514	59.56 (56.19-62.85)	17	3.31 (1.94-5.24)
Nonbinary	2	0.23 (0.02-0.83)	0	0
Age, y				
18-34	191	22.13 (19.40-25.05)	6	3.14 (1.16-6.71)
35-54	475	55.04 (51.65-58.39)	21	4.42 (2.75-6.68)
≥55	197	22.83 (20.06-25.78)	8	4.06 (1.77-7.84)
Race/ethnicity <sup>b</sup>				
Hispanic	190	22.01 (19.29-24.93)	4	2.10 (0.58-5.30)
White (non-Hispanic)	497	57.58 (54.21-60.91)	22	4.42 (2.79-6.62)
Black (non-Hispanic)	72	8.34 (6.58-10.39)	5	6.94 (2.29-15.46)
Other	104	12.05 (9.95-14.41)	4	3.85 (1.06-9.55)
Income				
<\$50 000	175	20.28 (17.64-23.11)	9	5.14 (2.38-9.54)
\$50 000-\$99 999	253	29.31 (26.29-32.47)	4	1.58 (0.43-4.00)
≥\$100 000	367	42.52 (39.2-45.90)	18	4.90 (2.93-7.64)
Missing data	68	7.88 (6.17-9.88)	4	5.88 (1.62-14.38)
Symptoms in previous 2 mo				
Fever with cough	113	13.09 (10.91-15.52)	10	8.85 (4.32-15.67)
Fever with shortness of breath	79	9.15 (7.31-11.28)	8	10.13 (4.47-18.98)
Loss of sense of smell or taste	55	6.37 (4.83-8.21)	7	12.73 (5.27-24.48)

Abbreviation: SARS-CoV-2, severe acute respiratory syndrome coronavirus 2.

<sup>a</sup> Confidence intervals estimated using exact binomial distribution.

<sup>b</sup> Race/ethnicity options were defined by the investigators and were included because infection rates might vary by race/ethnicity.

specificity (99.5%; 95% CI, 99.2%-99.7%) of the test kits were obtained from 16 different samples.<sup>2</sup> 95% Confidence intervals for unweighted data were estimated using exact binomial models and for weighted and adjusted estimates using bootstrap methods. We used Stata version 16 for the analysis.

**Results** | Of 1952 individuals invited to participate in antibody testing, 1702 (87.2%) provided consent and 865 (50.9%) were tested. Those not tested could not schedule testing or did not appear. Two test results were inconclusive due to faulty test kits and were removed from the analysis sample. Of 863 adults included, 60% were women, 55% were aged 35 to 54 years old, 58% were white, and 43% had yearly household incomes greater than \$100 000. Thirteen percent reported fever with cough, 9% fever with shortness of breath, and 6% loss of smell or taste (Table).

Thirty-five individuals (4.06% [exact binomial CI, 2.84%-5.60%]) tested positive. The fraction that tested positive varied by race/ethnicity, sex, and income (Table). The weighted proportion of participants who tested positive was 4.31% (bootstrap CI, 2.59%-6.24%). After adjusting for test sensitivity and specificity, the unweighted and weighted prevalence of SARS-CoV-2 antibodies was 4.34% (bootstrap CI, 2.76%-6.07%) and 4.65% (bootstrap CI, 2.52%-7.07%), respectively.

**Discussion** | In this community seroprevalence study in Los Angeles County, the prevalence of antibodies to SARS-CoV-2 was 4.65%. The estimate implies that approximately 367 000 adults had SARS-CoV-2 antibodies, which is substantially greater than the 8430 cumulative number of confirmed infections in the county on April 10.<sup>3</sup> Therefore, fatality rates based on confirmed cases may be higher than rates based on number of infections. In addition, contact tracing methods to limit the spread of infection will face considerable challenges.

This study has limitations. Selection bias is likely. The estimated prevalence may be biased due to nonresponse or that symptomatic persons may have been more likely to participate. Prevalence estimates could change with new information on the accuracy of test kits used. Also, the study was limited to 1 county. Serologic testing in other locations is warranted to track the progress of the epidemic.

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