Temporal Variations in Seroprevalence of Severe Acute Respiratory Syndrome Coronavirus 2 Infections by Race and Ethnicity in Arkansas

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Background. The aim of this study was to estimate severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection rates in the small rural state of Arkansas, using SARS-CoV-2 antibody prevalence as an indicator of infection.

Methods. We collected residual serum samples from adult outpatients seen at hospitals or clinics in Arkansas for non–corona-virus disease 2019 (COVID-19)–related reasons. A total of 5804 samples were identified over 3 time periods: 15 August–5 September 2020 (time period 1), 12 September–24 October 2020 (time period 2), and 7 November–19 December 2020 (time period 3).

Results. The age-, sex-, race-, and ethnicity-standardized SARS-CoV-2 seroprevalence during each period, from 2.6% in time period 1 to 4.1% in time period 2 and 7.4% in time period 3. No statistically significant difference in seroprevalence was found based on age, sex, or residence (urban vs rural). However, we found higher seroprevalence rates in each time period for Hispanics (17.6%, 20.6%, and 23.4%, respectively) and non-Hispanic Blacks (4.8%, 5.4%, and 8.9%, respectively) relative to non-Hispanic Whites (1.1%, 2.6%, and 5.5%, respectively).

Conclusions. Our data imply that the number of Arkansas residents infected with SARS-CoV-2 rose steadily from 2.6% in August to 7.4% in December 2020. There was no statistical difference in seroprevalence between rural and urban locales. Hispanics and Blacks had higher rates of SARS-CoV-2 antibodies than Whites, indicating that SARS-CoV-2 spread disproportionately in racial and ethnic minorities during the first year of the COVID-19 pandemic.

Keywords. antibodies; COVID-19; health disparities; SARS-CoV-2; seroprevalence; temporal variation.
seroprevalence in a convenience sample of remnant sera from subjects in urban and rural settings and across age, racial, and ethnic groups in the early stages of the pandemic from August through December 2020.

**MATERIALS AND METHODS**

**Human Specimens**
Remnant serum samples collected for routine, non–coronavirus disease 2019 (COVID-19)–related outpatient clinical laboratory tests were obtained from the University of Arkansas for Medical Sciences (UAMS) in Little Rock, Arkansas; family medicine clinics in Springdale, Fort Smith, and Pine Bluff, Arkansas; and the Arkansas Department of Health (ADH) with locations across the state. These locations were selected to provide broad geographic coverage across the state. Many of the ADH samples were obtained for evaluation of sexually transmitted infections, while the hospital/regional clinic samples had a multitude of reasons for collection. Every serum sample obtained from an ADH site and sent to the central laboratory in Little Rock was procured for this study during the appropriate time period listed below. Samples were collected across 3 time periods: 15 August–5 September 2020 (time period 1), 12 September–24 October 2020 (time period 2), and 7 November–19 December 2020 (time period 3). Time period 1 was used as a proof of concept and was shorter in duration than time periods 2 or 3. These time periods were chosen to provide ample time to obtain sample numbers and give a broad sampling across the state.

**Patient Consent Statement**
The study was reviewed and approved by the UAMS Institutional Review Board (IRB numbers 261232 and 260916) as an exempt study with waivers for consent and the Health Insurance Portability and Accountability Act of 1996 (HIPAA).

**Patient Inclusion and Exclusion Criteria**
Inclusion criteria for serum collection were age ≥18 years, Arkansas residency, and a specimen collected at one of the study sites. Samples were excluded with the following diagnosis codes: immunodeficiency (primary immunodeficiency [D80–D89], transplant recipient [all codes beginning with Z94], and cancer [C00–D49]). Samples from patients receiving chemotherapy (prior 2 months), steroids (prior 30 days), and/or intravenous immunoglobulin (prior 6 months) were also excluded. These criteria were meant to exclude potential false-positive serological testing or testing those patients with immunosuppression.

**Data Collection and Storage**
At UAMS, electronic health record data contained within the Arkansas Central Data Repository were examined by an honest broker according to the study inclusion criteria to identify study samples. A similar procedure was followed for ADH samples. Remnant samples were defined as clinical samples requiring no additional testing 5–7 days after a clinical visit. Remnant samples have been widely used for studies in special populations [17–19], such as premature infants where extensive blood sampling is a safety concern, or in resource-constrained environments. All samples were stored at 4°C until shipment to the research laboratory. All clinical and demographic variables were stored in a protected REDCap database [20, 21] and included patient age, sex, race, ethnicity, ZIP code, and county of residence. Urban vs rural determination was made by cross-referencing patient zip codes with the Federal Office of Rural Health Policy’s data files identifying nonmetropolitan counties and rural census tracts [22].

**Laboratory Methods**
SARS-CoV-2 antibody positivity was determined using a 2-step process, consistent with the US Centers for Disease Control and Prevention (CDC) guidelines [23]. Serum was inactivated at 56°C for 1 hour prior to testing. All sera were tested for SARS-CoV-2 receptor-binding domain immunoglobulin G (IgG) antibodies using the Beckman Coulter Access SARS-CoV-2 IgG (Brea, California) in the Clinical Laboratory at UAMS. The Access SARS-CoV-2 IgG assay in the UAMS Clinical Laboratory had a positive percent agreement of 74%, 94%, and 100% with reference samples collected 0–7, 8–14, and ≥15 days, respectively, after a positive SARS-CoV-2 reverse-transcription polymerase chain reaction (PCR) test. The negative percent agreement was 100% for samples collected prior to the SARS-CoV-2 pandemic.

Confirmation of specimens that scored as reactive by the Access SARS-CoV-2 IgG assay was performed using a 4-antigen confirmation test enzyme-linked immunosorbent assay (ELISA) as described previously [24]. An additional 5% of negative sera were randomly selected and tested in parallel. Approximately 44 samples in duplicate were tested on each run to diminish intrarun variability. To decrease interrun variability, negative pre–COVID-19 samples and samples with known positive SARS-CoV-2 antibodies were included in each ELISA.

**Statistical Analyses**
The prevalence of SARS-CoV-2 antibodies in the sample was reported with 95% confidence intervals (CIs) obtained using exact binomial distributions. Age-, sex-, and race/ethnicity-standardized prevalence rates were calculated using 2019 US Census Bureau Arkansas state adult population estimates [25]. Separate univariable and multivariable logistic regressions were employed to determine associations between variables and SARS-CoV-2 antibody positivity for each time period.

The significance of a monotone trend of the positivity to SARS-CoV-2 was tested by the Cochran-Armitage method. A multivariable logistic regression using the backward selection algorithm was employed to test the trend effect of race/ethnicity by the time period, starting with main effects and 2-way
interaction terms, and in each step retaining only the factors showing significant associations ($P < .2$). The final model included sex, race/ethnicity, sample collection site, time period, and the 2-way interaction terms: time period with race/ethnicity and time period with the site.

Because the outcome rate was <10%, a bias-reducing penalized likelihood optimization was applied for all of the logistic regression fittings [26]. Goodness-of-fit was examined by the deviance test results, which did not indicate model-fitting concerns. Statistical significance was set at .05. All analyses were conducted using SAS (version 9.4) and graphics were created using R (version 4.0.2) and ArcGIS Pro (version 2.7.3).

### RESULTS

#### Cohort Characteristics

Table 1 provides the demographic characteristics for each time period. We collected 1301 serum samples in time period 1, 2098 in time period 2, and 2405 in time period 3, for a total of 5804 samples. In terms of age distribution, the age groups 40–49 years and ≥70 years had the smallest number of samples (834 [14.4%] and 839 [14.5%], respectively), and the age group 18–29 years comprised the highest number of samples (1225 [21.1%]). The age distribution was generally consistent across each collection period, with a mean age of 47.8 years for time period 1, 48.6 years for time period 2, and 47.2 for time period 3. More

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**Table 1. Demographics of Sampled Populations in Arkansas Over 3 Collection Periods, August–December 2020**

| Characteristic | Time Period 1 (n = 1301) | Time Period 2 (n = 2098) | Time Period 3 (n = 2405) | Total (N = 5804) | Arkansas (n = 2,282,191) |
|---------------|--------------------------|--------------------------|--------------------------|-----------------|-------------------------|
| Age group     |                          |                          |                          |                 |                          |
| 18-29 y       | 257 (19.8)               | 406 (19.4)               | 562 (23.4)               | 1225 (21.1)     | 471,866 (20.7)           |
| 30-39 y       | 244 (18.8)               | 394 (18.8)               | 428 (17.8)               | 1066 (18.4)     | 377,230 (16.5)           |
| 40-49 y       | 205 (15.8)               | 294 (14.0)               | 335 (13.9)               | 834 (14.4)      | 355,760 (15.6)           |
| 50-59 y       | 211 (16.2)               | 335 (16.0)               | 358 (14.9)               | 904 (15.6)      | 373,048 (16.3)           |
| 60-69 y       | 209 (16.1)               | 349 (16.6)               | 377 (15.7)               | 935 (16.1)      | 349,101 (15.3)           |
| ≥70 y         | 175 (13.5)               | 319 (15.2)               | 345 (14.4)               | 839 (14.5)      | 355,186 (15.6)           |
| Missing       | 0                        | 1                        | 0                        | 1               |                         |
| Sex           |                          |                          |                          |                 |                          |
| Female        | 898 (69.3)               | 1430 (68.2)              | 1661 (69.1)              | 3989 (68.8)     | 1,176,416 (51.5)         |
| Male          | 398 (30.7)               | 668 (31.8)               | 742 (30.9)               | 1808 (31.2)     | 1,105,775 (48.5)         |
| Missing       | 5                        | 0                        | 2                        | 7               |                         |
| Race/ethnicity|                          |                          |                          |                 |                          |
| White         | 565 (45.7)               | 937 (47.6)               | 1120 (47.0)              | 2622 (46.9)     | 1,733,824 (76.0)         |
| Black         | 558 (45.2)               | 831 (42.2)               | 1026 (43.1)              | 2415 (43.2)     | 341,540 (15.0)           |
| Hispanic      | 74 (6.0)                 | 126 (6.4)                | 137 (5.8)                | 337 (6.0)       | 144,447 (6.3)            |
| Other         | 39 (3.2)                 | 75 (3.8)                 | 99 (4.2)                 | 213 (3.8)       | 62,380 (2.7)             |
| Missing       | 65                       | 129                      | 23                       | 217             |                         |
| Area          |                          |                          |                          |                 |                          |
| Urban         | 1126 (86.8)              | 1838 (87.6)              | 1990 (82.8)              | 4954 (85.4)     | 1,816,489 (60.4)*        |
| Rural         | 171 (13.2)               | 260 (12.4)               | 413 (17.2)               | 844 (14.6)      | 1,189,468 (39.6)*        |
| Missing       | 4                        | 0                        | 2                        | 6               |                         |
| Collection site|                        |                          |                          |                 |                          |
| UAMS          | 981 (75.4)               | 1338 (63.8)              | 1485 (61.8)              | 3804 (65.5)     |                         |
| Pine Bluff    | 266 (20.5)               | 403 (19.2)               | 319 (13.3)               | 988 (17.0)      |                         |
| Fort Smith    |                           | 206 (9.8)                | 131 (5.5)                | 337 (6.0)       |                         |
| Springdale    | 54 (4.2)                 | 151 (7.2)                | 220 (9.2)                | 425 (7.3)       |                         |
| ADH           |                           |                          | 250 (10.4)               | 250 (4.3)       |                         |
| SARS-CoV-2 test performed |         |                          |                          |                 |                          |
| Yes           | 139 (11.4)               | 271 (12.9)               | 437 (20.3)               | 847 (15.5)      |                         |
| No            | 1078 (88.6)              | 1827 (87.1)              | 1717 (79.7)              | 4622 (84.5)     |                         |
| Missing       | 84                       | 0                        | 251                      | 335             |                         |
| SARS-CoV-2 test result |       |                          |                          |                 |                          |
| Positive      | 12 (9.1)                 | 17 (6.3)                 | 8 (8.3)                  | 37 (7.4)        |                         |
| Negative      | 120 (90.9)               | 253 (93.7)               | 89 (91.8)                | 462 (92.6)      |                         |
| Missing       | 1169                     | 1828                     | 2308                     | 5305            |                         |

Data are presented as No. (%) unless otherwise indicated.

Abbreviations: ADH, Arkansas Department of Health; SARS-CoV-2, severe acute respiratory syndrome coronavirus 2; UAMS, University of Arkansas for Medical Sciences.

*Missing data are not included in the analysis for a variable.

The Arkansas rural/urban population is total population (N = 3,005,957) rather than adults only.
specimens were collected from females (n = 3989 [68.8%]) than from males (n = 1808 [31.2%]). The racial and ethnic distribution of the study population was 46.9% non-Hispanic White (n = 2622), 43.2% non-Hispanic Black (n = 2415), and 6.0% Hispanic (n = 337). A total of 213 specimens (3.8%) were collected from patients who did not identify as White, Black, or Hispanic. Most specimens were collected from patients living in urban areas (n = 4954 [85.4%]) compared to rural areas (n = 844 [14.6%]). Samples were obtained from 74 of 75 counties in the state (Supplementary Figure 1).

Extrapolated Seroprevalence Estimates

The observed seroprevalence rates were 3.8%, 4.9%, and 8.1% for time periods 1, 2, and 3, respectively (Supplementary Table 1). After standardizing by age, sex, and race/ethnicity for the Arkansas general population, the seroprevalence rate for time period 1 was 2.6% (95% CI, 1.7%–3.5%), 4.1% (95% CI, 3.1%–5.1%) for time period 2, and 7.4% (95% CI, 6.0%–8.7%) for time period 3 (Figure 1A).

Demographic Differences in Seroprevalence

The percentage of Hispanic patients with SARS-CoV-2 antibodies was substantially higher in all 3 time periods compared to White patients (time period 1, 17.6% vs 1.1%; time period 2, 20.6% vs 2.6%; time period 3, 23.4% vs 5.5%) (Supplementary Table 1, Figure 1B). A similar trend was observed for Black patients compared to White patients (time period 1, 4.8% vs 1.1%; time period 2, 5.4% vs 2.6%; time period 3, 8.9% vs 5.5%). Consistent with the increased percentages of SARS-CoV-2 seropositivity in Hispanic and Black patients, the adjusted odds ratios (ORs) comparing the racial and ethnic groups also were statistically significant (Table 2).

Over the course of the study, we observed a consistent increase in seroprevalence, including seroprevalence by racial/ethnic group. During all time periods, Blacks and Hispanics were more likely to be seropositive when adjusted for other variables (Table 3). However, a logistic regression fitting model showed that the increasing slope of seroprevalence by time period for Hispanics was significantly lower compared to the slope for Whites (OR, 0.49 [95% CI, .3–.78]) (Supplementary Table 2). Thus, although the positivity to SARS-CoV-2 was higher in Hispanics compared to Whites, the additive infection rate to Hispanics was smaller than to Whites over the time course of the study. The same finding was observed for Blacks, but there was not a statistical difference for Blacks compared to Whites (OR, 0.75 [95% CI, .5–1.12]) (Supplementary Table 2).

We observed a statistically significant association with positive antibody tests for 2 age groups in 2 separate time periods (Supplementary Table 1). In time period 1, individuals aged 18–29 years were more likely to have antibodies than those aged ≥70 years (OR, 3.59 [95% CI, 1.12–11.52]). Individuals aged 30–39 years were more likely to have antibodies than those aged ≥70 years age group in time period 2 (crude OR, 2.17 [95% CI, 1.08–4.36]) and time period 3 (crude OR, 1.85 [95% CI, 1.00–3.06]). However, no difference in the likelihood of testing positive for SARS-CoV-2 antibodies was observed for any age group when the data was adjusted by age, sex, and area (Table 2). Together, these data indicate that age did not affect the likelihood of testing positive for SARS-CoV-2 antibodies in our study. Similarly, there was no statistically significant association between sex or area of residence (rural vs urban) and having SARS-CoV-2 antibodies during any time period.

Figure 1. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) seropositivity rate. A, Age-, sex-, race-, and ethnicity-adjusted seroprevalence rates are shown for each time period. B, The percentage of samples with positive SARS-CoV-2 antibody tests is shown for each race/ethnicity group for each time period. Error bars indicate the 95% confidence interval.
Table 2. Adjusted Association With Severe Acute Respiratory Syndrome Coronavirus 2 Antibody Positivity by Time Period

| Effect                      | Time Period 1 (n = 1301) |               | Time Period 2 (n = 2098) |               | Time Period 3 (n = 2405) |               |
|-----------------------------|--------------------------|---------------|--------------------------|---------------|--------------------------|---------------|
|                             | OR (95% CI) | P Value*    | OR (95% CI) | P Value*    | OR (95% CI) | P Value*    |
| Age, y                      | .4392            | .6390        | .8960          | .8960        | .8960          | .8960        |
| 18–29 vs ≥70                | 2.04 (.62–6.65) | .109 (.51–2.3) | 1.09 (.51–2.3) | .114 (.64–2.04) | 1.66 (.83–3.42) | 1.29 (.71–2.31) |
| 30–39 vs ≥70                | 1.84 (.55–6.14) | .166 (.83–3.42) | 1.13 (.51–2.54) | .095 (.51–1.79) | 1.17 (.53–2.58) | .119 (.65–2.17) |
| 40–49 vs ≥70                | 1.08 (.28–4.16) | .260 (.51–2.58) | 1.37 (.64–2.62) | .074 (.37–1.62) | 1.21 (.67–2.21) |               |
| 50–59 vs ≥70                | 1.4 (.38–5.14)  | .14 (.65–2.17) | 1.1 (.51–2.17) | .095 (.51–1.79) | 1.19 (.65–2.17) |               |
| 60–69 vs ≥70                | 0.71 (.16–3.09) | .121 (.67–2.21) | 1.05 (.51–2.17) | .095 (.51–1.79) | 1.21 (.67–2.21) |               |
| Sex                         | .3658            | .9875        | .1131          | .1131        | .1131          | .1131        |
| Female vs male              | 1.39 (.68–2.83) | .63 (.56–1.06) | 1. (0.56–1.06) | .77 (.56–1.06) | .77 (.56–1.06) | .77 (.56–1.06) |
| Race/ethnicity              | .3658            | .9875        | .1131          | .1131        | .1131          | .1131        |
| Black vs White              | 3.9 (1.66–9.19)  | .14 (.64–2.04) | 1.93 (1.14–3.26) | .095 (.51–1.79) | 2.03 (1.41–2.92) | .0009        |
| Hispanic vs White           | 15.06 (5.59–40.6) | .1131        | 9.83 (5.32–18.14) | .095 (.51–1.79) | 4.42 (2.71–7.23) | .0009        |
| Others vs White             | 0.91 (.05–15.63) | .8960        | 2.55 (.98–6.65) | .095 (.51–1.79) | 1.43 (.64–3.17) | .095 (.51–1.79) |
| Area                        | .5473            | .8258        | .1481          | .1481        | .1481          | .1481        |
| Urban vs rural              | 0.75 (3–19)     | .73 (.47–1.12) | 0.73 (.47–1.12) | .73 (.47–1.12) | .73 (.47–1.12) | .73 (.47–1.12) |
| Collection site             | .5701            | .4906        | .0001          | .0001        | .0001          | .0001        |
| Pine Bluff vs U AMS         | 1.49 (.71–3.14) | .14 (.64–2.04) | 1.49 (.71–3.14) | .14 (.64–2.04) | 1.49 (.71–3.14) | .14 (.64–2.04) |
| Fort Smith vs U AMS         | 0.85 (.41–1.79) | .37 (.19–0.75) | 0.85 (.41–1.79) | .37 (.19–0.75) | 0.85 (.41–1.79) | .37 (.19–0.75) |
| Springdale vs U AMS         | 0.89 (.21–3.78) | .73 (.47–1.12) | 0.89 (.21–3.78) | .73 (.47–1.12) | 0.89 (.21–3.78) | .73 (.47–1.12) |
| ADH vs U AMS                | ...              | ...          | ...            | ...          | ...            | ...          |

Bold text indicates a statistically significant difference in antibody positivity between the indicated groups. Abbreviations: ADH, Arkansas Department of Health; CI, confidence interval; OR, odds ratio; UAMS, University of Arkansas for Medical Sciences.

*P value indicates whether the positivity differs between the category of a respective variable.

DISCUSSION

Our study using remnant samples found that the SARS-CoV-2 seroprevalence rate in Arkansas increased from 2.6% to 7.4% from August to December 2020. During the last week of the study, the raw seroprevalence rate approached 14%. The seroprevalence we observed is consistent with both reported infections and data from American Red Cross blood donations in southern US states [27] and the CDC Multi-State Assessment of SARS-CoV-2 Seroprevalence (MASS-C) [5]. The American Red Cross blood study found only 2.9% seroprevalence from August to September in southern states, while the MASS-C data revealed 9.2% seroprevalence in December in Arkansas. It should be noted that these earlier studies had no [28] or low [5] representation from Arkansas.

For comparison, ADH reported a total of 213 267 confirmed or suspected SARS-CoV-2 infections as of 25 December...
2020—roughly equivalent to 7% of the Arkansas population. Based on these numbers, our sampling potentially detected asymptomatic and untested people who were previously infected with SARS-CoV-2 in the state. Taken together, the data support the conclusion that more Arkansans had been infected with SARS-CoV-2 than previously recognized. The low seroprevalence rate in combination with slow vaccine uptake despite rapid distribution of vaccinations across the state left many people vulnerable to SARS-CoV-2 infection with variants of concern. In fact, in the spring of 2021, Arkansas experienced an uptick in cases due to the Delta variant, causing the state to rank as one of the worst for number of cases per 100 000 people during that time [29, 30].

We found higher seroprevalence of SARS-CoV-2 antibodies in Hispanics and Blacks compared to Whites throughout the study. Our data align with an earlier report that examined samples obtained from the American Red Cross for PCR testing across the US (4.11% African American, 4.35% Hispanic, and 1.65% White) [27]. In fact, CDC data from our state also noted higher rates of PCR-positive tests in Hispanics and Blacks early during our study. According to CDC data of PCR testing from the August 2020 to December 2020 time period, Hispanics had 600 incident cases per 100 000 that dropped to 388 incident cases per 100 000, while Blacks had 238 incident cases per 100 000 that increased to 385 incident cases per 100 000. In comparison, Whites had 69 incident cases per 100 000, which increased to 308 incident cases per 100 000. These numbers are consistent with our seroprevalence findings within these groups. While any attempt to explain the observed racial/ethnic disparities would be speculative, the data are consistent with a broader theme highlighting the need to understand biologic, social, and demographic factors that impact health in under-represented minority populations.

The temporal trend of the data showed that the increase in infection rates in Whites was more than that of Hispanics or Blacks during the same time period. Hispanics and Blacks in our state were noted to have higher rates of PCR-positive tests early in the course of the time periods. Ultimately, the rates of Hispanics and Blacks who had positive PCR tests leveled over the course of our study, as shown in the previous paragraph, which explains the lower ORs and change in effect size associated with these groups.

Contrary to our expectations, SARS-CoV-2 spread uniformly across urban and rural areas of Arkansas. This finding differs from reports from the northeastern and northwestern US, and in southern cities such as Houston and New Orleans [31, 32]. However, it is worth noting that Arkansas was home to a rural super-spreader event in March 2020 [33]. These data suggest that those in rural areas of the state are just as likely to have been infected with SARS-CoV-2 as those in urban population centers.

The benefits and limitations of convenience sampling techniques have been discussed elsewhere [13]. The limitations include but are not limited to (1) the variable entry of cases from participating sites; (2) the nonrandom nature of sampling; and (3) the association of sampling with preexisting health-seeking behavior. More specific to this study, we were limited by the higher proportion of urban individuals compared to rural individuals and the higher proportion of females and Blacks compared to the Arkansas population.
(Table 1). It is also possible that our sampling method could favor subjects who were more ill (eg, individuals who were hospitalized) or more willing to leave their homes (eg, individuals who were evaluated in clinics). Therefore, these data do not portend representativeness of the state; rather, the data only provide the seroprevalence within this specific population. Another limitation of this study was disparate participation from some sites across the 3 time periods of the study. For example, some sites did not provide samples until time period 3. To address this limitation, logistic regressions were fitted for each time period separately and the site factor was included as an adjusted effect (Table 2). While these 2 sites (Fort Smith and ADH; Table 3) had higher odds of infection (OR, 3.37 and 1.75, respectively; Table 2), the number of samples contributed from these sites was much less than the other 3 sites, minimizing this bias.

CONCLUSIONS

Seroprevalence studies play a critical role in defining the scope of the SARS-CoV-2 pandemic. In a state with a large rural populace, our serologic analysis of remnant samples demonstrates that SARS-CoV-2 infection was more widespread than reflected by acute testing. Additionally, Hispanics and Blacks had disproportionately higher rates of SARS-CoV-2 infections. This study highlights the need to understand factors that impact health in underrepresented minority populations and the contributory role of seroprevalence in understanding the SARS-CoV-2 pandemic.

Supplementary Data

Supplementary materials are available at Open Forum Infectious Diseases online. Consisting of data provided by the authors to benefit the reader, the posted materials are not copyedited and are the sole responsibility of the authors, so questions or comments should be addressed to the corresponding author.

Notes

Author contributions. Study concept and design: K. W. B., J. C. F., J. L. K., L. J., B. A., M. W., W. N. N., V. M. C., J. S. Acquisition, analysis, or interpretation of the data: K. W. B., J. C. F., S. O., J. L. K., M. K., R. M., C. P., S. G. Y., H. H., E. O., C. K., Z. M., K. C., D. B. Draft of the manuscript: K. W. B., J. C. F., J. L. K., S. O. Critical revision of the manuscript for important intellectual content: K. W. B., J. C. F., L. J., K., J. L. K., S. O. Obtained funding: K. W. B., J. C. F., L. J., J. L. K. Administrative, technical, or material support: J. L. K., K. W. B., J. C. F. Authors J. L. K., J. C. F., and K. W. B. had full access to the data in the study and take responsibility for the integrity of the data and the accuracy of the analysis.

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